



GEF 7 AFRICA MINIGRIDS PROGRAM COMPILATION OF CHILD PROJECT CONCEPTS

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GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: GEF AFRICA MINIGRID PROGRAM Other Program

Child Project Title:	Regional Project for the GEF Africa Minigrid Program
Countries:	Angola, Burkina Faso, Comoros, Djibouti, Ethiopia, Eswatini, Madagascar, Malawi, Nigeria, Somalia, Sudan
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity	UNDP, Rocky Mountain Institute
Project Duration	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEF TF	3,000,900	54,730,000
Total Project Cost		3,000,900	54,730,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting African countries to increase energy access by reducing the cost and increasing commercial viability of low-carbon minigrids.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1 - Knowledge Tools	TA	The latest developments and good practice in minigrids as they relate to cost-reduction are captured and made available to program stakeholders, organized across the program's three thematic areas (policies, private sector, financing), leveraging existing partner minigrid programs where possible	<p><i>1.1 Various tools (policy packages; financial models; template contracts; template tender documents; template legal documents; guidelines on system design) to support cost reduction in National Child Projects</i></p> <p><i>1.2 Reports, in-depth case studies, and insight briefs that codify and synthesize cost-reduction good practices</i></p> <p><i>1.3 Cost-reduction training materials for the community of practice for National Child Projects, and for a broader set of stakeholders</i></p>	GEF TF	1,208,000	23,223,500

Component 2— Tailored Technical Assistance to National Minigrid Project Implementation	TA	Child project countries benefit from rapidly-deployable technical expertise on minigrid cost-reduction and associated business models, tailored to each country's context, organized across across the program's three thematic areas (policies, private sector, financing)	<p><i>2.1. A roster of leading technical experts (consultants, program partner staff) are selected, and made available to countries on demand, providing rapidly-deployable support</i></p> <p><i>2.2. Regular tailored assessments and support (either via desk-review, video conference or travel) to countries to include operational and technical support, TOR reviews and trouble-shooting</i></p>	GEFTF	500,000	25,295,000
Component 3 - Convening, Dissemination, Tracking	TA	Increased awareness of and network opportunities in cost-reduction in the minigrid market and among stakeholders, organized across the program's three thematic areas (policies, private sector, financing) in such a way to give stakeholders an opportunity to work together in a structured way, and coordinated tracking for the program's and child projects' M&E	<p><i>3.1. A cost-reduction community of practice that includes members from national child project countries and global experts are established and convened on a semi-annual basis; learnings from the program are shared regularly with an emphasis on South-South cooperation and private sector engagement</i></p> <p><i>3.2. Cost-reduction community of practice web-platform established, webinars, conferences, blogs, media release (interviews etc.) arranged for knowledge management and communication</i></p> <p><i>3.3. A common</i></p>	GEF TF	1,150,000	4,575,000

			<i>monitoring and indicator framework (including MRV for GHGs, SDG impact, and quality assurance) is established for national child projects, support provided, and data tracked</i> <i>3.4. Annual monitoring and evaluation reports, including mid-term and terminal program evaluations for enhanced learning and tracking program impacts</i> <i>3.5. End-of-project replication / scaling-up plans, including investment plans, supported for national child projects to ensure sustainability, and to help countries integrate off-grid energy access in NDCs</i>			
Subtotal				GEF TF	2,858,000	53,093,500
Project Management Cost (PMC)				GEF TF	142,900	1,636,500
Total Project Cost					3,000,900	54,730,000

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Civil Society Organization	Dutch Postcode Lottery (via RMI)	Grant	Investment mobilized	2,600,000
Civil Society Organization	Good Energies Foundation (via RMI)	Grant	Recurrent expenditures	500,000
Civil Society Organization	IKEA Foundation (via RMI)	Grant	Recurrent expenditures	500,000
Private Sector	African Minigrid Developers Association	In-kind	Recurrent expenditures	250,000
GEF Agency	AfDB-Green Mini-grid Market Development Programme (Phase 3)	Grant, Loans	Investment mobilized	4,000,000
GEF Agency	AfDB-Sustainable Energy Fund for Africa (Technical Assistance)	Grant	Investment mobilized	11,000,000
GEF Agency	AfDB-Sustainable Energy Fund for Africa (Results Based Financing)	Loans	Investment mobilized	25,000,000
GEF Agency	UNDP	Grant	Investment	1,000,000

			mobilized	
Donor Agency	ESMAP, World Bank	Grant	Recurrent expenditures	7,500,000
Donor Agency	Carbon Trust (DFID)	Grant	Investment mobilized	2,380,000
Total Co-financing				54,730,000

Describe how any “Investment Mobilized” was identified.

The above table represents the co-financing figures at the regional project level. The PFD similarly collects co-financing figures at the national project level. At the regional level, investments mobilized were identified through stakeholder engagement with donor partners and foundations active in the minigrid sector in Africa. All of the investments will be confirmed during the PPG phase. At this stage, co-financing sources and amounts are indicative.

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEF TF	Regional	Climate change	CCM – Global Regional Set-Aside	3,000,900	270,081	3,270,981
Total GEF Resources					3,000,900	270,081	3,270,981

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☐ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved
 No ☒ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

The CEO Endorsement Request will be funded under an existing GEF-6 project, CREAC.

PROJECT’S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	321,495 (direct) 21,796,122 (consequential)
6.4	Increase in installed renewable energy capacity by technology (MW)	4.507
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	736,050 (of which 50% women)

These estimates represent the aggregate impact of the program’s national child projects, which will benefit from the support of the regional project concept.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country’s relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment

frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

840 million people - including over half of Africans - have no access to electricity, and, as a result, no access to the improved income and savings that depend on electricity.¹ Many millions more suffer from poor quality and unreliable grid-connected power, or expensive and polluting diesel generators. SDG7 (energy) is a fundamental enabler of the broader set of SDGs; electricity is an essential ingredient for lifting people out of poverty, improving health, boosting educational levels, reducing gender inequities, and enabling sustainable economic development.

In recent decades, electricity access has typically relied on a model of large, centralized power generation and extending publicly-funded grid connections. In some countries this has proved successful, in other countries the poor financial health of grid-connected power systems has held back progress. Today, innovative off-grid solutions – namely renewable energy minigrids ('minigrids') and solar home systems (often using a Pay-as-you-go (PAYG) model) – offer great potential for electricity access. The particular technology choice for electricity access – grid extension, minigrids or PAYG solar – will be determined on the basis of the least-cost solution for the particular site and scenario. Minigrids will have an important role to play: IEA geospatial analysis has shown that under a universal electricity access scenario by 2030, minigrids would be the cheapest technology for connecting 450 million people, two-thirds of whom live in sub-Saharan Africa².

This minigrid opportunity is driven by a number of converging disruptive trends: falling hardware costs (solar modules, batteries, energy efficient appliances, and modular approaches), disruptive digital technologies including mobile money, and innovative, private sector business models (new service offers, lowering customer acquisition costs). Just as mobile phones have eliminated the need to build costly landlines for communication, there is evidence that minigrids – with private sector involvement, could enable Africa to leapfrog traditional power systems that consist of large, polluting, and typically heavily-subsidized fossil-fueled power plants and expensive transmission lines.³

Unlike other off-grid energy solutions, such as most solar home systems currently on the market, minigrids have the added advantage of supporting both residential and institutional energy needs (e.g., lighting and small appliances) and productive energy uses (e.g., milling, irrigation, and light manufacturing). Minigrids can, therefore, have a positive impact on the local economy and contribute to sustainable community development; and, more importantly, they can support future energy demand growth. Minigrids also have the benefit of being able to be deployed fast at relative speed. This realization has meant that there is an increasing emphasis on developing lower cost minigrid business models in the aim to achieve universal electricity access.⁴

All participating countries have formulated medium-to-long term energy policies that cover rural electricity access as a means to poverty alleviation. While several challenges remain as discussed below, there is clear political commitment at national levels (as reflected in accompanying national child concept notes) for supporting productive end uses of renewable / low-carbon minigrids through innovative business models centered on cost reduction levers. Further, all participating countries have taken a combination of unconditional and conditional nationally determined mitigation contributions as summarized in Table 7 in the PFD.

Project Overview and Approach (maximum 1250 words)

- Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Despite the significant potential, several risks and barriers exist in most countries for renewable minigrid development and scaling up. The primary risks are summarized in Table 1. From an investor's perspective, these risks result in higher financing costs (equity and debt) and reduce the competitiveness of minigrids relative to

¹ IEA, IRENA, UNSD, WB, WHO (2019), *Tracking SDG 7: The Energy Progress Report 2019*, Washington DC

² World Economic Forum/IEA (2018): *1.1 billion people still lack electricity. This could be the solution*

³ T. Safdar (2017) *Business models for mini-grids, Technical Report 9, Smart Villages*

⁴ IRENA (2016) *Innovation Outlook: Renewable minigrids*, IRENA, T. Safdar and Brian Heap (2016) *Energy and Agriculture for Smart Villages in India*, Technical Report 7, Smart Villages

alternative sources of energy (e.g., diesel generators). All else being equal, the need for higher returns that reflect these risks translates into higher energy prices that, in turn, or require larger subsidy requirements for rural electrification programs.

Table 1. Risks and barriers to develop renewable energy minigrids

Risk Category	Underlying Barriers	Description
Energy Market Risk	Market outlook	Lack of political will and/or uncertainty regarding national/state targets for electrification and renewable energy minigrid investment, including lack of electrification plans, rural electrification agencies/institutions, and good data (geospatial) on energy demand and lowest cost technology options.
	Market access, competition and grid expansion	Lack, or limitations (suboptimal design, lack of capacity), in current government policy framework for minigrids including off-grid services areas; well-defined concessions (size, years, targets, bundling); compensation schemes in case of grid expansion.
	Tariffs	Uncertainty or inflexibility in electricity tariff regulations for minigrid developers
	Technical standards	Lack of clarity, uncertainty and/or inconsistent government technical requirements for minigrids regarding (i) quality of service and (ii) grid integration, should it occur.
	Competing subsidies	Competition from subsidized diesel and kerosene (mostly used for lighting); negative perceptions of minigrid tariffs due to subsidized grid-distributed electricity.
Social acceptance risk	Unfamiliarity with minigrids	Risk arises from lack of awareness and resistance to renewable energy and minigrids in communities, also from resistance from incumbent businesses.
Hardware risk	Availability and quality of hardware	Lack of availability of quality hardware and national quality standards for components of minigrids, and/or the lack of institutionalization of a minigrid quality assurance framework. In several countries, hardware costs are also higher than expected because of the lack of a supply chain for spare parts.
	End-of-life waste management	Risks arising from lack of policies and planning regarding disposal of hardware, including batteries, at end-of-life of mini-grids
	Customs	Cumbersome customs/clearing process for importing hardware, leading to delays in delivery; punitively high customs tariffs on minigrid hardware.
Digital risk	Networks and software availability	Lack of cellular coverage in rural area for minigrid remote monitoring and payments
Labor risk	Inadequate capacity	Lack of a competitive labor market of educated, skilled and qualified potential employees to design, construct, operate and maintain minigrids, leading to higher costs, hiring non-local staff and suboptimal performance.
Developer risk	Project development and management capacity	Minigrid business developers may not have the necessary expertise and capabilities to formulate financially viable projects and operate minigrids. Also, there is no 'one-size-fits-all' solution yet, implying that business models need to be contextualized.
	Developers' creditworthiness	Inability of developer to secure low-cost financing from investors due to lack of credit worthiness, or insufficient cash flows to meet investors' return requirements.
End-user credit risk	Lack of customer creditworthiness	Lack of end-user credit data; customers' willingness and ability to pay and methods of payment for electricity.
Financing risk	Capital scarcity	Limited availability of long-term domestic loans, well-capitalized actors and policy incentives.
	Limited experience with minigrids	Investors' lack of familiarity with minigrid projects and appropriate financing structures.
Currency risk	Local currency volatility	Currency mismatch between domestic currency revenues and hard currency financing.
Sovereign risk	Various uncertainties not specific to minigrids	Limitations and uncertainty related to conflict, political instability, economic performance, weather events/natural disaster, legal governance, ease of doing business, crime and law enforcement, land tenure and infrastructure in country.

Source: UNDP, Derisking Renewable Energy Investment: Off-Grid Electrification (2018)

Geographical location

The primary form of country participation in the program will be as national child projects. The program will initially support a first round of 11 such countries submitted for the GEF December 2019 work programme. These 11 countries are: Angola, Burkina Faso, Comoros, Djibouti, Ethiopia, Eswatini, Madagascar, Malawi, Nigeria, Somalia and Sudan. The map locating these participating countries is shown in Figure 1. Funding for national child projects has come from GEF STAR, UNDP TRAC and AFDB SEFA , as well as other co-financing sources. The opportunity of a future second round of national child projects, as well as via other modalities such as the GEF non-grant instrument modality, will also be explored.

These initial 11 countries represent a diverse cross-section of African countries: both large as well as smaller markets; Anglophone and Francophone countries; small island developing states; and countries in post-crisis contexts. This can create a rich and diverse mix of contexts, perspectives and experiences in the program.

In addition to participating as national child projects, countries in Africa will be able to participate in the program in three further ways. Under these additional categories, the regional child project will look to create a ‘docking station’ by which countries can engage with the program. This support will be subject to availability of regional child project resources, and may involve a degree of cost-sharing.

- Should there be no second round of GEF 7 national child projects, interested countries can still benefit from the program as standalone GEF-7 project.
- Existing GEF-funded minigrid projects being implemented in African countries with closure dates planned for between 2021 and 2024 as per Table 6 Annex E in the PFD – i.e. 11 in total - will be invited to participate in the program with observer status.
- A final category can come from all other interested countries. In this regard, the program can be viewed as a public good that will seek to be inclusive, open and accessible, making its knowledge tools available to all interested parties.

Figure 1. Map showing the geographical location of participating countries



Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

There are several private and development partner-supported baseline initiatives that the AMP will complement based on a robust Theory of Change (discussed below) underlined by innovative business models aimed at cost-reduction and productive energy uses. The detailed list of baseline initiatives is given in the PFD. Table 2 provides a summary of the main initiatives.

Table 2: Baseline activities

Agency/ Initiative	Description
RMI	RMI is currently supporting minigrid policy, strategy, and regulatory framework development in Nigeria and Ethiopia. It has performed research and published several widely-read reports on the minigrid market in sub-Saharan Africa. RMI has participated in and hosted several regional minigrid convening events.
UNDP	UNDP's baseline activities in minigrids are composed of its DREI framework, as well as its on-the-ground support to developing countries, including execution of GEF-financed projects
AfDB	AfDB is actively supporting minigrids via the Green Mini Grid Market Development Program, SEFA, FEL, and GCF projects, amongst others.
BOAD	BOAD is the project owner of the GCF-funded project in Mali, as well as the BOAD climate finance facility to scale up solar energy investments in Francophone West Africa. It is also the GEF implementing agency for a GEF-6 renewable energy program in Togo.
ESMAP	The ESMAP Global Facility on Mini Grids works to increase World Bank investments in mini grids while generating knowledge on the factors affecting mini grid scale-up.
GCF	The Green Climate Fund is supporting a range of climate mitigation minigrid projects across Africa. Project owners for these minigrid projects include the AfDB and BOAD, as described above.
CLUB-ER	This is a Community of Practice including rural electrification agencies and ministries from over 35 member countries in Africa, and is supported by ADEME and IFDD.
Carbon Trust	The <i>Carbon Trust</i> manages the Transforming Energy Access (<i>TEA</i>) Programme, targeting sub-Saharan Africa and South Asia, with funding from the UK Government's Department for International Development (DFID).
Innovation Lab	CrossBoundary and The Rockefeller Foundation launched the Minigrid Innovation Lab in April 2018 in Kenya that focuses exclusively on testing business model innovations in the minigrid sector aiming to accelerate sustainable rural electrification.
UNF Mini Grid Partnership	This is a voluntary partnership of leading minigrid stakeholders that seeks to accelerate the development and deployment of minigrids through the exchange of information and ideas, shaping policy and markets to unlock the potential of widespread minigrid electrification.

Stakeholder Engagement and Gender Integration

During the formulation of the program proposal, the technical team travelled to a large majority of the countries under consideration. During these fact-finding missions, the technical team met with national counterparts, UNDP Country Offices, donor partners, and private sector developers and investors. Summary findings of these analyses are reflected in Annex D in the PFD and are reflected in each national child project concept note.

Prior to CEO endorsement, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 8 of the PFD will be used to develop country-specific Gender Action Plan (GAP).

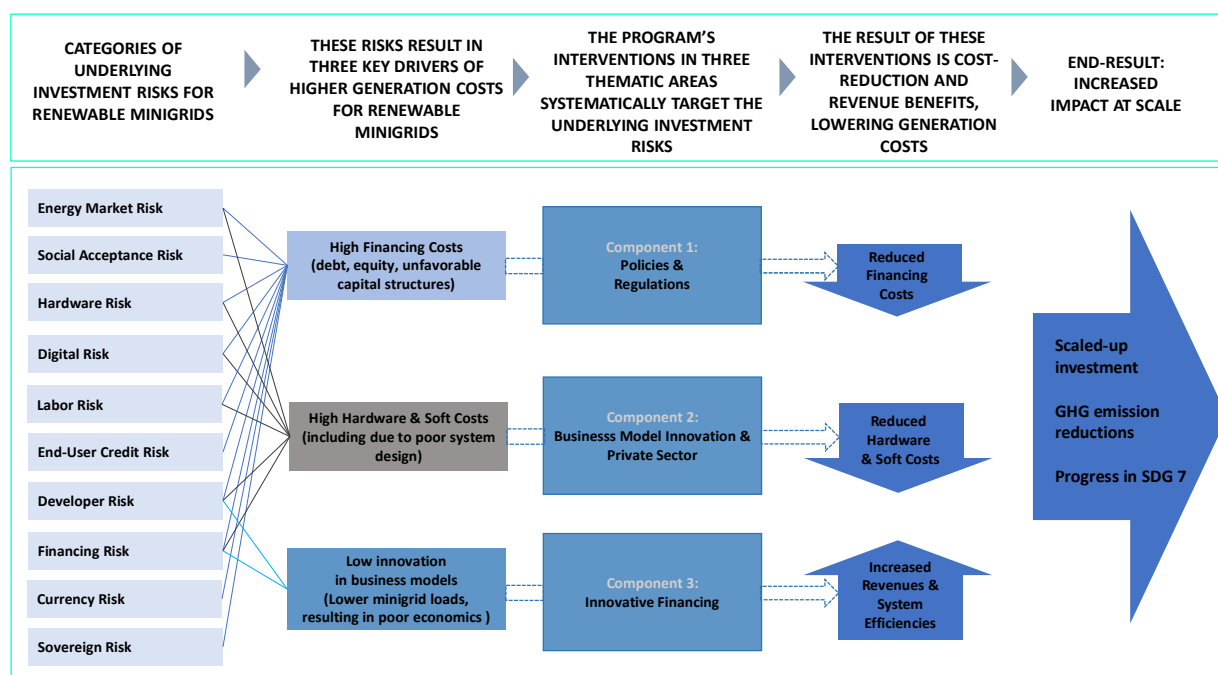
- Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The program's theory of change is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. The theory of change is that this program, by focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs for end-users.

As set out in Figure 2, a number of internal logical steps need to occur to achieve this change

- Renewable energy minigrids face a range of underlying investment risks. These are shown in Figure 2, and described earlier in Table 1.
- These underlying investment risks in turn result in three key negative drivers on renewable energy minigrids' generation costs: high financing costs, with elevated costs of equity, debt and unattractive capital structures; high hardware/soft costs, reflecting market barriers and poor system design; and lack of innovation in business models, holding back revenue growth and new sources of demand.
- In this context, the program itself has interventions organized into three key areas (components): policies and regulations; business model innovation and private sector; and innovative finance. The program's specific outputs under each of these three areas are designed to systematically target the underlying investment risks at the national level for renewable energy minigrids.
- When underlying investment risks are mitigated, this in turn inverses the earlier relationships, resulting in three key beneficial drivers for the competitiveness and financial viability of renewable energy minigrids: reduced hardware and soft costs, and increased revenues and economies of scale. Collectively these three beneficial drivers result in a virtuous cycle of lower generation costs.

Figure 2. Theory of Change diagram



- Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – **will increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids')**.

The programmatic approach aims to achieve greater impact by creating new minigrid markets across the continent, which, in aggregate, will create scale and momentum, attracting private sector interest and investment. The programmatic approach will also allow for a broader sharing of good practice, and create economies of scale in providing program services.

The program is **focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids**. With lower costs minigrids will be more financially viable, commercial capital flows will increase, and end-users will benefit from lower tariffs and expanded service.

The program has been designed to specifically address the niche of cost-reduction, and in this way be complementary to existing baseline activities supporting minigrid investment in Africa. Figure 3 sets out how the program can promote more efficient and effective use of development resources. Program partners such as AfDB and the World Bank can leverage the program’s focus on cost reduction in their own distinct activities.

Figure 3. Additionality of the GEF 7 Africa Minigrid Program



To ensure complementarity, the program’s specific activities have been selected based on detailed ‘gap analysis’ exercises at the national child project level. Via in-country missions and consultations with the private sector, development actors and government counterparts, each gap analysis systematically identifies current investment risks for minigrids, and any existing or planned public instruments (policies or financial) targeting these investment risks.

The regional project will work across the three thematic areas – (i) policy and regulations, (ii) business model innovation and private sector, and (iii) innovative finance, described in detail in the Program Framework Document.

In the PFD there are four program components, of which the first three are implemented at the participating country level. The fourth component in the PFD relates to outcomes and outputs that are expected at the regional program level, and which constitute the focus of the Regional Child Project. This component will support the implementation of all the components and outcomes planned in each child country project. The Regional Child Project, therefore, has three functional components as:

- Component 1: Knowledge Tools

This component will **develop and share knowledge products** that provide guidance and share good practice regarding minigrid cost-reduction. Development of tools will be demand-driven, based on surveys of stakeholder needs. Emphasis will be placed on accessible, user-friendly tools that can be applicable in a wide-range of contexts. Activities may include collecting and analyzing good practices around minigrid cost-reduction in a variety of regulatory environments, research and develop tools (e.g., policy packages, template tender documents, and guidelines) on productive use program designs to reduce cost. These tools will be made widely available and used in multiple markets. This will draw from and build on RMI and UNDP’s innovative research and experience in minigrids. These toolkits will support both the public sector (e.g. rural electrification agencies) and the private sector (e.g. minigrid developers) in National Child Projects and the overall minigrid market. An emphasis will be placed on market-oriented outputs, reflecting the needs of developers and investors to accelerate market growth and ensuring additionality relative to other minigrid knowledge tools.

- Component 2: Tailored Technical Assistance to National Child Project Implementation

It will also **provide tailored, hands-on, technical assistance** to support activities in National Child Projects, both at the design and implementation stages. A roster of technical minigrid experts will be made available to participating countries. These technical experts at the regional level will be rapidly deployable for either short-term or longer-term embedded support to participating countries. Early in the implementation of national child projects, the

regional project will make clear to national child projects the availability of technical experts and discuss the use of technical assistance in child project activities. Through discussion between the regional and national child projects, or by direct request, the regional project will help to scope the technical assistance. It will also support participating countries during key decisions and technical reviews at National Child Project milestones and provide actionable, strategic recommendations to National Child Projects to increase adoption of minigrid cost-reduction opportunities and innovative business models.

- Component 3: Convening, Dissemination, and Tracking

Further, this component will **support and facilitate knowledge management and information sharing** between the regional parent project and National Child Projects, within the program's community of practice, as well as broader information sharing amongst the larger minigrid community. This component will also develop a monitoring and evaluation framework against which GHG emission reductions, and broader impact on the SDGs, can be measured, and will work closely with National Child Projects to ensure operationalization and harmonization. A common M&E framework with SMART indicators will ensure that the Program is able to track progress toward its overarching objective. Several working groups organized around the program's three thematic areas (policies, private sector and financing) will be established and will convene regularly, with an emphasis on south-south cooperation, private sector engagement, and minigrid cost reduction. Particular attention will be given to private sector engagement, encouraging their active participation in working groups, in order to collect inputs for project implementation and to inform government action. The Program will also support National Child Projects carry out lessons learned studies that will be used to develop replication plans for scaling up minigrid investments in each participating country.

The regional child project is expected to generate ~2,180 ktCO_{2e} consequential emission reductions (top down) from the provision of technical support and knowledge tools to national child projects. The methodology to calculate this is set out in the PFD. This methodology will be further developed, and calculations refined, prior to CEO endorsement.

National child project budget allocations for program activities

It is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program, and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example this budget can cover costs related to:

- M&E to feed into program framework indicators
- Travel to participate in the regional child project's workshops/events
- Sharing of research and lessons learned to the regional child project
- Contributions towards the regional child projects knowledge products.

Results framework

	Objective and Outcome Indicators
Project Objective: Supporting African countries to increase energy access by reducing the cost and increasing commercial viability of low-carbon minigrids.	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access
	<u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i>
	<u>Mandatory indicator 3:</u> <i># of direct beneficiaries disaggregated by gender.</i>
Outcome 1 <i>The latest developments and good practice in minigrids as they relate to cost-reduction are captured and made available to program stakeholders, organized across the program's</i>	<i>Indicator 4: # of gender-sensitive knowledge products shared and applied (disaggregated by child project country / whether knowledge product is first-of-its kind in GEF-funded projects)</i>
	<i>Indicator 5: # of strategic partnerships developed to promote innovative minigrid business models centered on cost-</i>

<i>three thematic areas (policies, private sector, financing), leveraging existing partner minigrid programs where possible</i>	<i>reduction levers such as hardware standardization</i>
Outcome 2 <i>Child project countries benefit from rapidly-deployable technical expertise on minigrid cost-reduction and associated business models, tailored to each country's context, organized across the program's three thematic areas (policies, private sector, financing)</i>	<i>Indicator 6: # of countries making use of regional roster of high-caliber consultants</i>
	<i>Indicator 7: # of political-level interventions deployed by regional program (disaggregated by child project country)</i>
	<i>Indicator 8: # of innovative business models to promote private investments in minigrids designed and operationalized (disaggregated by child project country)</i>
	<i>Indicator 9: Investments mobilized (US\$ disaggregated by source and child project country) through the innovative financial mechanisms and business models</i>
Outcome 3 <i>Increased awareness of and network opportunities in cost-reduction in the minigrid market and among stakeholders, organized across the program's three thematic areas (policies, private sector, financing) in such a way to give stakeholders an opportunity to work together in a structured way, and coordinated tracking for the program's and child projects' M&E</i>	<i>Indicator 10: # of countries with improved enabling environment (legal and regulatory conditions (e.g. tariff regimes), hardware quality standards, cost-effective derisking instruments, minigrid market intelligence, least-cost geospatial rural electricity access mapping, harmonized customs clearance procedures) to support minigrid development</i>
	<i>Indicator 11: # National platforms (industry associations, networks, Communities of Practice) created and linked to regional platform</i> <i>Indicator 12: # of countries adopting harmonized monitoring and indicator framework (including MRV for GHGs, SDG impact, and minigrid quality assurance)</i>

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

N/A

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				(Metric tons of CO ₂ e)
		Expected metric tons of CO ₂ e (6.1+6.2)			
		PIF stage	Endorsement	MTR	TE
	Expected CO ₂ e (direct)	-			
	Expected CO ₂ e (indirect)	2,180,000			
Indicator 6.2	Emissions avoided Outside AFOLU				
		Expected metric tons of CO ₂ e			
		Expected		Achieved	
		PIF stage	Endorsement	MTR	TE
	Expected CO ₂ e (direct)	-			
	Expected CO ₂ e (indirect)	2,180,000			

	Anticipated start year of accounting	2025			
	Duration of accounting	20 years			

GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: MEDIUM-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Angola
Lead Agency	AfDB
GEF Agency(ies):	AfDB
Project Executing Entity(s):	TBD
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	0	1,000,000
Total Project Cost		0	1,000,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Angola.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1. A minigrid regulatory framework, including tariff model, tax regime, and grid expansion risk, is developed in close coordination with other development partners</p> <p>1.2. Geospatial, techno-economic modeling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)</p> <p>1.3. Institutional set-up for rural electrification assessed and supported, and institutional capacity building provided on technical, managerial, and regulatory issues</p> <p>1.4 Capacity building provided to MINEA specifically to design procurement/tender process that incorporate cost-reduction levers and</p>	GEFTF	0	172,000

			innovative business models			
Component 2— Project Preparation and competitive tender program design	TA	Pipeline of mini-grid projects identified, tendering program designed	<p>2.1. Mini-grid project sites identified and pre-feasibility studies undertaken</p> <p>2.2 Tender program designed that achieves scale and reduces project risks and thus facilitates cost reductions</p> <p>2.2. Capacity of potential developers strengthened to consider, and propose innovative business models and cost-reduction levers</p> <p>2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p>	GEFTF	0	486,000
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of low-carbon minigrids	<p>3.1 Design support, including development of operational guidance, provided for Minigrid Funding Facility (MFF, or equivalent financial mechanism) under rural electrification agencies/funds</p> <p>3.2 Feasibility study support provided to minigrid developers, creating a pipeline of investible assets</p> <p>3.3 Domestic financial sector capacity-building on business and financing models for minigrids</p>	GEFTF	0	162,000
Component 4— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	<p>4.1 Lessons learned captured and disseminated at all levels</p> <p>4.2 Replication plan (including investment plan) for scaling up rural energy access using solar minigrids developed</p> <p>4.3 Knowledge networks / Communities of Practice / industry</p>	GEFTF	0	126,000

			association strengthened to promote minigrids development			
			4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of minigrids, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTF	0	946,000
Project Management Cost (PMC)				GEFTF	0	54,000
Total Project Cost					0	1,000,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
GEF Agency	AfDB (SEFA)	Grant	Investment Mobilized	1,000,000
Total Co-financing				1,000,000

Describe how any "Investment Mobilized" was identified. Direct grant contribution by UNDP TRAC and the AfDB (SEFA resources)

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Angola	0	CC STAR Allocation	0	0	0
Total UNDP TRAC Resources					0	0	0

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☐ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☒ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

n/a

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved

targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	7,000 (direct) 1,554,041 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	28,040 (of which 51.5% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Angola, a major oil-exporting country and OPEC member, is sub-Saharan Africa's third-largest economy with a population of around 29 million; yet these figures hide strong inequalities, with 48% of the population living in multidimensional poverty⁵. To date, Angola's electrification rate is low compared to the region, reaching a third of the population (51% in urban areas, 2.2% in rural areas). The decades of civil conflict left a deteriorated and unsustainable electricity system, although recent investments are contributing to rapid changes. The generation capacity tripled over the last few years and efforts are being made to rapidly extend the transmission and distribution networks, which are still divided into 5 independent networks and a number of isolated systems. The Government of Angola targets to reach 60% electrification rate by 2025⁶ with 9.9 gigawatts (GW) of installed generation capacity. Rural electrification remains a challenge, with wide expanses of the country which are not to be covered by the grid in the medium term and for which decentralised solutions are being explored.

Angola is endowed with an extensive wealth of natural resources, including a large hydro network, high solar radiation and widespread biomass resources, offering a significant potential for clean renewable energy production⁷. Hydropower is the main generation source, accounting for 64% of the generation capacity in 2019⁸ the rest being produced from fossil sources. Renewable energy is a growing priority for Government of Angola (GoA), which targets 500 MW renewable generation by 2022 and 800 MW by 2025. To this aim, the Government of Angola has set forth three strategic goals to reach by 2025: i) Improve the access to energy services in rural areas based on renewable energies, ii) Develop the use of new renewable technologies connected to the grid and iii) Promote and accelerate public and private investments in new renewable energies.⁹ The government has electrified over 50 villages through the pilot "Solar Villages Programme", targeting public infrastructure such as schools and hospitals and the private solar off-grid market is nascent but growing. At utility-scale, 8 public hybrid solar-diesel plants of 5 MW each have been commissioned in 2018 and 380 MW of public solar projects in 6 provinces are under way. The

⁵ National Institute of Statistics of the Republic of Angola, SGS Report – Agenda 3030, 2018

⁶ USAID (2018), Angola Power Africa Fact Sheet;

https://www.usaid.gov/sites/default/files/documents/1860/Angola_-_November_2018_Country_Fact_Sheet.pdf

⁷ In 2014, mapping studies identified the potential for 55 GW solar power, 3 GW wind power, and 18 GW in hydropower throughout the country. From: Republic of Angola Ministry of Energy and Power, New Renewables Strategy.

⁸ Calculated from: Republic of Angola Ministry of Energy and Power, Energy and Water Sector Action Plan 2018-2022,

⁹ Republic of Angola Ministry of Energy and Power, New Renewables Strategy.

<http://www.angolaenergia2025.com/en/conteudo/new-renewables-strategy> - accessed 08 October 2019

country also boasts 50 MW biomass-based generation and projects for wind generation and waste-to-energy are under discussion.

The distribution utility ENDE runs 18 public isolated systems (each inferior to 5 MW) for a total capacity of 33 MW. Informal mini-grids are also widespread (mostly from diesel generation), ran by municipalities, the communal administrator, the community itself or as a private initiative (farm, business or individual).

The child project will support the objective of GoA in improving energy access while contributing to socioeconomic development fueled by productive energy uses in rural and peri-urban areas. Further, the child project will support implementation of the mitigation contributions pledged in the Nationally Determined Contribution (NDC) – i.e. a reduction of 50% emissions reduction compared to BAU by 2030¹⁰. Mitigation targets are well aligned with projected economic development that will leverage energy generation from renewable energy sources and adopt state-of-the-art rural electrification technologies.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Angola's power sector is characterized by rising power demand, dominance of thermal and hydro powered generation and significant gaps in rural electrification. The national grid only reaches about a third of the country's population and grid subsidies, particularly non-cost reflective tariffs and subsidised input prices, continue to be substantial. Demand for electricity has been growing by as much as 15% per year in recent years¹¹. Businesses and households that can afford it run their own diesel back-up generation to make up for unreliable or non-existent public electricity services. Yet more than 8 out of 10 rural households still live in energy poverty. Improving access to modern, reliable and affordable energy services is essential for Angola's economic and human development.

The diversification of the economy is at the core of the government's strategy, to decrease its heavy reliance on the oil and gas industry (representing over 90% of GDP in 2017), which made the country highly vulnerable to shocks in the international oil market and plunged the country into an economic crisis in recent years. The development of the agriculture sector is a top priority, to decrease imports, increase exports and boost the national economy. The government therefore aims at dynamizing the rural areas to retain the needed workforce for agriculture and limit the growing strain on public infrastructure in urban areas due to rural exodus. Expanding access to electricity in rural areas is fundamental to this goal, improving living standards as well as the quality of the education, health and other public services, while creating the conditions for further income generating activity, small businesses and entertainment.

Grid extension will be focused until 2025 on powering the capitals of all municipalities¹² in Angola.¹³ This is reaffirmed in the Energy Action Plan 2018-2022.¹⁴ For large areas of Angola, in particular in the East of the country, grid extension is unlikely in the medium to long-term because villages are very remote and the population density is low. Beyond the electrification of public institutions in municipal capitals, providing grid electricity to households will remain a low priority until at least 2022.¹⁵ Nevertheless, the Energy Action Plan has the ambition of increasing the electrification rate from 35% to 50% with a minimum of 20% in each province by 2022 and to an overall 60% by 2025, for which high expectations are set on decentralised solutions.

To date, there is no formal private investment in mini-grids in Angola. Informal existing micro- and mini-grids are based on private businesses' need for self-investment in energy generation (which recover part of their investment by selling the surplus energy) or social responsibility projects, but none are business-oriented. To date, the major challenge for private investors is the lack of clear regulation for mini-grids and isolated systems, in particular tariffs

¹⁰ World Bank Group (2016), Climate Policy Team. http://spappssecext.worldbank.org/sites/indc/PDF_Library/AO.pdf

¹¹ Angola Energy 2025: Power Sector Long Term Vision.

¹² Angola has three levels of administrative units: provinces, municipalities and communes. The 18 provinces are divided into 162 municipalities, which are further sub-divided into 559 communes.

¹³ Republic of Angola (2015) SE4ALL Rapid Assessment and Gap Analysis.

¹⁴ Ministry of Energy and Water (2018) Energy Action Plan 2018-2022.

¹⁵ Ministry of Energy and Water (2018).

that can be charged and conditions of a future connection to the grid in case of grid extension, which do not allow investors to design a long-term viable business plan. Lack of clear sector extension strategy, of detailed knowledge of communities' capacity and willingness to pay, as well as challenges deriving from the macro-economic environment in Angola (currency volatility, difficult access to Forex to repatriate earnings) are also key hindrances to private sector investment in MGs in Angola. The high subsidies for grid electricity and fossil fuels also represent key challenges and many mini-grid investors request rural electrification subsidies to make their investment viable. The lack of skilled personnel as well as limited payment options for end-users in rural areas are added challenges to investors' activity.

Thus, despite government commitment and progress to date, scaling up mini-grids still faces several barriers (Table 1). Currently, financing costs are high in the nascent market of renewable mini-grids in Angola. These higher financing costs reflect a range of investment risks for mini-grid developers and investors in Angola. The risks and barriers that a typical investor would face in the minigrid market are capture in the table below.¹⁶

Risk Category	Risk Description	Root Barriers Underlying the Risk in Angola
1. Energy Market Risk	Risks arising from limitations and uncertainty in the energy market regarding market outlook, access, price and competition	<ul style="list-style-type: none"> ▪ Uncertain role for renewable energy minigrids in electrification plan, and lack of publicly available medium-to-long term grid extension plans ▪ Unclear electricity tariff regulations for minigrids ▪ Lack of technical requirements for minigrids regarding quality of service and grid integration ▪ Subsidized grid tariff sets unrealistic expectations for minigrid tariffs
2. Social Acceptance Risk	Risks arising from lack of awareness and resistances to renewable energy and minigrids in communities	<ul style="list-style-type: none"> ▪ Cost-reflective tariffs practiced by private developers expected to be higher than cost of subsidized electricity
3. Hardware Risk	Risks arising from limitations in the quality and availability of minigrid hardware, as well as the customs treatment of hardware	<ul style="list-style-type: none"> ▪ No domestic suppliers of hardware (100% import market) ▪ Lack of coherent and standardized customs process for importing hardware leads to delays in delivery; customs tariffs on hardware not harmonized
4. Digital Risk	Risks arising from use of cellular networks for remote monitoring and payments; the use of software, and abuse of consumer data	<ul style="list-style-type: none"> ▪ Lack of cellular coverage in rural areas where electrification is needed ▪ Low mobile money penetration
5. Labor Risk	Risks arising from the lack of skilled and qualified potential employees	<ul style="list-style-type: none"> ▪ Lack of a competitive labor market of educated, skilled, and qualified potential employees, leading to higher costs, and suboptimal performance (this risk is dependent on the type of minigrid technology that is proposed by the investor)
6. Developer Risk	Risks arising from limitations in the minigrid operator's management capability, and its creditworthiness and cash flow	<ul style="list-style-type: none"> ▪ Lack of executive talent and experience to ensure effective execution and to manage challenges ▪ Lack of established minigrid companies that could finance, build and operate more than a couple of minigrids without international partners
7. End User Credit Risk	Risks arising from customers' willingness, ability, and methods of payment for electricity	<ul style="list-style-type: none"> ▪ Lack of public information on end-user credit worthiness: Lack of end-user credit data with which to assess the ability of end-users to pay for the initial connection fees, ongoing electricity bills and ancillary equipment (e.g., lights and appliances)
8. Financing Risk	Risks arising from scarcity of domestic investor capital (debt and equity) for minigrids, and domestic investors' lack of familiarity with minigrids and appropriate financing structures	<ul style="list-style-type: none"> ▪ Limited availability of long-term domestic loans due to high banking reserve requirements ▪ Low number of well-capitalized actors and lack of regulatory clarity on legality of new financial products ▪ Lack of information, assessment skills, and track-record for minigrid projects amongst domestic investor community; lack of network effects found in established markets; lack of

¹⁶ The barriers and risks table was generated using detailed interviews with three potential private investors in minigrids in Angola using UNDP minigrid Derisking Renewable Energy Investment (DREI) methodology.

Risk Category	Risk Description	Root Barriers Underlying the Risk in Angola
		familiarity and skills with appropriate finance structures
9. Currency Risk	Risks arising from currency mismatch between domestic currency revenues and hard currency financing	<ul style="list-style-type: none"> Government limitations on exchanging Angola Kwanza (AOA) to hard currencies High volatility in exchange rates between AOA and hard currencies
10. Sovereign Risk	Risks arising from a mix of cross-cutting political, economic, institutional and social characteristics not specific to minigrids	<ul style="list-style-type: none"> Limitations and uncertainty related to conflict, political instability and ease of doing business

Source: UNDP, Derisking Renewable Energy Investment: Off-Grid Electrification (2018)

Geographical location

The exact project locations for investments will be identified through geospatial least cost generation planning and close consultation with relevant government agencies to maximize the economic and social benefits from the mini grid systems.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

A number of donor partners are providing support to GoA for the development of the electricity sector:

- Past support includes a 1 billion USD AfDB loan for the restructuring of the energy sector, the unbundling of the power utilities and strengthening of the energy regulator. Power Africa have financed a power transmission stability analysis and JICA financed the development of the Nationwide Power Development Master Plan.
- In the transmission and distribution sectors, AfDB's Energy Sector Efficiency and Expansion Program Phase I (ESEEP I) is targeting electricity access scale up, transmission network expansion and a revenue improvement program for the sector utilities, in particular the distribution company ENDE. This project is complementary to the World Bank's Electricity Sector Improvement Project (expected 250 MUSD), which shall address electricity access expansion and improvement of revenue collection, electricity service improvement, along with capacity building for planning, operation and maintenance and for project management.
- The Norwegian cooperation, through the Norwegian Water Resources and Energy Directorate, supported the elaboration of key regulations in the distribution, transmission and commercialization of national electricity. A second phase of this support is under consideration, which, if confirmed, may target renewable energy and mini-grids.
- For grid-connected renewable energy generation, the EU financed technical assistance for the elaboration of a new template of Power Purchase Agreement (PPA) aligned with international standards and specifically adapted to the development of Renewable Energy projects in Angola. As a continuation, AfDB is supporting, through the Angola Renewable Energy Program (1 MUSD SEFA grant) the enabling environment for IPP/PPP projects for the improvement of the bankability of a pipeline of RE projects, with a specific focus on tender documents. The US is also financing technical assistance to extend international tendering practices in the country.
- In the off-grid space, UNDP is launching a GEF-financed project (3.5 MUSD) to develop a private sector-led technology value chain for solar home systems and solar lanterns, so that off-grid renewable energy technologies be made available to base-of-pyramid rural households in isolated areas. The World Bank is also planning to support GoA define its National Electrification Strategy, including a geospatial mapping of most cost-effective electrification options (grid connection, mini-grids and off-grid electrification), which shall have significant synergies with this project.

The GoA is committed to developing rural electrification and creating the conditions for the widespread implementation of mini-grids projects, as expressed in the Action Plan developed between GoA and partners during the Angola Energy Market Place, organized by AfDB in June 2019 in Abidjan, which established the following priorities:

- Establishing the Rural Electrification Institute already foreseen in the law, mandated to promote rural electrification, mobilize financial resources and oversee delivery of access solutions.
 - Initiate a rural electrification strategy to accelerate access to electricity for Angola's rural population, which should include i) an assessment of institutional options (e.g. in the forms of concessions or locally owned cooperatives); ii) financing options; and iii) a clear demarcation of grid, mini-grid and off-grid regions; iv) fiscal incentives, tax and duty exemptions.
 - Finalize and implement new policy/regulatory framework for distributed generation (below 5MW) allowing operators to sell/distribute directly to communities, charge cost-reflective tariffs, understand future grid integration and compensation options.
 - Assess potential for developing mini-grid scale-up programme. Development partners to deliver a study to assess market potential, identify policy and regulatory hurdles, explore viability gap financing needs and sketch out building blocks of scale-up programme.
- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the planned and existing baseline projects and initiatives referred to in section b will address some of the barriers outlined above, there will still be significant gaps regarding electricity access and productive uses of electricity in rural communities, in particular in the mini-grids sphere. Hence, the proposed project will complement baseline initiatives through the development of solar minigrids using private investments. The project is expected to bring about the first public-private partnerships or privately-ran mini-grid projects in Angola. These first mini-grids shall serve to demonstrate these models and pave the way for scale-up investment in mini-grids in Angola. Indeed, there is confirmed interest by other donor partners including IFC for subsequent scale-up of mini-grid tenders in Angola, once the enabling environment is in place and the success of the first mini-grid projects has been demonstrated.

For access to electricity, the incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in mini-grids in Angola. The derisking approach will unlock some of the challenges currently impeding private investment in minigrids and reduce financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking mini-grid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will squarely support implementation of the Energy and Water Sector Action Plan within the National Development Plan 2018-2022 as well as the medium term Angola Energy 2025 policy and the NDCs of Angola.

The project will generate ~7 ktCO_{2e} direct lifetime emission reductions and ~1,554 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the project inception phase.

Project components

The Angola Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulations
- Component 2: Project Preparation and competitive tender program design
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

Component 4 will serve as a knowledge management bridge between the Child Project and the Regional Program, and between the Angola Child Project and other country child projects.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in PV-battery minigrids in Angola through business models centred on cost reduction levers</i>	Mandatory Indicator 1: Number of households benefitting from clean, affordable and sustainable energy access (project will target rural communities only) Mandatory Indicator 2 (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> Mandatory indicator 3: <i># of direct beneficiaries disaggregated by gender.</i>
Outcome¹⁷ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	Indicator 4: <i>Number of DREI analyses and number of cost-effective derisking instruments identified and adopted in strategies and action plans</i>
Outcome 2 <i>Pipeline of mini-grid projects identified, tendering program designed</i>	Indicator 5: <i>Number of solar-battery minigrids identified and ready to be developed (by installed capacity and region)</i> Indicator 6: <i>Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Angola are operating and have access to working capital and equipment.</i>	Indicator 7a: <i>Number of feasibility studies carried out to create a pipeline of investible assets;</i> Indicator 7b: <i>Total market value (US\$) investible assets in pipeline</i>
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	Indicator 8: <i>Number of knowledge networks supported</i> Indicator 9: <i>Number of M&E frameworks adopted and applied for tracking SDG impacts and GHG emission reductions</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project

¹⁷Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Angola project, and vice versa, and between the Angola project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. The Regional Program will support the Angola Child Project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country. Support to national activities in Angola will consist of:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Angola. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Angola with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (Ministério da Energia e Águas – MINEA, Instituto Regulador dos Servicos de Electricidade e de Agua – IRSEA, Empresa Nacional de Distribuição de Electricidade - ENDE etc.) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework (SDG impacts and GHG emission reductions) for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Angola project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	7,000				
	Expected CO ₂ e (indirect)	1,554,041				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	7,000				
	Expected CO ₂ e (indirect)	1,554,041				
	Anticipated start year of accounting	2021				
	Duration of accounting	20 years				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.15				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	14,440				
	Male	13,600				
	Total	28,040				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: MEDIUM-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Burkina Faso
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity(s):	Rural Electrification Agency, Ministry of Energy
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	924,566	48,100,000
Total Project Cost		924,566	48,100,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Burkina Faso.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	1.1. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments 1.2. Domestication of quality standards for solar minigrid components, and institutional capacity of national standards organizations/bureau strengthened	GEFTF	291,469	8,129,000
Component 2—Project and Business Model Innovation with Private Sector Engagement	INV	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	2.1 Pilots developed, including on productive use/innovative appliances, using innovative business models focused on cost reduction levers (in regions complementing WB and AfDB)	GEFTF	208,027	32,467,500

	TA		2.2 Capacity of winning tender bidders / new COOPELs strengthened to develop and implement innovative business models and cost-reduction levers		66,569	
Component 3— Innovative Financing	TA	Capacity building to incentivize investments in solar PV minigrids	3.1 Domestic financial sector capacity-building on business and financing models for minigrids 3.2 General market intelligence study on minigrids in regions complementary to WB and AfDB investments	GEFTF	136,423	4,493,500
Component 4— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	4.1 Lessons learned captured and disseminated at all levels 4.2 Replication plan (including investment plan) for scaling up rural energy access using solar minigrids developed 4.3 Knowledge networks / Communities of Practice established to promote MG development 4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable develop impacts of MGs, including GHG emission reductions is developed and operationalized	GEFTF	138,027	2,000,000
Subtotal				GEFTF	840,515	47,090,000
Project Management Cost (PMC)				GEFTF	84,051	1,010,000
Total Project Cost					924,566	48,100,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government	World Bank (IDA)	Loan	Investment Mobilized	20,000,000
Recipient Country Government	Green Climate Fund (GCF)	Grant	Investment Mobilized	19,646,350
Recipient Country Government	Green Climate Fund (GCF)	Loan	Investment Mobilized	7,453,650
GEF Agency	UNDP	Grant	Investment Mobilized	1,000,000
Total Co-financing				48,100,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Burkina Faso	Climate change	CC STAR Allocation	924,566	83,211	1,007,777
Total UNDP TRAC Resources					924,566	83,211	1,007,777

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes X If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Burkina Faso	Climate Change	CC STAR Allocation	80,000	7,200	87,200
Total PPG Amount					80,000	7,200	87,200

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	3,700 (direct) 727,037 (consequential)

		top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	15,074 (of which 50% women)

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Burkina Faso is a low-income, landlocked Sub-Saharan country with limited natural resources. Its population, which is growing at an average annual rate of 3.1%, was estimated at almost 18.6 million inhabitants in 2016. The economy is heavily reliant on agriculture, with close to 80% of the active population employed in the sector. Despite a noticeable improvement in recent years, the country is ranked 144 out of 157 countries on the new Human Capital Index established by the World Bank. Its economic and social development will, among others, be contingent on the creation of fiscal space to expedite investments in infrastructure and human capital with the aim of boosting the productivity and competitiveness of the economy.¹⁸

Although access to electricity and renewable energies are acknowledged to be significant levers to socioeconomic development,¹⁹ Burkina Faso is one of the least electrified countries globally, currently at 19% overall, with 60% of the urban and only 3% of the rural population connected to electricity.²⁰ Energy access for micro and small enterprises is only 10.5% in urban areas and 1% in rural areas²¹. Further, it has some of the most expensive electricity in the region, with cost of production (mainly thermal power) at \$0.22-0.25 US/kWh. SONABEL, the national utility, depends on subsidies since several years to recover costs as the tariffs (\$0.13-0.17 US/kWh) do not recover costs. In November 2017, the 33 MW Zagtouli Solar Power Station near Ouagadougou was connected to the grid, contributing about 5% to the national electricity production at production costs of 6 US-cent/kWh.²² This illustrates the cost competitiveness of solar energy in Burkina Faso that has abundant solar insolation.

The Government of Burkina Faso has set a bold national plan to increase its electricity access rate from 20% to 80% as part of its National Plan for Economic and Social Development. According to the Energy Sector Policy 2014-2025, Burkina Faso seeks to lower its cost of energy, increase the electricity access rate to 95%, and a renewable energy target of 50% by 2025.²³ The child project will squarely support these policies and plans. Further, the child project will support implementation of the mitigation contributions pledged in the Nationally Determined Contribution (NDC).²⁴ Table 1 shows the unconditional and conditional mitigation targets to 2030 for electricity generation of which renewable and hybrid minigrids development will be an essential part.

Table 1. GHG emission reduction targets for electricity generation, ktCO_{2e}: 2015-2030

	2015	2020	2025	2030
Unconditional	22.18	284.3	344.4	493.04
Conditional	22.18	73.87	94.10	162.80

Source: INDC (2015)

¹⁸ <https://www.worldbank.org/en/country/burkinafaso/overview> - accessed 16 September 2019.

¹⁹ Conseil National de Prospective et de Planification Stratégique (2005) Etude Nationale Prospective 'Burkina 2025'; Downloads\Documents\burkina2025_rapportgeneral.pdf – accessed 16 September 2019

²⁰ <https://www.se4all-africa.org/seforall-in-africa/country-data/burkina-faso/> - accessed 16 September 2019.

²¹ UNDP Burkina Faso data.

²² https://energypedia.info/wiki/Burkina_Faso_Energy_Situation - accessed 16 September 2019.

²³ Ministry of Energy (2013) Energy Sector Policy 2014-2025.

²⁴ Government of Burkina Faso (2015) Burkina Faso's Intended Nationally Determined Contribution.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

While it is acknowledged that energy access is an important lever for poverty alleviation, access to electricity remains very low as discussed earlier. About 70% of electricity generation relies exclusively on diesel oil thermal generation, and growth in electricity demand has generally outstripped centralized production capacity. The electricity gap has been increasingly being met from a combination of solar PV-battery and hybrid (solar-diesel) minigrids.²⁵ These minigrids are typically owned by consumer cooperatives (COOPEL) that have limited technical capacities. Consequently, external technical expertise is sought to operate the minigrids.²⁶ Currently, minigrid electricity tariff is leveled with on-grid tariff set by the regulator (l'Autorité de Régulation du Sous-secteur de l'Electricité, ARSE) thereby constraining private minigrid development.²⁷

According to the Renewable Energy Action Plan 2015-2020/2030 (PANER, 2015),²⁸ renewable on-grid capacity installation (318 MW) will outstrip renewable off-grid capacity installation (10 MW) by a factor of ~32 in 2030, demonstrating the continued emphasis on grid extension. One advantage for minigrid development in Burkina Faso is the possibility for grid interconnection, and the selling of any excess electricity to the national grid. Well designed, operated and maintained solar minigrids therefore have the strong potential to provide the basis for a country-wide grid-connected distribution system so that power can be wheeled and sold across the network. This strategy provides an opportunity to increase renewable electricity access at lower costs, while also reducing losses that plagues the national grid. Nevertheless, there are significant barriers constraining the scaling up of solar minigrids. Preliminary analysis of barriers and risks facing investors in minigrids has revealed the following:²⁹

- Lack of regulatory framework for minigrids tariffs
- Low capacity of government authorities and private investors in standardized tendering processes
- Low level of private sector knowledge of innovative business models based on cost reduction considerations that could increase the affordability of electricity
- Incumbent operators lack technical capacity for managing minigrids
- Incumbent operators lack of knowledge of technologies (renewable energies, loss reductions in distribution systems, smart and/or pre-paid metering) preventing cost reductions and improvements in service delivery
- Limited access to capital (equity and grants) by private investors
- Lack of technical standards for minigrids
- Poor customer credit worthiness in rural areas due to limited productive energy uses

Geographical location

The exact project locations for investments will be defined during PPG stage in close collaboration with the complementary initiatives discussed below. It is anticipated that investments will be outside the Boule de Mouhoun and Haut-Bassins regions that are targeted by the AfDB-executed Yeleen project, and closely coordinate with the government's ecovillage initiative.

²⁵ Preliminary baseline investigation has revealed that there were approximately 45 minigrids in Burkina Faso with 20 being solar PV-battery minigrids and 25 hybrids. The minigrids are less than 120 kW installed solar capacity.

²⁶ Expertise is provided by 'fermiers' with or without contractual agreements in place. In some case, the 'fermiers' are seasonal volunteers.

²⁷ The AfDB-implemented GEF project Yeleen Rural Electrification Project has proposed to cap minigrid tariff at \$0.4/kWh for all sectors, which is indicated by local authorities as a maximum level for privately owned minigrids.

²⁸ Ministry of Mines and Energy (2015) National Renewable Energy Action Plan; https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_PANER/Burkina_Faso_Plan_d_Actions_National_pour_les_Energies_Renouvelables.pdf - accessed 17 September 2019.

²⁹ UNDP's derisking renewable energy investments (DREI) in minigrids was used to carry out preliminary barriers and risks analyses; https://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment/guidance-materials-and-tools.html - accessed 17 September 2019.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Given the gap between electricity supply and demand, and the significant potential that minigrids hold to reduce this gap, there are two main initiatives focusing on minigrid development in Burkina Faso. The World Bank is funding the Burkina Faso Electricity Access Project (US\$50million; 2019-2024) that will focus on expanding electricity access in rural areas. It plans to electrify around 300 new localities in selected rural areas and the connection of 115,000 households, micro, small and medium-sized enterprises (MSMEs) and community infrastructures (school, health centers, etc.) to least-cost modern and reliable energy sources. Three project components will focus on minigrids, namely:³⁰ (1) Component 1: reinforcement of existing COOPELs based on commercial and technical performance; (2) Component 3: development, installation and operation of PV-based mini-grids with storage and connection of 25,000 households and MSMEs by competitively selected private concessionaires to provide reliable, sustainable and affordable electricity; and (3) Component 4: Capacity building for improved operational and commercial performance of COOPELs. Half of the funding will be used for the on-grid electrification Component 2. Further, the total project cost is US\$90million, implying a shortfall of US\$40million (of which US\$15million is expected to be private investments).

This GCF-funded Yeleen Rural Electrification Project (US\$27.1million; 2019-2025) aims to create a paradigm shift towards low-emissions electricity access by creating an enabling environment for the private sector to invest in and operate solar minigrids. The project will include installing 100 minigrids (11.4 MW; 50,000 household connections; 3,300 productive use connections) in Burkina Faso using results-based payments to private sector operators, improving the regulatory framework in order to mobilize private sector capital in renewable energy-based rural electrification investments, and provision of productive use equipment to support economic activity in the targeted regions.

ABER was established by electricity law 2017 as the fully fledged Rural Electrification Agency aimed to promote rural electrification in the country. It succeeds to the Rural Electrification Fund (FDE) to contribute to the implementation of the National Electrification Plan in rural areas. ABER develops and tender rural electrification projects identified by central and local governments, as well as by private investors or operators, with both on-grid and off-grid technologies. FDE/ABER acts as a de facto technical quality regulator in the rural electricity subsector particularly with COOPELs.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP).

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1)

³⁰ The two other components will be: Component 2 - support the electrification of selected localities within a maximum range of 30 km from the nearest substation or along route of interconnected national grid, and the connection of 50,000 households, MSMEs and community infrastructures ; and Component 4 - Strengthen ABER's capacity and support operations.

policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

Given the large resources needed to achieve the national targets discussed above, the authorities intend to mobilize private sector participation alongside with public and concessional resources, notably for the deployment of off-grid and mini-grid solutions. Despite donor partners', catalyzing private investments will remain a challenge, and the incremental AMP contributions are seen as:

- Operationalizing viable minigrid business models with focus of cost reduction approaches;
- Cost effective derisking of investments in solar minigrids using UNDP's DREI methodology;
- Supporting Communities of Practice to facilitate conversations among private government, financial institutes, and private sector, and sharing of lessons learned on sustainable minigrid management;
- Establishing a harmonized framework for tracking the SDG impacts and GHG emission reductions accruing from investments in solar minigrids;
- Emphasis on capturing and disseminating lessons learned and knowledge management;

The proposed project will complement baseline initiatives through the development of solar minigrids using private investments. For access to electricity, the incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Burkina Faso. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will squarely support the ambition of government to combat poverty through socioeconomic development in rural areas. The proposed project is also supportive of the climate change mitigation objectives as indicated in the Nationally Determined Contribution (NDC) of Burkina Faso.

The project will generate ~3.7 ktCO_{2e} direct lifetime emission reductions and ~727 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Burkina Faso Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first two components correspond to the thematic areas described in the PFD, while Component 3 serves as a knowledge management bridge between the Child Project and the Regional Program, and between the Burkina Faso Child Project and other country projects.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrid in Burkina Faso.</i>	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only)
	<u>Mandatory Indicator 2:</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission</i>

	<i>reductions, metric tCO_{2e}.</i>
	<i>Mandatory indicator 3: # of direct beneficiaries disaggregated by gender.</i>
Outcome³¹ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	<i>Indicator 4: Number of DREI analyses and geospatial modelling of least-cost off-grid electrification options</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	<i>Indicator 5: Number of solar-hybrid minigrids developed (by installed capacity and region)</i> <i>Indicator 6: Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Burkina Faso are operating and have access to working capital and equipment.</i>	<i>Indicator 7: Number of market intelligence surveys by regions</i>
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	<i>Indicator 8: Number of knowledge networks created</i> <i>Indicator 9: Number of M&E frameworks adopted and applied for tracking SDG impacts and GHG emission reductions</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Burkina Faso project, and vice versa, and between the Burkina Faso project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Burkina Faso project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program will support the Burkina Faso project in the following ways:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Burkina Faso. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Burkina Faso with key decisions and technical reviews at Child Project milestones and provide actionable, strategic

³¹Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

- recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
- ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (ABER/FDE) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Burkina Faso
 - ✓ Providing a standardized methodology for carrying out market intelligence
 - ✓ Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing.
 - ✓ The Program will support the development of a common monitoring and indicator framework (SDG impacts and GHG emission reductions) for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries.

The results of Component 4 in the Burkina Faso project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	3,700				
	Expected CO ₂ e (indirect)	727,037				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	3,700				
	Expected CO ₂ e (indirect)	727,037				
	Anticipated start year of accounting	2021				
	Duration of accounting	20 years				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.09				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	7,537				
	Male	7,537				
	Total	15,074				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: MEDIUM-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Comoros
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	Ministry of Environment, Agriculture, Fisheries and Energy
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	1,269,863	16,300,000
Total Project Cost		1,269,863	16,300,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Comoros.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1 A minigrid regulatory framework, including tariff model, tax regime and incentives is developed in close coordination with other development partners</p> <p>1.2 Assessment of negative impact of competing fossil-fuel subsidies on competitiveness of minigrids, and recommendations for subsidy reform</p> <p>1.3 Institutional set-up for rural electrification assessed and supported, and institutional capacity building provided on technical, managerial, and regulatory issues.</p> <p>1.4 Minigrid DREI techno-economic analyses carried out to propose most cost-</p>	GEFTF	262,975	1,633,500

			<p>effective basket of policy and financial derisking instruments.</p> <p>1.5 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models</p>			
Component 2— Project and Business Model Innovation with Private Sector Engagement	INV TA	Innovative business models based on cost reduction operationalized to support and strengthen private sector participation in solar PV-battery minigrid development	<p>2.1 National report on opportunities to boost economic activities through electricity access and productive use, with focus on minigrids</p> <p>2.2 Renewable energy off-grid production sites with a least-cost / high-efficiency management systems are developed in rural areas</p> <p>2.3 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, using innovative business models</p> <p>2.4 New Public-private partnerships in renewable energy sector are established</p> <p>2.5 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost reduction levers</p>	GEFTF	457,151 114,288	12,469,500
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in	3.1 Innovative financing solutions for minigrid development are identified and implemented	GEFTF	178,575	733,500

		place to incentivize investments in the development of solar PV-battery minigrids	3.2 General market intelligence study on minigrids prepared and disseminated amongst public officials and finance community 3.3 Facilitate in-country discussions and convene finance development institutions and philanthropic organizations to attract additional financing			
Component 4— Convening, Dissemination, Tracking (Knowledge Management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids.	4.1 Lessons learned captured and disseminated at the national level 4.2 Replication plan (including investment plan) for scaling up rural energy access developed 4.3 Knowledge network / Community of Practice established to promote minigrids development / rural energy access 4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of minigrids, including GHG emission reductions is developed and operationalized	GEFTF	141,432	733,500
Subtotal				GEFTF	1,154,421	15,570,000
Project Management Cost (PMC)				GEFTF	115,442	730,000
Total Project Cost					1,269,863	16,300,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government (SONELEC)	European Union	Grant	Investment mobilized	3,300,000
Recipient Country Government (SONELEC)	VIGOR	Equity Investment	Investment mobilized	10,000,000
Recipient Country Government (SONELEC)	INOVANT	Equity Investment	Investment mobilized	3,000,000

Total Co-financing			16,300,000
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Describe how any “Investment Mobilized” was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Comoros	Climate change	CC STAR Allocation	1,269,863	114,288	1,384,151
Total GEF Resources					1,269,863	114,288	1,384,151

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☐ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Comoros	Climate change	CC STAR Allocation	100,000	9,000	109,000
Total PPG Amount					100,000	9,000	109,000

PROJECT’S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO2e)	8,200 (direct) 8,545 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	33,126 (of which 50% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Comoros is a fragile state. The electrification rate is relatively high compared to other African countries. But in reality, “real access” as defined in SE4All is very challenging due to technical (e.g. high transmission loss) and cultural reasons. Only an average of 50% of consumers on the 3 islands can afford to get connected to the electricity grid and pay for the services. About 90% of Comoros' electricity generation relies on imported fuel oil. With abundant resources, Comoros is looking more closely at renewable energy, especially geothermal and solar. However, both private sector interest and international donor support could dry up due to the political situation.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Electricity access in Comoros varies between the three populated islands as follows: 80.2% in Grande Comore, 43.7% in Anjouan and 52.9% in Mohéli. However, real access is lower than indicated because of recurring issues related to inadequate electricity production capacity and poor transmission and distribution networks. In this context, Comoros has potential to reach 100% electrification by 2033³². While there are few minigrid projects that are being developed or planned to be implemented, there is no coherent energy policy regarding the role and contribution of minigrid development and standalone systems in reaching these ambitious objectives set by the Comoros government, the United Nations Sustainable Development Goals (SDG7) and the Samoa pathway on sustainable energy. There is no electricity regulator, and the utility companies (SONELEC and EDA) are responsible for regulation of the electricity sub-sector, including setting tariffs, and market activities in their respective islands.

While there is increasing recognition for the role of off-grid/minigrids in enhancing electricity access and energy-mix, there are still several barriers that hinder minigrid development.

Preliminary analysis of barriers and risks faced by investors in minigrids development has revealed the following:

- Lack of regulator/utility capacity for proper grid planning and maintenance
- Lack of cost reduction considerations that could increase the affordability of electricity
- Limited access to capital due to an underdeveloped financial sector and unfamiliarity with renewable energy projects
- Poor customer credit worthiness and high default rates leading to poor cost recovery
- Lack of detailed market mapping to identify cost-effective electrification options for rural areas.

Geographical location

The exact project locations for minigrid investments will be defined during PPG stage.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Existing donor partner projects tend to focus on the rehabilitation of production capacities, grid extension and energy sector capacity building. For instance, the largest investment taking place in the energy sector is a

³² According to the Accelerated Electricity Access Scenario developed by UNECA, [Development of the Energy Balance Statistics and Energy Systems Model for the Union of Comoros](#)

US\$41.6million (Exim Bank, India) for the construction of a 16 MW heavy fuel oil (HFO) thermal power plant and strengthening of the grid network. The Global Environment Facility (GEF) is funding the project entitled “Sustainable development of Comoros Islands by promoting the geothermal energy resources” (July 2018 – June 2024, US\$5.9million), which aims to formulate the policy and regulatory framework for the development and use of geothermal energy on Grande Comore and to promote investments in the development of geothermal resources for base load power generation. The project will also develop a 10MW geothermal power plant as a replacement and an alternative to the usual fossil fuel power generation.

The Comoros Energy Sector Support Project funded by the AfDB, World Bank and Government of Qatar (2013-2022, US\$33million) has three major objectives, namely: (1) rehabilitate production capacities on the three islands (covering retrofits to the grid, upgrading the conventional and small-scale hydro facilities), (2) contribute to the improvement of financial governance through capacity building in the electricity sub-sector, and (3) ensure the preparation of the quality-at-entry of future renewable energy projects by conducting appropriate studies. The project does not have a specific focus on minigrids.

Engie is developing two minigrids at Mohéli and Anjouan. The two minigrids will be composed of 22.1MW solar coupled with a series of storage systems distributed throughout the island, which will supply clean energy for the 400,000 inhabitants. The project concerns the hybridization of the power supply, greening the fuel mix and taking part of the production closer to some load centers.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP). The GAP will be informed by the overall gender strategy defined in NEP 2.0. As the procurement and financial management capacity of the Ministry of Environment, Agriculture, Fisheries and Energy tends to be fairly weak, it is expected that support services will be required. During the PPG stage, further analyses will be performed to determine who is the best entity to provide these services.

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program’s Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the ‘program’) – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids (‘minigrids’). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program’s theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD’s baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs for end-users.

- d) Describe the project’s incremental reasoning for GEF financing under the program, including the results framework and components.

It is expected that there will be significant gaps in the capacity of government of reach universal electricity access without the development of minigrids. As mentioned above, most baseline projects and initiatives do not address barriers related to minigrid development in Comoros. The proposed project will complement baseline initiatives in the development of renewables minigrids in Comoros using private investments. The incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in

order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Comoros. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will, therefore, squarely support the ambition of government to have universal electricity access by 2033. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Comoros.

The project will generate ~8.2 ktCO_{2e} direct lifetime emission reductions and ~8.55 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Comoros Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first three components correspond to the three thematic areas described in the PFD, while Component 4 serves as a knowledge management bridge between the Child Project and the Regional Program, and between the Comoros Child Project and other country projects.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrid in Comoros.</i>	Mandatory Indicator 1: Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only) Mandatory Indicator 2 (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> Mandatory indicator 3: <i>number of direct beneficiaries disaggregated by gender.</i>
Outcome³³ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	Indicator 4: <i>Number of DREI analyses and geospatial modelling of least-cost off-grid electrification options</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	Indicator 5: <i>Number of solar-hybrid minigrids developed (by installed capacity and region)</i> Indicator 6: <i>Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Comoros are operating and have access to working capital and equipment.</i>	Indicator 7: <i>Number of financing schemes for minigrids developed and operationalised</i>
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	Indicator 8: <i>Number of knowledge networks created</i> Indicator 9: <i>Number of replication plan, including detailed budget, for scaling up the deployment of off-grid technologies in Comoros (based on annual lessons learned)</i>

National Child Project Budget Allocations for Program Activities

³³Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Comoros project, and vice versa, and between the Comoros project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation.

Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Comoros project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs.
- The Regional program will support the Comoros project in the following ways:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Comoros. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Comoros with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (e.g. EDA and SONELEC) and private sector (e.g. minigrid developers) and the overall minigrid market
 - ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Comoros, as well as standardized methodology for geospatial modeling of least-cost options for off-grid electrification using renewable energies
 - ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Comoros project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	8,200				
	Expected CO ₂ e (indirect)	8,545				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	8,200				
	Expected CO ₂ e (indirect)	8,545				
	Anticipated start year of accounting	2021				
	Duration of accounting	20 years				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.18				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	16,063				
	Male	16,063				
	Total	32,126				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Djibouti
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	Ministry of Urban Planning, Environment and Tourism
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	2,193,347	20,000,000
CCM-1-3 Promote innovation and technology transfer for sustainable energy breakthroughs for accelerating energy efficiency adoption	GEFTF	878,000	20,000,000
Total Project Cost		3,071,347	40,000,000

PROJECT COMPONENTS AND FINANCING

Project Objective Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids for powering energy efficient social housing in Djibouti.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids and energy efficiency in buildings	1.1. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments 1.2. Domestication of quality standards for: (1) solar minigrid components; (2) electrical appliances (air conditioners, refrigerators and lighting); (3) thermal insulation, and institutional capacity of ADME and l'Agence Djiboutienne de Normalisation strengthened 1.3 Capacity	GEFTF	556,211	2,400,000

			<p>building provided to public officials (regulator, ministries) specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models</p> <p>1.4 Public programmes (apprenticeships, certificates, university programs) to develop competitive, skilled labor market in minigrids</p>			
Component 2— Minigrid Project and Business Model Innovation with Private Sector Engagement	<p>INV</p> <p>TA</p>	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	<p>2.1 Pilots developed, including in productive use (e.g. milk and fish processing), innovative energy efficiency appliances, and with consideration on business models for social housing</p> <p>2.2 Capacity of potential tender bidders (private sector developers) public officials in MERN and EDD strengthened to consider innovative business models and cost-reduction levers</p> <p>2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p>	GEFTF	<p>637,656</p> <p>316,893</p>	16,150,000
Component 3— Innovative Financing for Minigrids	TA	An innovative financing mechanism and	3.1 Design support, including development of	GEFTF	345,899	950,000

		accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids	operational guidance, provided for Minigrid Funding Facility (MFF, or equivalent financial mechanism) under the national development fund (NDF) / Guarantee Fund (GF) 3.2 Domestic financial sector capacity-building on business and financing models for minigrids 3.3 Capacity building (e.g. trainings) provided to local minigrid investors 3.4. Training provided to local developers			
Component 4—Energy efficiency in buildings (thermal insulation and electrical appliances) as an additional cost reduction lever for solar PV-battery minigrids	INV 					

			minigrid-powered housing 4.4. Training workers and entrepreneurs of small and medium enterprises on the fabrication of pozzolan bricks 4.5. Development and dissemination of an online tool for carrying out comparative socio-economic and environmental analysis of the demonstration EE house using life-cycle methodology 4.6. Development of guidelines for the design and construction of EE buildings, and retrofitting existing buildings; and capacity building of architects, construction workers and the Department of Environment and Sustainable Development to implement guidelines			
Component 5— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the sustainable energy markets and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids and energy efficiency in buildings	5.1 Lessons learned captured and disseminated at all levels 5.2 Replication plan (including investment plan) for scaling up rural energy access and EE in buildings developed 5.3 Knowledge networks / Communities of Practice established to promote MG development & EE in buildings 5.4 A Quality	GEFTF	232,243	1,900,000

			Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of MGs and EE buildings, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTF	2,925,092	38,500,000
Project Management Cost (PMC)				GEFTF	146,255	1,500,000
Total Project Cost					3,071,347	40,000,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Donor Agency	World Bank	Loan	Investment mobilized	40,000,000
Total Co-financing				40,000,000

Describe how any "Investment Mobilized" was identified. The investments mobilized are through loans contracted by the Government of Djibouti from the World Bank.

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Djibouti	Climate change	CC STAR Allocation	3,071,347	276,421	3,347,768
Total GEF Resources					3,071,347	276,421	3,347,768

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved
No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFTF	Djibouti	Climate change	CC STAR Allocation	125,000	11,250	136,250

Total PPG Amount	125,000	11,250	136,250
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PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	16,800 (direct for minigrids only) 36,266 (consequential top down for minigrids only)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	67,950 (of which 47% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

The Republic of Djibouti is located in the Horn of Africa between the Red Sea and the Indian Ocean. The population is about 1 million inhabitants with 70% and 30% living in urban and rural areas, respectively. Nearly 58% of the population lives in the capital. In 2017, the GDP per capital was around US\$5,307. Despite important economic growth, some 21.7% (2017) of the population lived in extreme poverty.³⁴ Traditionally, Djibouti has had a service-oriented economy with relatively weak primary and industry sectors.

The Djibouti government's goal is to transform Djibouti into a middle-income country by 2035. To achieve this goal, SCAPE and Vision 2035 estimate the average annual growth rate of the economy between 6 and 10% over the period 2015 to 2035. This goal will not be achieved unless energy is available in sufficient quantities; is reliable and is affordable. Energy demand projections for 2038 show an energy need of between 1,550 GWh for the low growth scenario and 4,340 GWh for the high growth scenario.³⁵ While there is a need to increase electricity supply, there is an equal urgency to increase the energy productivity through energy efficiency (EE) measures. One area that offers significant opportunities is the housing sector regarding (1) building envelope thermal insulation and EE electrical appliances, and (2) supplying electricity from renewable energy sources, such as solar energy. Buildings consume 90% of all electricity generated in Djibouti, with 60% used for cooling, refrigeration and ventilation. The average daytime temperature in Djibouti is 35 °C over the year, with peaks of 50 °C in June/July throughout the summer,

³⁴ <https://www.worldbank.org/en/country/djibouti/overview> - accessed 4 October 2019.

³⁵ Idriss Ahmed Hared (2019) Draft inception report on the project "clean energy and energy efficiency for social housing in Djibouti".

and accompanied by relative humidity levels exceeding 90%.³⁶ The relatively high share of demand load arising from space cooling poses a significant problem to supplying houses with electricity generated from solar PV with battery storage. Managing possible peak load demand would require oversizing of PV/storage systems, making renewable electricity provisioning less cost effective. In order to supply electricity from PV-battery minigrids in a cost effective way, it is imperative to decrease and manage the possible load demand from space cooling. Consequently, energy efficiency in houses becomes a significant additional cost-reduction lever for the operation of PV-battery minigrids. It is envisaged that energy efficiency in buildings can be carried out in large part through building envelope thermal insulation, as well as, to a lesser degree, energy efficient appliances.

Around 60% of all houses are built from low-quality salvaged materials, making them vulnerable to bad weather and very uncomfortable thermally. The root causes of this situation are the low income of households; their inability to access low cost capital; and the unavailability of micro-finance for house construction. This context results in a deficit in social housing estimated at around 2,500 dwellings per year, including 2,000 for the city of Djibouti alone. It is estimated that only one third of annual needs are met. The private sector is primarily involved in the construction of luxurious houses for a niche market, leaving the bulk of the housing gap being met the government through l'Agence de Réhabilitation Urbaine et du Logement Social (ARULOS) for the poorest market segment and the Société Immobilière de Djibouti (SID) that caters for the middle-income market segment.

However, Djibouti has local building materials that have adequate thermal properties, and that are available in sufficient quantities. If adequately exploited, these local building materials have the potential to solve two problems simultaneously, namely: (1) affording a relative cheap construction material for bridging the housing gap, and (2) allowing better load management in houses, therefore, making provisioning of electricity from PV-battery minigrids more effective. The latter can be enhanced with the use of EE electrical appliances. The exploitation of this locally available construction material will require demonstration prior to scaling up.

The child project will support implementation of the Nationally Determined Contribution (NDC), and the national EE Strategy and Action Plan seeks to reduce electricity consumption by 26% (2025) and 35% (2035) relative to the business-as-usual scenario. The target set in Vision2035 to achieve universal access to electricity by 2035 will also be supported.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Government plans to build 50,000 units of social housing over the next decade using locally sourced materials with good thermal properties. Nevertheless, there are significant challenges regarding the adoption of energy efficiency in both the construction (i.e. building envelope) and operation (i.e. use of energy by electrical appliances) of social housing that will be powered using PV-battery minigrids. These barriers have been identified as follows: i) lack of availability and affordability of EE appliances because of unfavorable fiscal incentives; ii) lack of market development of EE appliances; iii) sociocultural resistance to use of thermal insulation in buildings arising from poor prior experience with low-quality products; v) lack of technical standards for EE building materials and electrical appliances, and iv) lack of technical capacities among local companies and technicians.³⁷

The overall electrification rate is 42% - i.e. 54% in urban areas and 1% in rural areas. All electricity generated in Djibouti is from thermal energy sources, and there is reliance on imports from Ethiopia. Off-grid renewable power can meet demand in unserved rural areas in Djibouti, new social housing units and can replace existing diesel systems.³⁸ There are currently 9 operational minigrids of which 3 are PV-battery (62kWp) or PV-diesel hybrid (100-150kWp) minigrids. The Ministry of Energy and Natural Resources (MERN) owns most of the minigrids. Operators

³⁶ Djibouti has specific topography whereby the western part of the country is below sea level. The basin topography translates into unusually high temperatures.

³⁷ Idriss Ahmed Hared (2019).

³⁸ IRENA (2015) Djibouti Renewables Readiness Assessment.

include the MERN, EDD or the local authority like the prefet or under-prefet. For remote villages, communities themselves are operating the diesel mini-grids.

Despite the potential for PV minigrids to support government objective for increasing electricity access, there are significant barriers and information gaps regarding the status of the minigrids. The main barriers are:

- Lack of economics of scale to attract private investors in the off-grid, rural electricity market
- Low level of public institution capacities in the energy sector
- Low level knowledge of innovative business models based on cost reduction considerations that could increase the affordability of electricity
- Lack of local expertise to design, operate and maintain PV-battery / hybrid minigrids
- Incumbent operators lack of knowledge of technologies (renewable energies, loss reductions in distribution systems, smart and/or pre-paid metering) preventing cost reductions and improvements in service delivery
- Limited access to capital due to lack of knowledge of minigrid sector
- Poor customer credit worthiness and high default rates leading to poor cost recovery due to high levels of poverty
- Lack of quality standards and enforcement mechanisms for minigrid components

The Child Project is intended to be a lever of change in the construction of energy efficient social housing and their energy supply, as well as targeting productive energy uses.

Geographical location

ARULOS (l'Agence de Réhabilitation Urbaine et du Logement Social) and the Fondation Logement pour Tous (Housing for All Foundation) are undertaking the construction of more than 5,000 social housing units in Djibouti City and in the cities of the interior. In addition, other social housing projects are under consideration on newly developed land perimeters in the south of the capital. The most suitable target area will, therefore, be the southern part of Balbala.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Several initiatives are underway for developing the energy sector and EE in Djibouti and the National Child Project will complement all baseline initiatives. In particular, it will complement the UNDP-GEF project entitled “Promoting a better access to modern energy services through sustainable mini-grids and hybrid technologies in Djibouti” (US\$ 863,242 GEF funding; 2019-2022) that aims to address the specific barriers for unlocking (private) investment in the sustainable off-grid sector (solar based mini-grids and Solar Home Systems - SHS) for increased access to reliable and affordable electricity to peri-urban and rural areas of Djibouti.

The World Bank (WB) is implementing the Sustainable Electrification Program (SEP) (US\$23.3million; 2017-2023) for proving street lighting and electricity access to 5,000 social housing.³⁹ Another WB initiative is the Integrated Slum Upgrading Project (ISUP) for Djibouti (US\$ 20million; 2018-2023).⁴⁰ The development objectives of the ISUP are: (i) to improve the living conditions for slum dwellers in selected urban areas, and (ii) to strengthen the capacity of public institutions in charge of implementing the zero-slum program (ZSP). The ISUP is yet to be implemented, while only US\$3.3 million has been disbursed to date for SEP activities.

The Ministry of Energy and Natural Resources (MERN), under the Office of the President, is responsible for designing, defining and developing government policy on energy and natural resources. The Djibouti Energy Management Agency (ADME) was created in 2013. Its mandate is to promote EE and renewable energy in all economic sectors and the national territory as a whole.

³⁹ <https://projects.worldbank.org/en/projects-operations/project-detail/P158505?lang=en> – accessed 4 October 2019.

⁴⁰ <https://projects.worldbank.org/en/projects-operations/project-detail/P162901?lang=en> – accessed 4 October 2019.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 5 of the PFD will be used to develop country-specific Gender Action Plan (GAP).

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

In the specific case of Djibouti, hardware costs will be higher than otherwise because of significant peak load in houses arising from space cooling due to extreme weather conditions. This peak load management will translate in system oversize, and additional hardware to ensure proper load management. In this case, energy efficiency in houses will be used as a cost reduction lever for renewable electricity from PV-battery minigrids that will be used to power housing units. In addition, the Child Project will operationalize innovative business models centered on productive energy uses, implying improved economic opportunities in terms of income generating activities for local communities. The combined effects of decreasing electricity costs and improved economic conditions will be the increased affordability of renewable electricity for end users.

Further, using a combination of lifecycle analysis, piloting of energy efficient building design principles (for both new and old buildings), construction using locally available materials, use of energy efficient appliances, and human and institutional capacity building, the socioeconomic and environmental benefits of investing in integrated solar PV-battery mini-grids and EE housing will be demonstrated

Increasing access to renewable electricity and increasing energy productivity through energy efficiency in buildings will have multiple sustainable development benefits, such as improved livelihoods, job creation and GHG emission reductions.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access, productive uses of electricity and adoption of energy efficiency measures in housing/buildings as an additional cost reduction lever for renewable electricity from PV-battery minigrids. Hence, the proposed project will complement baseline initiatives through the development of PV-battery minigrids and energy efficient buildings (envelope thermal insulation and efficient appliances) in Djibouti using private investments. For access to electricity, the incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Djibouti. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in milk and fish processing sub-sectors). Energy efficient housing (new and old) will be demonstrated through application of bio-acclimatized design principles, locally sourced

construction materials, internal thermal insulation and efficient appliances. The proposed project will, therefore, squarely support the ambition of government to bring together electrification through mini-grids and social housing, bridging the housing gap in the most sustainable way, while at the same time using energy as a lever to improve the socio-economic conditions of beneficiaries. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Djibouti.

The project will generate ~16.8 ktCO_{2e} direct lifetime emission reductions and ~36.27 ktCO_{2e} consequential emission reductions (top down). The numbers relate to investments in PV minigrids only, and direct and consequential emission reductions for EE in buildings will be calculated during the PPG stage. All bottom up consequential emission reductions will also be carried out during the PPG stage.

Project components

The Djibouti Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Minigrid project and business model innovation with private sector engagement
- Component 3: Innovative financing for minigrids
- Component 4: Energy efficiency in buildings (thermal insulation and electrical appliances) as an additional cost reduction lever solar PV-battery minigrids
- Component 5: Convening, dissemination, and tracking progress (Knowledge management)

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids and energy efficient buildings in Djibouti.</i>	Mandatory Indicator 1: Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only)
	Mandatory Indicator 2 (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i>
	Mandatory indicator 3: <i># of direct beneficiaries disaggregated by gender.</i>
Outcome⁴¹ 1: <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids and energy efficiency in buildings</i>	Indicator 4: <i>Number of DREI analyses and cost effective derisking instruments identified and included in policies</i>
	Indicator 5: <i>Number of domesticated quality standards</i>
Outcome 2: <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	Indicator 6: <i>Number of solar-hybrid minigrids developed (by installed capacity and region)</i>
	Indicator 7: <i>Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3: <i>An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids</i>	Indicator 8: <i>Number of financing schemes for minigrids developed and operationalised</i>
Outcome 4: <i>Technical and financial support provided to reduce demand load, mainly cooling, in social housing making provisioning of electricity from solar PV-battery minigrids more efficient and cost-effective</i>	Indicator 9: <i>Number and floor area of energy efficient buildings demonstrated (new and retrofitted)</i>
	Indicator 10: <i>Number of stakeholders trained on the use and implementation of guidelines for the design and construction of EE buildings, and retrofitting existing buildings</i>
Outcome 5: <i>Increased awareness and network opportunities in the sustainable energy markets and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids and</i>	Indicator 11: <i>Number of knowledge networks created</i>
	Indicator 12: <i>Number of replication plans, including detailed budgets, for scaling up the deployment of sustainable minigrids and EE buildings in Djibouti (based</i>

⁴¹Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

<i>energy efficiency in buildings</i>	<i>on annual lessons learned)</i>
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National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Djibouti project, and vice versa, and between the Djibouti project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. The Regional Program will support the Djibouti Child Project as follows:

Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country. Support to national activities in Djibouti will consist of:

- ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Djibouti. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Djibouti with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
- ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (MERN and EDD) and private sector (e.g. mini-grid developers) and the overall minigrid market
- ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Djibouti
- ✓ Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- ✓ The Program will support the development of a common monitoring and indicator framework (SDG impacts and GHG emission reductions) for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 5 in the Djibouti project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	16,800				
	Expected CO ₂ e (indirect)	36,266				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	16,800				
	Expected CO ₂ e (indirect)	36,266				
	Anticipated start year of accounting	2021				
	Duration of accounting	20 years				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.33				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	31,937				
	Male	36,013				
	Total	67,950				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: Medium-sized Child Project

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Eswatini
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	Ministry of Natural Resources and Energy
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	863,242	10,330,000
Total Project Cost		863,242	10,330,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Eswatini.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1. A minigrid regulatory framework, including tariff model and tax regime, and grid expansion risk, is developed in close coordination with other development partners</p> <p>1.2 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments</p> <p>1.3 Institutional set-up for rural electrification assessed and supported, and institutional capacity building provided on</p>	GEFTF	169,486	2,020,000

			<p>technical, managerial, and regulatory issues</p> <p>1.4 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/ tender processes that incorporate cost-reduction levers and innovative business models</p>			
Component 2— Project and Business Model Innovation with Private Sector Engagement	INV	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	<p>2.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in mini-grids and sufficient growing demand for minigrid systems</p> <p>2.2 Capacity of potential tender bidders (private sector developers) strengthened to consider innovative business models and cost-reduction levers</p> <p>2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p> <p>2.4 Support provided to establish and grow a national industry association for private sector developers</p>	GEFTF	277,611	3,400,000
	TA				107,905	1,300,000
Component 3—	TA	An innovative	3.1 Design support,	GEFTF	121,067	1,800,000

Innovative Financing		<p>financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids</p> <p>including development of operational guidance, provided for MG Funding Facility (MFF, or equivalent financial mechanism) under the Rural Electrification Fund</p> <p>3.2 Innovative financing solutions for minigrid development are identified and implemented through the MFF (or equivalent) with supporting human and institutional strengthening</p> <p>3.3 General market intelligence study on minigrids prepared and disseminated amongst public officials and finance community</p> <p>3.4 Feasibility study support provided to minigrid developers, creating a pipeline of investible assets</p>				
Component 4— Convening, Dissemination, Tracking (Knowledge Management)	TA	<p>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</p>	<p>4.1 Lessons learned captured and disseminated at the national level</p> <p>4.2 Replication plan (including investment plan) for scaling up rural energy access developed</p> <p>4.3 Knowledge network / Community of Practice established to promote MG development / rural energy access</p> <p>4.4 A Quality Assurance and Monitoring</p>	GEFTF	108,696	1,400,000

			Framework for measuring, reporting and verification of the sustainable development impacts of MGs, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTF	784,765	9,920,000
Project Management Cost (PMC)				GEFTF	78,477	410,000
Total Project Cost					863,242	10,330,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government	Ministry of Natural Resources and Energy	Grant	Recurrent expenditures	3,000,000
Private Sector	Eswatini Electricity Company	Grant	Recurrent expenditures	230,000
Recipient Country Government	Eswatini Standards Authority	In-kind	Recurrent expenditures	100,000
Donor Agency	Japan International Cooperation Agency (JICA)	Grant	Investment mobilized	2,000,000
Donor Agency	Italian Government / Africa Centre for Climate and Sustainable Development	Grant	Investment mobilized	1,000,000
Donor Agency	World Bank	Loan	Investment mobilized	4,000,000
Total Co-financing				10,330,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Eswatini	Climate change	CC STAR Allocation	863,242	77,692	940,934
Total GEF Resources					863,242	77,692	940,934

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Eswatini	Climate change	CC STAR Allocation	50,000	4,500	54,500
Total PPG Amount					50,000	4,500	54,500

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	5,400 (direct) 54,611 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	16,263 (of which 51 % women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

The Kingdom of Eswatini (Eswatini) is a landlocked, small open economy in Southern Africa with a land area of 17,364 km² and a population of 1.2 million. The country is largely mountainous, bordered on the east by Mozambique and on all other borders by South Africa with approximately 76% of the population living in rural areas. Eswatini is very closely linked to South Africa and depends on it for about 85% of imports and about 60% of exports. With a Gross Domestic Product (GDP) per capita of approximately US\$3,000, Eswatini is classified as a lower middle-income country.

Poverty, inequality and unemployment remain the most stubborn primary development challenges for Eswatini and overcoming these is a Government priority. Poverty levels have remained unchanged over the last five years, with approximately 40 % of the population estimated to be living under the international USD1.90 poverty line. Furthermore, it is estimated that 60% of the population is poor overall. Income inequality is also high, with an estimated Gini coefficient of 0.51 in 2009/10.

Eswatini is a net importer of electricity through the Southern African Power Pool (SAPP). In 2018, Eswatini installed and operating power capacity stood at 70 MW and 55 MW, respectively. All electricity generation is from hydro-electric sources.⁴² However, peak demand was 232 MW, implying that Eswatini imported ~841 GWh mainly from South Africa where power generation is dominated by coal. This represented an emission of ~710 MtCO₂.⁴³ According to SAPP, Eswatini's electricity demand is expected to grow from 1,283 GWh to 1,863 GWh between 2018 and 2025. Amidst this growing electricity demand, an additional generation capacity of only 17 MW (12 MW and 5 MW in 2019 and 2022, respectively) has been committed by EEC. In the same period, peak demand is expected to increase by 72 MW, revealing that dependence on imported electricity will continue to grow in the foreseeable future despite generation capacity additions. The average electricity tariff applied by SEC was ~8.6 USc/kWh.

Another salient feature of Eswatini's energy consumption patterns relates to rural fuel sources. On-grid vs. off-grid consumers are roughly divided along urban vs. rural population lines. The rural population of Eswatini represents 79% of the total. Less than 10% of rural dwellers have access to grid energy, in contrast to 45% of the nation overall.⁴⁴ These realities drive rural use of traditional fuels, especially wood, charcoal, and paraffin. The UNEP estimates that Eswatini's primary fuel mix contains 66% traditional fuels,⁴⁵ meaning that traditional-fuels consumption would total approximately 2,438 GWh and produce an additional 3.6 MtCO_{2e} over and above what is produced by modern methods, and that total GHG emissions from energy may reach 4.4 MtCO_{2e}.⁴⁶

Eswatini has made significant progress in increasing the electrification rate and the goal is to reach universal access by 2022. In 2003, only 5% of the population had access to electricity and by 2017 this had risen to 75%.

⁴² SAPP, 2018, 2018 Annual Report.

⁴³ An emission factor of 0.8438 tCO₂/MWh has been derived using data from the GCF Concept Note for the Eswatini Energy Programme.

⁴⁴ African Development Bank, 2014, Swaziland Country Strategy Paper.

⁴⁵ UNEP, "Energy Consumption and Production, Swaziland," available at https://wedocs.unep.org/bitstream/handle/20.500.11822/20595/Energy_profile_Swaziland.pdf?sequence=1&isAllowed=y. Accessed on May 17, 2018.

⁴⁶ A figure of 1.5 kg CO₂ per kWh of wood-produced energy was used, per: <http://blueskymodel.org/kilowatt-hour>.

This is in large part due to the Rural Electrification Program (REP) that is integral to GoKE's Vision 2022 national development strategy which aims for Eswatini to attain "developed" country status by 2022.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

In order to shield the country from increasing dependence on imported energy, the MNRE promulgated the National Energy Policy 2018 (NEP 2018). The policy sets out five objectives: (a) Ensuring access to modern energy services for all; (b) Enhancing employment creation; (c) Ensuring security of energy supply; (d) Stimulating economic growth and development; and (e) Ensuring environmental and health sustainability. To achieve these objectives, the NEP 2018 has eleven policy positions for the electricity sector as listed in Table 1.

As discussed above, the imported electricity is highly carbon intensive resulting in relatively high greenhouse gas emission. Further, the alternative technology that would be used for productive energy uses in the baseline situation would be standalone diesel-powered generators that will also generate high GHG emissions.

Table 1. Policy positions in NEP 2018.

No.	Policy position
1	To ensure adequate security of electricity supply
2	To ensure efficient and cost-effective electricity supply integrating pricing for economic efficiency and financial sector viability
3	To support the development of renewable energy resources for a target of 50% of the electricity generation mix
4	To plan and support a comprehensive development of national capacities for the development of renewable energy projects
5	To strive to provide all households with access to modern energy by 2022
6	To strive to ensure eradication of energy poverty at all levels by 2030
7	To ascertain options and ensure establishment of a national electricity fund in support of renewable energy and accelerating access to modern energy throughout the country
8	To ensure the launch and implementation of a National Energy Efficiency Policy and associated implementation strategy covering all relevant sectors of the economy
9	To facilitate the further liberalization of the electricity market
10	To facilitate the access of Independent Power Producers (IPPs) in the electricity market through an effective regulatory framework
11	To ensure that appropriate local standards are established for relevant RE and EE technologies to enhance ease of trade and ensure safe and relevant quality to the consumers

While the country has taken large strides towards enhancing electricity access through grid extension, several barriers are expected to keep Eswatini from fully achieving their low-emission energy goals. The main barriers include:⁴⁷

1. Lack of financial resources:⁴⁸ Investments by the utility have been the main driver for electrification. However, the EEC cannot afford to implement many of the solutions at hand;
2. Lack of cost-reflective tariff:⁴⁹ The current tariff regime, which is not based on cost of service delivery. This has two implications : (i) lower revenues for SEC to invest in power generation and grid extension

⁴⁷ Eswatini and AfDB, 2018, Eswatini Energy Programme GCF Concept Note, available at https://www.greenclimate.fund/documents/20182/893456/21210_-_Eswatini_Energy_Programme.pdf/33a58f00-7b3c-b250-309c-3a36242a7735 - accessed 21 March 2019.

⁴⁸ According to the Statements of Comprehensive Income (2016), profits for SEC were USD 7.6 million and USD 5.1 million for the past two. These revenues are not sufficient for maintaining existing assets, including climate proofing power infrastructure, and for investing in new power generation and grid transmission and distribution network.

(linked to barrier 1) ; and (ii) market distortion resulting in uncompetitive decentralized electricity sources such as mini-grids and standalone solar home systems;

Climate risks: Current and future climate change, including extreme conditions, have detrimental impacts on some existing essential infrastructure. Addressing these risks to public infrastructure will absorb funding that could otherwise have been invested in indigenous power generation and further grid extension;

The **Sustainable Energy for All Country Action Plan 2014** had previously identified additional barriers related to access to electricity and productive uses of electricity, including:^{50,51}

3. Financial and economic incentives: There was a lack of appropriate incentives to attract private sector investments in electricity generation;
4. Institutional capacity: Improvement of the technical, managerial, financial and regulatory capacity of key institutions in the energy sector in order to address managerial and technical inefficiencies was required;
5. Policy outlook for renewable energy sources: The gap analysis observed that there was a need to develop a National Integrated Resource Plan that would clearly outline generation, transmission and distribution expansion plans, and the contribution of renewable energy in the energy mix. Further, there is a need to develop the Rural Electrification Strategy and Action Plan;
6. Stakeholder coordination: Development of strategic partnerships with clear roles and responsibilities for key project stakeholders including development partners, Ministries, Departments and Agencies, Town Councils and Tinkhundla Centers, Community-based organizations, financial institutions, NGOs and private sector entrepreneurs and investors was necessary to ensure maximum sustainable development benefits of projects;
7. Human capacity: Human capacity gaps is proposed to be bridged through the provision of sound business development training for key project implementers/managers, service providers and beneficiaries of projects; and
8. Innovative business models: There was a need for new business-oriented models for ensuring the long-term impact and sustainability of project, including more robust results-based planning, monitoring and evaluation indicators and targets for pilot projects.

These barriers were validated during in-country gap analyses (Annex D in PFD).

Geographical location

The Kingdom of Eswatini is divided into four regions as shown in Figure 1. According to the Multiple Indicator Cluster Survey 2014 and the Household Income and Expenditure Survey 2016/17, the Lubombo region is the poorest with high poverty indices. Given the relative lack of investments that the Lubombo region is likely to experience in the near-future, it is proposed that the pilot project be implemented in this region. In this case, the project will complement investments under the REF and above-mentioned initiatives, in order to support government policy for universal access to modern energy by 2022 in an area that is expected to receive less investment than the other regions. Alternatively, project could complement the WB initiative in the Shiselweni region, whereby communities that will still not be grid-connected will have access to electricity through the mini-grid.

⁴⁹ There have been recent increases in tariffs. However, they are below the rate at which business costs are rising. Also, EEC's petitions have resulted in some rate increases, but there remains a historical gap to plug.

⁵⁰ Kingdom of Swaziland, 2014, Sustainable Energy for All Country Action Plan;
https://www.seforall.org/sites/default/files/Swaziland_RAGA_EN_Released.pdf - accessed 20 March 2019.

⁵¹ IRENA (2014).

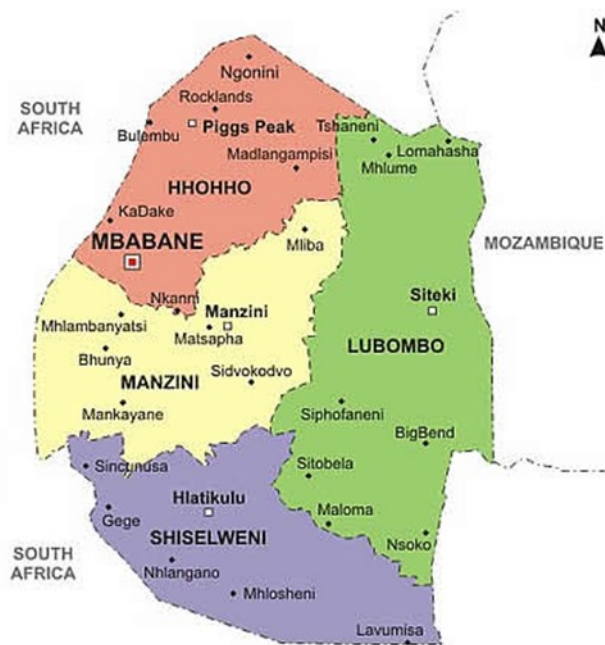


Figure 1. Map showing the four Regions of Eswatini.⁵²

The exact geographical location will be detailed during the PPG stage using the above guidance and the selection criteria for pilot sites detailed in the PFD. In either location, the GEF investments will complement the TA provided by the NRAP to develop of a policy and regulatory environment that will engender private sector participation in off-grid electrification and renewable energy generation (**Error! Reference source not found.**).

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

The **World Bank Network Reinforcement and Access Project, NRAP** (P166170 ; US\$45 million [USD 40 million loan + USD5 million GoKE]; approval to be determined at Board meeting on 18 April 2019). The development objective of NRAP is to “Improve the reliability of electricity supply and increase access to electricity services in targeted areas of Eswatini”. NRAP proposes to target the Shiselweni region, one of the poorest in Eswatini. A cluster survey conducted in 2014 identified Shiselweni as the region with the lowest electricity access rate amongst the four regions at 48% with the next being the Lubombo region, which had an electrification rate of 66%.⁵³ Prioritized electrification of the region through the REP has increased its electrification rate. However, the region remains one of the poorest with high poverty indices, second only to the Lubombo region.⁵⁴ 67.2% of the region’s population live below the poverty line with 21.1% described as living in extreme poverty.

The **Eswatini Energy Programme**⁵⁵ (African Development Bank; ~USD 60.1 million) is a Concept Note submitted to the GCF (31 July 2018) for funding consideration. The EEP is a suite of five climate related projects. The Programme’s activities are divided into two categories: A Mitigation component, and an Adaptation component. Under the mitigation component, the program will accelerate the nation toward its goal of low-emission, renewable energy delivery by reducing coal-based imports and delivering grid energy to new households, thus reducing burning of wood and charcoal. The adaptation component will climate-proof power sector infrastructure.

⁵² http://www.swazilandhappenings.co.za/swaziland_maps.htm - accessed 25 March 2019.

⁵³ Multiple Indicator Cluster Survey 2014 (Central Statistical Office, 2016).

⁵⁴ Eswatini Household Income and Expenditure Survey 2016/17 – Key findings report.

⁵⁵ Eswatini and AfDB, 2018, Eswatini Energy Programme GCF Concept Note.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP).

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access and productive uses of electricity in some rural communities. Further, none of the existing initiatives will directly support off-grid electricity access solutions. Hence, the proposed project will complement baseline initiatives through the development of renewables minigrids in Eswatini using private investments, while leveraging on the attributes and results of baseline activities. The incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Eswatini. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses in agriculture, agro-processing and measures to combat land desertification.

The proposed project will, therefore, squarely support implementation of the NEP 2018, as well as several national developmental policies and strategies, such as the National Development Strategy 1998-2022 that supports Vision 2022 and the Poverty Reduction Strategy and Action Programme 2006. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Eswatini.

The project will generate ~5.4 ktCO_{2e} direct lifetime emission reductions and ~54.61 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Eswatini Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first three components correspond to the three thematic areas described in the PFD, while Component 4 serves as a knowledge management bridge between the Child Project and the Regional Program.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrid in Eswatini.</i>	Mandatory Indicator 1: Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only) Mandatory Indicator 2 (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> Mandatory indicator 3: <i># of direct beneficiaries disaggregated by gender.</i>
Outcome⁵⁶ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	Indicator 4: <i>Number of Rural Electrification Strategy and Action Plan (based on DREI analyses and geospatial modelling of least-cost off-grid electrification options)</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	Indicator 5: <i>Number of solar-hybrid minigrids developed (by installed capacity and region)</i> Indicator 6: <i>Number of bidders with enhanced technical capacity</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Nigeria are operating and have access to working capital and equipment.</i>	Indicator 7: <i>Number of MG Funding Facility (MGFF) established and operational</i> Indicator 8: <i>Number of financing schemes developed and operationalised</i>
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	Indicator 9: <i>Number of knowledge networks created</i> Indicator 10: <i>Number of replication plan, including detailed budget, for scaling up the deployment of off-grid technologies in Eswatini (based on annual lessons learned)</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Eswatini project, and vice versa, and between the Eswatini project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Eswatini project as follows:

⁵⁶Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program will support the Eswatini project in the following ways:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Eswatini. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Eswatini with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (e.g. ESERA) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Eswatini, as well as standardized methodology for geospatial modeling of least-cost options for off-grid electrification using renewable energies
 - ✓ Dedicated support for the design, implementation and operationalization of the MG Funding Facility based on lessons learned from other countries (e.g. Nigeria), and support to link the REF with potential regional and international investors
 - ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 the Eswatini project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	5,400				
	Expected CO ₂ e (indirect)	54,611				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	5,400				
	Expected CO ₂ e (indirect)	54,611				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.1				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	8,294				
	Male	7,969				
	Total	16,263				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Ethiopia
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	Ministry of Water, Irrigation and Electricity (MoWIE)
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	2,890,826	57,000,000
Total Project Cost		2,890,826	57,000,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Ethiopia.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1— Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in low-carbon minigrids	<p>1.1. Customs procedures and import requirements harmonized, and capacities of public officials to implement and enforce simplified import process strengthened</p> <p>1.2 Geospatial, techno-economic modeling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)</p> <p>1.3 Formulation of the Rural Electrification Strategy and Action Plan</p> <p>1.4 Mingrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments to implement the Rural</p>	GEFTF	729,997	8,122,500

			<p>Electrification Strategy and Action Plan</p> <p>1.5 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models</p> <p>1.6 Public programmes (apprenticeships, certificates, university programs) to develop competitive, skilled labor market in minigrids</p> <p>1.7 Support provided to establish waste management policies and plans to ensure minigrid hardware and batteries are properly handled at end of life</p>			
Component 2— Project and Business Model Innovation with Private Sector Engagement	INV	Innovative business models based on cost reduction operationalized to support and strengthen private participation in low-carbon minigrid development	2.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in mini-grids and sufficient growing demand for minigrid systems	GEFTF	1,113,181	21,660,000
	TA		<p>2.2 Capacity of potential tender bidders (private sector developers) strengthened to consider innovative business models and cost-reduction levers</p> <p>2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p>		203,331	5,415,000
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial	<p>3.1 Financial advisory committee established and operational</p> <p>3.2 Domestic financial</p>	GEFTF	446,662	10,830,000

		instruments in place to incentivize investments in the development of low-carbon minigrids	<p>sector capacity-building on business and financing models for minigrids</p> <p>3.3 Innovative financing solutions for minigrid development are identified and implemented through the Development Bank of Ethiopia (DBE) and the Market Development Credit Line (MDCL)</p> <p>3.4 General market intelligence study on minigrids prepared and disseminated amongst public officials and finance community</p> <p>3.5 Feasibility study support provided to minigrid developers, creating a pipeline of investible assets</p>			
Component 4— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using low-carbon minigrids	<p>4.1 Lessons learned captured and disseminated at the national level</p> <p>4.2 Replication plan (including investment plan) for scaling up rural energy access developed</p> <p>4.3 Knowledge network / Community of Practice established to promote minigrid development / rural energy access</p> <p>4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of MGs, including GHG emission reductions is developed and operationalized</p>	GEFTF	259,997	8,122,500
Subtotal				GEFTC	2,753,168	54,150,000
Project Management Cost (PMC)				GEFTC	137,658	2,850,000
Total Project Cost					2,890,826	57,000,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government	Ethiopia's Electric Utility	Grant	Investment mobilized	12,000,000
Donor Agency	World Bank	Grant	Investment mobilized	15,000,000
Donor Agency	African Development Bank	Loan	Investment mobilized	20,000,000
Donor Agency	EU	Grant	Investment mobilized	10,000,000
Total Co-financing				57,000,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Ethiopia	Climate change	CC STAR Allocation	2,890,826	260,174	3,151,000
Total GEF Resources					2,890,826	260,174	3,151,000

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Ethiopia	Climate change	CC STAR Allocation	100,000	9,000	109,000
Total PPG Amount					100,000	9,000	109,000

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	13,900 (direct)

		4,966,674 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	55,947 (of which 50% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Ethiopia faces significant challenges in providing reliable energy access. More than 50 percent of Ethiopians lack access to electricity⁵⁷. The situation is starker in rural areas, where about 70 percent of Ethiopians lack access to electricity (see Figure **Error! Reference source not found.**). For the population with access to electricity, power quality is poor—only 4.5 percent of households receive Tier 5 level of service—11.3 percent of urban households and 2.2 percent of rural households.⁵⁸ A third of all firms identify electricity as a major constraint.⁵⁹

Achieving the national target of universal electricity access by 2025 will not be possible relying solely on traditional grid expansion. An estimated 90% of the population lives in fairly close proximity to distribution infrastructure. However, the existing infrastructure, which is not properly maintained, is inadequate for existing demand. Achieving universal access would require over a five-fold expansion of the grid by 2025. The national utility—Ethiopian Electric Utility (EEU)—already faces challenges in providing reliable service due to poor cost recovery, insufficient maintenance, and system overloading. The required expansion will further strain the infrastructure and operational capacity of the system. For these reasons, it is unrealistic to rely solely on grid extension to achieve the ambitious universal access in 2025.

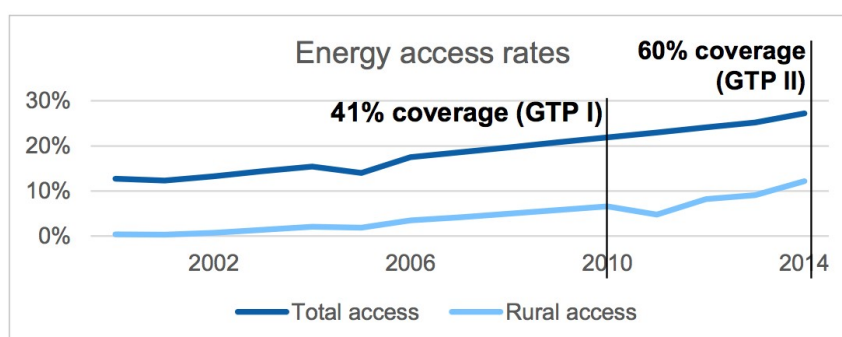


Figure 1: Energy Access Rates in Ethiopia

Minigrids are a compelling solution to accelerate progress towards universal access, drive rural economic development through productive energy use and provision of social services. Minigrids comprising of small-scale distribution networks with local generation based primarily on solar photovoltaic (PV) power, backed up with batteries or gensets for reliable 24/7 power have a vital role in accelerating access and can help Ethiopia meet its national targets. Until the grid arrives, minigrids can offer faster, more reliable energy solutions. Further, minigrids

⁵⁷ World Bank 2017 data, <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=ET>

⁵⁸ World Bank, Beyond Connections, 2018

⁵⁹ World Bank, Doing Business Report

can be the most cost-effective energy access solution for isolated communities in the long term. For remote communities that require higher levels of service, such as productive energy uses to stimulate local socioeconomic development, minigrids are more adequate than solar home systems.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

The Government of Ethiopia ('the Government') has recognized the potential value of minigrids and, with support from development partners, has defined an important role for minigrids in Ethiopia's energy access vision. The **Implementation Roadmap and Financing Prospectus** of the **National Electrification Program** (2017) ('the Roadmap') establishes an action plan and the institutional capacity and financial requirements needed to achieve universal access by 2025. The Roadmap defines the scope and outlines activities for off-grid development and grid extension. A geo-spatial assessment scheduled for completion in 2019 will lay-out the least-cost access roll-out plan ('roll-out plan') which will define target areas and approaches for different off-grid technologies, including minigrids. Further, the National Electrification Program (NEP) 2.0 (2019) singles out minigrids as the least-cost technology for ramping up off-grid electricity access from 11% in 2019 to 35% in 2025 for a total of 9 million beneficiaries.

The Roadmap aims to use both private and public-led delivery mechanisms to implement the roll-out plan and articulates activities needed to implement both delivery mechanisms.

- For **public-led delivery mechanisms**, the Roadmap includes Ethiopia Electric Utility ('EEU') developing minigrid pilot projects in areas that are not commercially viable and are unlikely to attract the private sector
- For **private-led delivery mechanisms**, the Roadmap addresses legal, policy, regulatory, market, information, and financial barriers that prevent private sector participation in the minigrid and solar home system markets.

Despite government commitment and progress to date, scaling up minigrids still faces several barriers (Table 1).

Risk Category	Risk Description	Root Barriers Underlying the Risk in Ethiopia
Energy Market Risk	Risks arising from limitations and uncertainty in the energy market regarding market outlook, access, price and competition	<ul style="list-style-type: none"> ▪ Uncertain role for renewable energy mini-grids in electrification plan ▪ Inability of private minigrid developers to access the electrification market, uncertainty about potential future competition, lack of publicly available grid extension plans ▪ Unclear electricity tariff regulations for minigrids ▪ Uncertain and/or inconsistent government technical requirements for minigrids regarding quality of service and grid integration ▪ Subsidized grid tariff sets unrealistic expectations for minigrid tariffs
Social Acceptance Risk	Risks arising from lack of awareness and resistances to renewable energy and minigrids in communities	<ul style="list-style-type: none"> ▪ Cost-reflective tariffs practiced by private developers might be higher than EEU charges
Hardware Risk	Risks arising from limitations in the quality and availability of minigrid hardware, as well as the customs treatment of hardware	<ul style="list-style-type: none"> ▪ Lack of a competitive market for buying hardware from international and domestic suppliers ▪ Inconsistent administration of customs process for importing hardware leads to delays in delivery; high customs tariffs on hardware
Digital Risk	Risks arising from use of cellular networks for remote monitoring and payments; the use of software, and abuse of consumer data	<ul style="list-style-type: none"> ▪ Lack of cellular coverage in rural areas where electrification is needed; ▪ Overdependence on a single operator for reliable cell service and payment processing ▪ Low mobile money penetration
Labor Risk	Risks arising from the lack of skilled and qualified potential employees	<ul style="list-style-type: none"> ▪ Lack of a competitive labor market of educated, skilled, and qualified potential employees, leading to higher costs, and suboptimal performance

Risk Category	Risk Description	Root Barriers Underlying the Risk in Ethiopia
Developer Risk	Risks arising from limitations in the minigrid operator's management capability, and its creditworthiness and cash flow	<ul style="list-style-type: none"> ▪ Lack of capacity to operate and maintain minigrid systems ▪ Lack of executive talent and experience to ensure effective execution and to manage challenges ▪ Lack of operation and maintenance interventions, especially in rural areas ▪ Lack of established minigrid companies that could finance, build and operate more than a couple of minigrids, even in partnership with international companies.
End User Credit Risk	Risks arising from customers' willingness, ability, and methods of payment for electricity	<ul style="list-style-type: none"> ▪ Lack of information on end-user credit worthiness: Lack of end-user credit data with which to assess the ability of end-users to pay for the initial connection fees, ongoing electricity bills and ancillary equipment (e.g., lights and appliances)
Financing Risk	Risks arising from scarcity of domestic investor capital (debt and equity) for minigrids, and domestic investors' lack of familiarity with minigrids and appropriate financing structures	<ul style="list-style-type: none"> ▪ Limited availability of long-term domestic loans due to high banking reserve requirements ▪ Low number of well-capitalized actors and lack of regulatory clarity on legality of new financial products ▪ Existing policies incentivize or mandate domestic financial sector to invest in alternative, competing sectors to minigrids ▪ Lack of information, assessment skills, and track-record for minigrid projects amongst domestic investor community; lack of network effects found in established markets; lack of familiarity and skills with appropriate finance structures
Currency Risk	Risks arising from currency mismatch between domestic currency revenues and hard currency financing	<ul style="list-style-type: none"> ▪ Government limitations on exchanging Ethiopian Birr to hard currency
Sovereign Risk	Risks arising from a mix of cross-cutting political, economic, institutional and social characteristics not specific to minigrids	<ul style="list-style-type: none"> ▪ Limitations and uncertainty related to conflict, political instability and ease of doing business

Source: UNDP, Derisking Renewable Energy Investment: Off-Grid Electrification (2018)

Geographical location

NEP 2.0 (2019) identifies the geographical areas that will be served by minigrids in the short and medium terms up to 2025. In alignment with NEP 2.0, GEF investments will target off-grid communities living between 2.5 km and 25 km away from the existing grid. This leads to a potential market of 5 million beneficiaries by 2025. The exact project locations for minigrid investments will be defined during PPG stage.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Various **international development partners** are also supporting the off-grid sector. USAID is conducting feasibility analyses for the conversion of EEU's diesel mini-grids to renewable energy power, five hydroelectric sites identified by Water Works Enterprise, and several clusters of unelectrified villages to evaluate mini-grid solutions for access provision. The European Union is financing five hydro mini-grids implemented by GIZ, testing a model for renewable energy-distributed generation that is currently based on cooperatives, but is aimed at scaling up the market for private or public agencies, as well as a combination of both. In collaboration with the Korean International Agency Cooperation, UEAP launched two hydro mini-grids in 2017. In addition, solar, wind, and other renewable mini-grids activities are being piloted.⁶⁰ A summary of ongoing minigrid activities by various development partners are summarised in Table 4.5 in NEP 2.0.

⁶⁰ Federal Democratic Republic of Ethiopia (2019) National Electrification Program 2.0 – Integrated Planning for Universal Access.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP). The GAP will be informed by the overall gender strategy defined in NEP 2.0.

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access and productive uses of electricity in some rural communities. Hence, the proposed project will complement baseline initiatives through the development of renewables minigrids in Ethiopia using private investments, while leveraging on the attributes and results of baseline activities. The incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Ethiopia. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses in agriculture, agro-processing and measures to combat land desertification. The proposed project will, therefore, squarely support implementation of the NEP 2.0. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Ethiopia.

The project will generate ~13.9 ktCO_{2e} direct lifetime emission reductions and ~4,967 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Ethiopia Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first three components correspond to the three thematic areas described in the PFD, while Component 4 serves as a knowledge management bridge between the Child Project and the Regional Program.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by reducing the cost and increasing the commercial viability of low-carbon minigrids in Ethiopia.</i>	<u>Mandatory Indicator 1:</u> Number of households benefiting from clean, affordable and sustainable energy access (project will target rural households only) <u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> <u>Mandatory indicator 3:</u> # of direct beneficiaries disaggregated by gender.
Outcome⁶¹ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in low-carbon minigrids</i>	Indicator 4: Number of DREI analyses and geospatial modelling of least-cost off-grid electrification options
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in low-carbon minigrid development</i>	Indicator 5: Number of solar-hybrid minigrids developed (by installed capacity and region) Indicator 6: Number of bidders with enhanced technical capacity
Outcome 3 <i>Sustainable minigrid providers in Ethiopia are operating and have access to working capital and equipment.</i>	Indicator 7: Number of financing schemes for minigrids developed and operationalised under the DBE and MDCL
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using low-carbon minigrids</i>	Indicator 8: Number of knowledge networks created Indicator 9: Number of replication plan, including detailed budget, for scaling up the deployment of off-grid technologies in Ethiopia (based on annual lessons learned)

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Ethiopia project, and vice versa, and between the Ethiopia project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Ethiopia project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program with support the Ethiopia project in the following ways:

⁶¹Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

- ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Ethiopia. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Ethiopia with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
- ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (e.g. EEU and MOWIE) and private sector (e.g. mini-grid developers) and the overall minigrid market
- ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Ethiopia, as well as standardized methodology for geospatial modeling of least-cost options for off-grid electrification using renewable energies
- ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Ethiopia project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	13,900				
	Expected CO ₂ e (indirect)	4,966,674				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	13,900				
	Expected CO ₂ e (indirect)	4,966,674				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.27				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	27,974				
	Male	27,973				
	Total	55,947				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: MEDIUM-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Madagascar
Lead Agency	UNDP
GEF Agency(ies):	UNDP, AfDB
Project Executing Entity(s):	TBD
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	0	2,000,000
Total Project Cost		0	2,000,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Madagascar.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1. A minigrid regulatory framework, including tariff model, tax regime, and grid expansion risk, is developed in close coordination with other development partners (WB and GIZ)</p> <p>1.2. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments to support minigrid development</p> <p>1.3. Institutional set-up for rural electrification assessed and supported, and institutional capacity building provided on technical, managerial, and regulatory issues</p> <p>1.4 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/tender</p>	GEFTF	0	408,000

			<p>processes that incorporate cost-reduction levers and innovative business models</p> <p>1.5 Support provided to improve policies around digital infrastructure for smart minigrids, including improving cellular coverage in rural areas and mobile money</p>			
Component 2— Project and Business Model Innovation with Private Sector Engagement	INV	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	2.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, using innovative business models focused on minigrids cost reduction levers (in regions complementing WB, USTDA investments)	GEFTF	0	774,000
	TA		<p>2.2 Capacity of potential tender bidders (private sector developers) strengthened to consider innovative business models and cost-reduction levers</p> <p>2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost reduction levers</p>		0	162,000
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of low-carbon minigrids	<p>3.1. Concessional finance and result-based finance (RBF) proposal are written to mobilize additional resources from EU, ADF, GCF, etc.</p> <p>3.2. Domestic financial sector capacity-building on business and financing models for minigrids</p> <p>3.3. General market intelligence study on minigrids prepared and disseminated amongst public officials and finance community</p>	GEFTF	0	324,000
Component 4— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for	<p>4.1 Lessons learned captured and disseminated at all levels</p> <p>4.2 Replication plan (including investment plan) for scaling up rural energy access using solar minigrids</p>	GEFTF	0	252,000

		scaling up rural electrification using solar PV-battery minigrids	developed 4.3 Knowledge networks / Communities of Practice / industry association established to promote minigrids development 4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable develop impacts of minigrids, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTF	0	1,920,000
Project Management Cost (PMC)				GEFTF	0	80,000
Total Project Cost					0	2,000,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
GEF Agency	UNDP	Grant	Investment Mobilized	1,000,000
GEF Agency	AfDB (SEFA)	Grant	Investment Mobilized	1,000,000
Total Co-financing				2,000,000

Describe how any "Investment Mobilized" was identified. Direct grant contribution by UNDP (TRAC resources) and the AfDB (SEFA resources)

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Madagascar	0	CC STAR Allocation	0	0	0
Total UNDP TRAC Resources					0	0	0

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☐ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☒ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

n/a

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	13,900 (direct) 2,465,395 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	56,086 (of which 50% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Madagascar (population ~26 million) is one of the poorest countries in the world with per capita gross domestic product (GDP) at 440 US\$/person. This is well below the average of all least-developed Sub-Saharan African countries. Approximately, 91% of households live below the threshold of 2 US\$/day. Consequently, Madagascar has a relative high poverty index of 36.1.⁶² Recent economic growth has barely touched the poverty rate, which inched back from 77.7% in 2014 to 75.1% in 2018. Agriculture, as the country's leading employer and livelihood of 80% of the population, plays a key role in progress with poverty in Madagascar. Yet agricultural growth has been too low and volatile in recent years, generally trending at less than demographic growth.⁶³ The precarious socioeconomic conditions are exacerbated by the country's vulnerability to natural disasters, including cyclones, droughts, earthquakes, floods, and locust invasions. The country experiences about \$100 million in economic losses annually from cyclones, earthquakes, and floods.⁶⁴

Madagascar has very low electrification rate (13%) especially in rural regions, which constrains the country's social and economic development. The government has to allocate a large share of spending for national utility's (JIRAMA) financial deficit. The 2015 New Energy Policy (NEP) aims to increase electrification to at least 70% by 2030⁶⁵ following three principles: least-cost, grid-based renewable energy solutions, and social justice. This Child Project will squarely support these NEP objectives.

The child project will support the main objective of poverty alleviation through socioeconomic development fueled by productive energy uses in rural and peri-urban areas. Further, the child project will support implementation of the mitigation contributions pledged in the Nationally Determined Contribution (NDC)⁶⁶ – i.e. a reduction of 30 MtCO₂e

⁶² Republic of Madagascar (2015) Intended Nationally Determined Contribution of the Republic of Madagascar.

⁶³ <https://www.worldbank.org/en/country/madagascar/overview> - accessed 20 September 2019.

⁶⁴ Between 1980 and 2010 alone, Madagascar was struck by 35 cyclones and floods, five periods of severe droughts, five earthquakes, and six epidemics; <https://www.gfdrr.org/en/madagascar> - accessed 20 September 2019;

⁶⁵ Ministère de l'Énergie et des hydrocarbures (2015) Lettre de politique de l'énergie de Madagascar 2015-2030 ; <http://www.ore.mg/> - accessed 20 September 2019.

⁶⁶ Republic of Madagascar (2015) Intended Nationally Determined Contribution of the Republic of Madagascar.

(14% excluding LULUCF) relative to the BAU in 2030. Mitigation targets are well aligned with projected economic development that will leverage energy generation from renewable energy sources and adopt state-of-the-art rural electrification technologies. Given its precarious socioeconomic condition, Madagascar can contribute only 4% of the total US\$42.1billion needed to implement its NDC.⁶⁷

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

While it is acknowledged that energy access is an important lever for poverty alleviation, access to electricity remains very low as discussed earlier. The NEP 2015 supports rural electrification using minigrids based on locally available renewable energy sources (solar, wind, biomass and hydro) that can be interconnected with existing regional grids. The Policy also proposes to make use of Public-Private Partnerships (PPPs), in close collaboration with local communities to increase investments in electrification. The NEP 2015 envisages that solar minigrids is expected to be a lower cost electrification option in solar abundant regions in the West and South of the country. In addition to affordability, local electricity generation will avoid losses that afflict the national grid. Nevertheless, there are significant barriers constraining the scaling up of minigrids. Preliminary analysis of barriers and risks facing investors in minigrids has revealed the following:⁶⁸

- Lack of regulatory framework for minigrids tariffs
- Low capacity of government authorities and private investors in standardized tendering processes
- Low level of private sector knowledge of innovative business models based on cost reduction considerations that could increase the affordability of electricity
- Low private sector capacity to develop, operate and maintain minigrids
- Lack of domestic financing and international support on minigrids
- Lack of technical standards for minigrids
- Poor customer credit worthiness in rural areas due to limited productive energy uses

Geographical location

The exact project locations for investments will be defined during PPG stage in close collaboration with the complementary initiatives discussed below. The NEP 2015 has identified regions in the West and South of the country as having the most abundant solar resources.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

A number of donor partners provided/are providing technical assistance to Madagascar, mostly focused on government capacity building:

- World Bank's Least-Cost Electricity Access Development Project (LEAD) will assist the MEH, ADER, JIRAMA, and ARELEC in building technical expertise and operational capacity of their staff and help the four agencies devise enabling policies and regulatory frameworks to further their respective mandates. Its off-grid component will engage both private sector companies and financial institutions in accelerating the scale-up of the market for solar off-grid technology;
- The Climate Investment Fund (CIF), through funds of the WB, the IFC, and the AfDB, supports the Government of Madagascar through the Scaling-Up Renewable Energy Program (SREP) Investment Plan, with the aim to catalyze funding from donors and the private sector. The program is divided into two strategic avenues, namely (i) the development of rural electrification by renewable energy plants and mini-

⁶⁷ The breakdown is as follows: Mitigation (US\$6.37billion); Adaptation (US\$28.713billion); Capacity Building (US\$1.754billion); Technology Transfer (US\$5.262billion).

⁶⁸ UNDP's derisking renewable energy investments (DREI) in minigrids was used to carry out preliminary barriers and risks analyses; https://www.undp.org/content/undp/en/home/librarypage/environment-energy/low_emission_climateresilientdevelopment/derisking-renewable-energy-investment/guidance-materials-and-tools.html - accessed 17 September 2019.

networks (implemented by World Bank), and (ii) the hybridization of JIRAMA's priority isolated centers (implemented by AfDB);

- GIZ is supporting ADER to improve minigrid tender process; to better coordinate and allocate concessions, financings to accelerate rural electrification; to provide professional education program with schools, universities, private sector, and explore PPP platforms;
- USAID's PowerAfrica is providing some support on capacity building to ADER with its plan to roll out electricity nationwide;
- USTDA, partnering with Malagasy energy company HFFC and US battery storage manufacturer, is supporting a feasibility study, evaluating the technical and economic viability of deploying solar photovoltaic-powered minigrids with integrated battery storage at up to 100 sites across Madagascar;

Madagascar has public institutions that are active in the off-grid electrification. ADER was established in 2004 and is responsible for rural electrification through grid extension and off-grid solutions, including minigrids. Since 2016, it has launched two rounds of minigrid tenders using a regional approach in order to reach economies of scale by bundling concessions. Also, JIRAMA, together with ADER, own and operate around 130 minigrids in Madagascar, and funding has relied exclusively from grant support from development partners.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 5 of the PFD will be used to develop country-specific Gender Action Plan (GAP).

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

Given the large resources needed to achieve the national targets discussed above, the authorities intend to mobilize private sector participation alongside with public and concessional resources, notably for the deployment of off-grid solutions. Despite donor partners', catalyzing private investments will remain a challenge, and the incremental AMP contributions are seen as:

- Operationalizing viable minigrid business models with focus of cost reduction approaches;
- Cost effective derisking of investments in solar minigrids using UNDP's DREI methodology, combined with efforts to reduce hardware and soft costs;
- Supporting Communities of Practice to facilitate conversations among private government, financial institutes, and private sector, and sharing of lessons learned on sustainable minigrid management;
- Establishing a harmonized framework for tracking the SDG impacts and GHG emission reductions accruing from investments in solar minigrids;

- Emphasis on capturing and disseminating lessons learned and knowledge management for scaling up investments in PV-battery minigrids;

The proposed project will complement baseline initiatives through the development of solar minigrids using private investments. For access to electricity, the incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Madagascar. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will squarely support implementation of NEP 2015 and the NDC of Madagascar.

The project will generate ~13.9 ktCO_{2e} direct lifetime emission reductions and ~2,465 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Madagascar Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

Component 4 will serve as a knowledge management bridge between the Child Project and the Regional Program, and between the Madagascar Child Project and other country child projects.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in PV-battery minigrids in Madagascar through business models centred on cost reduction levers</i>	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access (project will target rural communities only) <u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> <u>Mandatory indicator 3:</u> # of direct beneficiaries disaggregated by gender.
Outcome⁶⁹ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	<i>Indicator 4: Number of DREI analyses and number of cost-effective derisking instruments identified and adopted in strategies and action plans</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	<i>Indicator 5: Number of solar-battery minigrids developed (by installed capacity and region)</i> <i>Indicator 6: Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Madagascar are operating and have access to working capital and equipment.</i>	<i>Indicator 7: Number of market intelligence surveys by regions</i>
Outcome 4	<i>Indicator 8: Number of knowledge networks created</i>

⁶⁹Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer-term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

<i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	<i>Indicator 9: Number of M&E frameworks adopted and applied for tracking SDG impacts and GHG emission reductions</i>
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National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Madagascar project, and vice versa, and between the Madagascar project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. The Regional Program will support the Madagascar Child Project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country. Support to national activities in Madagascar will consist of:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Madagascar. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Madagascar with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (MEH, ADER, JIRAMA, ARELEC) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Madagascar
 - ✓ Providing a standardized methodology for carrying out market intelligence
 - ✓ Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
 - ✓ The Program will support the development of a common monitoring and indicator framework (SDG impacts and GHG emission reductions) for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Madagascar project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>			
		Expected metric tons of CO ₂ e (6.1+6.2)						
		PIF stage	Endorsement	MTR	TE			
	Expected CO ₂ e (direct)	13,900						
	Expected CO ₂ e (indirect)	2,465,395						
Indicator 6.2	Emissions avoided Outside AFOLU							
		Expected metric tons of CO ₂ e						
		Expected		Achieved				
		PIF stage	Endorsement	MTR	TE			
	Expected CO ₂ e (direct)	13,900						
	Expected CO ₂ e (indirect)	2,465,395						
	Anticipated start year of accounting	2021						
	Duration of accounting	20						
Indicator 6.4	Increase in installed renewable energy capacity per technology							
		Capacity (MW)						
	Technology	Expected		Achieved				
		PIF stage	Endorsement	MTR	TE			
	Solar Photovoltaic	0.27						
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>			
		Number						
		Expected		Achieved				
		PIF stage	Endorsement	MTR	TE			
	Female	28,043						
	Male	28,043						
	Total	56,086						



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: MEDIUM-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Malawi
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	TBD
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	396,125	6,550,000
Total Project Cost		396,125	6,550,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Malawi.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1— Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1. Strengthening minigrid policy and regulatory framework, including development of quality standards for minigrid components and formulation of the Rural Electrification Act (in collaboration with the Malawi Electricity Access Project)</p> <p>1.2 Streamlining customs process, and developing an effective market surveillance for minigrid components</p> <p>1.3 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments to accelerate minigrid development</p> <p>1.4 Capacity building provided to public</p>	GEFTF	78,433	594,750

			officials (regulator, ministries) specifically to design procurement/ tender processes that incorporate cost-reduction levers and innovative business models			
Component 2— Project and Business Model Innovation with Private Sector Engagement	INV TA	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	2.1 Productive-use 100 kW solar PV-battery minigrid pilot developed using innovative business models 2.2 Capacity of potential tender bidders (private sector developers) strengthened to consider innovative business models and cost-reduction levers 2.3 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers	GEFTF	128,380 28,521	5,010,750
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids	3.1 Design support, including development of operational guidance, provided to REF for a financing window dedicated to renewable minigrids 3.2 Innovative financing solutions for minigrid development are identified and implemented 3.3 Feasibility study support provided to minigrid developers, creating a pipeline of investible assets	GEFTF	53,477	294,750
Component 4— Convening, Dissemination, tracking (Knowledge Management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	4.1 Lessons learned captured and disseminated at the national level 4.2 Replication plan (including investment plan) for scaling up minigrids developed 4.3 Supporting the creation of an industry association as a	GEFTF	71,303	294,750

			Community of Practice to advocate for the perspective of private sector minigrid developers			
			4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of , including GHG emission reductions is developed and operationalized			
Subtotal				GEFTC	360,114	6,195,000
Project Management Cost (PMC)				GEFTC	36,011	355,000
Total Project Cost					396,125	6,550,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government	Ministry of Natural Resources, Energy and Environment	Grant	Investment mobilized	5,000,000
GEF Agency	UNDP	Grant	Investment mobilized	1,000,000
Donor Agency	World Bank	Loan	Investment mobilized	250,000
Donor Agency	USAID	Grant	Investment mobilized	300,000
Total Co-financing				6,550,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Malawi	Climate change	CC STAR Allocation	396,125	35,651	431,776
Total GEF Resources					396,125	35,651	431,776

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Malawi	Climate change	CC STAR Allocation	10,000	900	10,900
Total PPG Amount					10,000	900	10,900

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	2,400 (direct) 2,004,726 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	9,644 (of which 51% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Malawi is a landlocked, least-developed country, with one of the lowest electrification rates but abundant solar and hydro resources. The country's total area is 118,484 km², with an estimated population of 17.5 million, growing at a rate of 2.8% per annum. About 80% of the population lives in rural areas. Malawi's per capita gross domestic product (GDP) is approximately \$272. Malawi has an agro-based economy that accounts for 30 to 40% of the GDP, and employs 85% of the country's workforce and supplies 60 to 70% of raw materials to the manufacturing sector.⁷⁰ Access to grid electricity is at 10%, one of the lowest in the world. Malawi's electricity generation deficit of between 1,200 MW and 1,500 MW is not only a hindrance to new investments in manufacturing, industry, mining and tourism but also detrimental to poverty reduction, rural economic transformation and the social and economic well-being of its people.

Currently, power supply largely relies on hydro, which is vulnerable to drought and seasonality, and most of the targets proposed in the Malawi Energy Policy (2003) to increase generation capacity were not achieved. The government is undertaking a comprehensive power sector reform, aiming to expand generation and transmission capacity, improve utility financial and operational performance and enhance regulatory framework. Malawi set the target to electrify 80% rural population and reach universal modern energy access by 2030 and is exploring both on-grid and off-grid solutions.⁷¹ The lack of financing is among the biggest challenge in Malawi's nascent off-grid sector.

The Child Project is supportive of the National Energy Policy 2018 to increase access to affordable, reliable, sustainable, efficient and modern energy for every person in the country. The provision of sustainable and reliable energy is expected to catalyze industrialization and modernization of the economy through supporting rapid growth of the productive sectors such as agriculture, manufacturing, mining and the service sector. It is also aligned with Malawi's First Nationally Determined Contribution (NDC), and the National Climate Change Management Policy 2016 that seek to promote climate change mitigation and adaption for sustainable livelihoods through measures that increase levels of knowledge and understanding and improve human well-being and social equity, while pursuing economic development that significantly reduces environmental risks and ecological scarcities. In particular, the share of national greenhouse gas (GHG) emissions arising from the energy sector is anticipated to increase to 17% in 2040 compared to being only 4% in 2015. In addition, to supporting the broader socioeconomic development of Malawi, the Child Project will support GHG emissions reductions through off-grid renewable electricity access based on energy cost reduction levers to increase the affordability of renewable electricity.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

While the country has taken the commitment to achieve universal enhancing electricity access mainly through grid extension, the prevailing condition is that most rural and peri-urban areas are still either underserved or unserved.

⁷⁰ Republic of Malawi (2015) Malawi's First Nationally Determined Contribution, available at <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Malawi%20First/MALAWI%20INDC%20SUBMITTED%20TO%20UNFCCC%20REV.pdf> – accessed 5 September 2019.

⁷¹ Government of Malawi (2018) National Energy Policy 2018, available at <https://energy.gov.mw/index.php/resource-centre/documents/policies-strategies> - accessed 5 September 2019

The Malawi Rural Electrification Program (MAREP) which is being implemented by Government of Malawi (GOM) and the Electricity Supply Company of Malawi (ESCOM) has had limited impact on electrification of rural and peri-urban areas in the country. The National Energy Policy (2018) notes that, among others: (1) the Rural Electrification Fund (REF) has had little impact in connecting rural areas to the national grid, and (2) financing, human and institutional capacity, and technical and technology limitations have prevented deployment of renewable energies. UNDP's derisking approach has been used to identify the main barriers that have hindered the development of minigrids in Malawi. The main barriers include:

- Weak regulatory and institutional frameworks for supporting minigrid development, including amongst others: no apex organization dedicated to rural electricity access; lack of quality standards for equipment and capacity for enforcements, lack of standardized bidding process for minigrid concessions and no institutional arrangements for mobilizing financial resources in minigrids
- Lack of access to financing, especially for private sector, and lack of interest from financial institutions to invest in nascent minigrid market due to a combination of lack of sector knowledge and perceptions of risks
- Lack of technology supply chain limiting access to quality products (in conjunction with lack of standards and weak enforcement capacities)
- Poor market information regarding customer capacity to pay and credit worthiness
- Lack of cost reduction considerations that could increase the affordability of electricity
- Low private sector capacity to develop, operate and maintain minigrids
- Weak human and institutional capacity on solar PVs

Geographical location

The exact project locations for minigrid investments will be defined during PPG stage but will be different from rural areas that are benefitting from investments under the existing UNDP-GEF project and the Malawi Energy Access Project (see below).

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

The Child Project will collaborate and complement two baseline initiatives.

The GEF is funding the project entitled "Increasing Access to Clean and Affordable Decentralized Energy Services in Selected Vulnerable Areas of Malawi" (2016 – 2020, US\$1.725million GEF grant), which aims to increase access to energy in selected remote, rural areas in Malawi by promoting innovative, community-based minigrid applications in cooperation with the private sector, social enterprises and civil society. The ongoing UNDP-GEF project is focusing in mini hydro minigrids in Mulanje. The Child Project has been designed to complement the existing UNDP-GEF project by focusing on interventions mentioned in the National Energy Policy 2018, and on solar PV-battery minigrids.

The Ministry of Natural Resources Energy & Mining (MNREM) and ESCOM are implementing the Malawi Electricity Access Project funded by the World Bank (US\$150 million; 2019-2024). The objective of the project is to increase access to electricity in Malawi. While most of the funding will go to grid expansion, the project's off-grid market development fund will have a minigrid window for minigrid developers, prioritizing agriculture loads, schools, health facilities and enterprises in peri-urban and rural areas. The technical assistance part of the project will support development of (1) bankable minigrid projects, (2) business model, and (3) regulatory framework. A Geospatial Least-cost Electrification Plan implemented by ESMAP (World Bank) helped identify minigrid locations for investment

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP). The GAP will be informed by the overall gender strategy defined in NEP 2.0.

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the ‘program’) – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids (‘minigrids’). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program’s theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD’s baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project’s incremental reasoning for GEF financing under the program, including the results framework and components.

It is expected that there will be significant gaps in the capacity of government to reach universal access to modern energy for 80% of the population without the development of minigrids by 2030. The proposed project will complement baseline initiatives in the development of solar PV-battery minigrids in Malawi. The incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Malawi. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will, therefore, squarely support the ambition of government to achieve universal energy access by 2030. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Malawi, and fully supports implementation of the National Energy Policy 2018.

The project will generate ~2.4 ktCO_{2e} direct lifetime emission reductions and ~2,005 ktCO_{2e} consequential emission reductions (top down). The bottom-up consequential emission reductions will be calculated during the PPG stage.

Project components

The Malawi Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Project and business model innovation with private sector engagement
- Component 3: Innovative financing
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first three components correspond to the three thematic areas described in the PFD, while Component 4 serves as a knowledge management bridge between the Child Project and the Regional Program, and between the Malawi Child Project and other country projects.

Results framework

	Objective and Outcome Indicators
Project Objective:	<u>Mandatory Indicator 1</u> : Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only)
<i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrid in Malawi.</i>	<u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission</i>

	<i>reductions, metric tCO_{2e}.</i>
	<i>Mandatory indicator 3: # of direct beneficiaries disaggregated by gender.</i>
Outcome⁷² 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	<i>Indicator 4: Number of DREI analyses and geospatial modelling of least-cost off-grid electrification options</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	<i>Indicator 5: Number of solar-battery minigrids developed (by installed capacity and region)</i>
	<i>Indicator 6: Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>Sustainable off-grid lighting (service) providers in Malawi are operating and have access to working capital and equipment.</i>	<i>Indicator 7: Number of financing schemes for minigrids developed and operationalised</i>
Outcome 4 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	<i>Indicator 8: Number of knowledge networks created</i>
	<i>Indicator 9: Number of replication plan, including detailed budget, for scaling up the deployment of off-grid technologies in Malawi (based on annual lessons learned)</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Malawi project, and vice versa, and between the Malawi project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Malawi project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program will support the Malawi project in the following ways:
- ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Malawi. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Malawi with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models

⁷²Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

- ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (e.g. ESCOM) and private sector (e.g. mini-grid developers) and the overall minigrid market
- ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Malawi, as well as standardized methodology for geospatial modeling of least-cost options for off-grid electrification using renewable energies
- ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Malawi project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	2,400				
	Expected CO ₂ e (indirect)	2,004,726				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	2,400				
	Expected CO ₂ e (indirect)	2,004,726				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.06				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	4,918				
	Male	4,726				
	Total	9,644				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Nigeria
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity(s):	Rural Electrification Agency
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	5,905,046	96,500,000
Total Project Cost		5,905,046	96,500,000

PROJECT COMPONENTS AND FINANCING

Project Objective: Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Nigeria.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1— Project and Business Model Innovation with Private Sector Engagement	INV	Innovative business models based on cost reduction operationalized to support and strengthen private participation in low-carbon minigrid development	1.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in mini-grids and sufficient growing demand for minigrid systems	GEFTF	3,099,447	53,221,250
	TA				560,979	9,167,500
			1.2 Interconnected minigrids for underserved urban areas in Port Harcourt and other cities in Nigeria			
			1.3 Capacity of potential tender bidders (private sector developers) strengthened to consider innovative business models			

			<p>and cost-reduction levers</p> <p>1.4 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p> <p>1.5 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models</p> <p>1.6 Support to upstream suppliers on hardware standardization / modular approaches, including in tendering processes</p>			
Component 2— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of low-carbon minigrids	<p>2.1 Financial advisory committee established and operational</p> <p>2.2 Innovative financing solutions for minigrid development are identified and implemented through the REF</p> <p>2.3 General market intelligence study on minigrids prepared and disseminated amongst public officials and finance community</p> <p>2.4 Feasibility study support provided to minigrid</p>	GEFTF	1,065,861	17,418,250

			<p>developers, creating a pipeline of investible assets</p> <p>2.5 Capacity building provide to minigrid developers and investors on measuring and reporting on impact indicators, building credibility in impact investment as an asset class</p>			
Component 3— Convening, Dissemination, Tracking (Knowledge Management)	TA	Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using low-carbon minigrids	<p>3.1 Lessons learned captured and disseminated at the national level</p> <p>3.2 Replication plan (including investment plan) for scaling up rural energy access developed</p> <p>3.3 AMDA Nigeria chapter strengthened to promote minigrid development</p> <p>3.4 Quality Assurance Framework augmented for measuring, reporting and verification of the sustainable develop impacts of MGs, including GHG emission reductions</p>	GEFTF	897,567	14,668,000
Subtotal				GEFTF	5,623,854	94,475,000
Project Management Cost (PMC)				GEFTF	281,192	2,025,000
Total Project Cost					5,905,046	96,500,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
Recipient Country Government	Rural Electrification Agency	Grant	Investment mobilized	1,875,000
Recipient Country Government	Rural Electrification Agency	In-kind	Recurrent expenditures	625,000
Donor Agency	World Bank	Grant	Investment mobilized	80,000,000

Donor Agency	GIZ	Grant	Investment mobilized	6,000,000
Donor Agency	GIZ	Loan	Investment mobilized	3,600,000
Donor Agency	GIZ	Equity Investment	Investment mobilized	2,400,000
Private Sector	AllOn	Equity Investment	Investment mobilized	2,000,000
Total Co-financing				96,500,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional / Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFT F	Nigeria	Climate change	CC STAR Allocation	5,905,046	531,454	6,436,500
Total GEF Resources					5,905,046	531,454	6,436,500

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFT F	Nigeria	Climate change	CC STAR Allocation	150,000	13,500	163,500
Total PPG Amount					150,000	13,500	163,500

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	177,300 (direct) 4,936,129 (consequential top

		down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	357,726 (of which 49% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Nearly 85 million Nigerians are underserved or unconnected to the grid due to the poor quality of grid power and low electrification rates.⁷³ As a result Nigerians and their businesses spend almost \$14 billion annually on off-grid power from small self-generators that is expensive (around \$0.52/kWh), has poor quality, and is noisy and polluting.⁷⁴ The use of diesel based generators is widespread. Petrol and diesel generators generate 7 Terawatt-hours of electricity annually, which represents 25 percent of total electricity generated through the grid.⁷⁵ Power production from diesel generators in Nigeria is estimated to emit 29 million metric tons of CO₂ annually.⁷⁶

Minigrids—small-scale distribution networks with local generation based primarily on solar photovoltaic (PV) power, backed up with batteries or gensets for reliable 24/7 power—have a vital role in accelerating access and reducing CO₂ emissions. Until the grid arrives, minigrids can offer faster, more reliable, and in some cases more cost-effective access to cleaner sources of energy to portions of the population far away from the grid that require higher levels of service than solar home systems can currently provide.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Nigeria is leading the way in sub-Saharan Africa in establishing a regulatory and policy framework supportive of private sector led minigrid development. The Nigerian Electricity Regulatory Commission (NERC) established the Mini Grid Regulation (2017) that offers a clear framework for developers to follow. The government of Nigeria ('FGN') has established a robust policy framework that includes incentives to promote private sector participation by attracting local and foreign investment, increasing access to concessionary finance, reducing costs for project development, enforcing contracts, limiting exposure to foreign exchange volatility, eliminating import taxes, and fast-tracking the customs clearance process.⁷⁷

REA has attracted significant sources of grant and concessional funding that it is mobilizing through the Rural Electrification Fund (REF). The REF provides capital grants to cover up to 75 percent of minigrid project costs and technical support for rural electrification. REA has obtained public financing through budget provisions and government loans. REA obtained US\$86 million to develop 386 rural electrification projects in the 2016/2017

⁷³ Based on an access rate of 60% as of 2015. "Nigeria Country Data," Sustainable Energy for All Africa Hub, 2019, <https://www.se4all-africa.org/seforall-in-africa/country-data/nigeria/>

⁷⁴ REA, Minigrid Investment Brief, 2017

⁷⁵ Farquharson, D; Jaramillo, P; Samaras, C. Sustainability Implications of Electricity Outages in sub-Saharan Africa. Nature Sustainability. 2018

⁷⁶ Moss, T; Gleave, M. How can Nigeria Cut CO₂ Emissions by 63%? Build More Power Plants. 2014. <https://www.cgdev.org/blog/how-can-nigeria-cut-co2-emissions-63-build-more-power-plants>

⁷⁷ The policy framework includes the National Electric Power Policy of 2001 (NEPP), the Electric Power Sector Reform Act of 2005 (EPSRA), the National Renewable Energy and Energy Efficiency of 2015 (NREEEP), the Rural Electrification Strategy and Implementation Plan of 2016 (RESIP), and the Power Sector Recovery Plan of 2017 (PSRP).

budget provision. In 2018, REA implemented an additional US\$6 million capital grant scheme for off-grid projects. In the same year, it obtained a US\$350 million loan from the World Bank to develop the off-grid market by providing detailed market data, grant funding, and technical assistance. US\$150 million of this loan will develop minigrid projects.

Despite significant progress in establishing a clear policy and regulatory framework, and increased investments in minigrids, uneven enforcement and implementation has led to poor clarity among potential investors, limiting investor ability to benefit from it. For instance, FGN has implemented clear procedures for tax incentives to manufacturers of renewable energy and energy efficient equipment. However, implementation is still pending for similar incentives for manufacturing other systems components needed to build minigrid systems such as transformers and meters. Similarly, tax exemptions for importing equipment and other system components have not been implemented yet.⁷⁸ Further, while minigrids offer a compelling case, their returns on invested capital are not high enough to scale a commercial market. The typical levelized cost of energy (LCOE) for a well-run minigrid today is at least \$0.60 per kilowatt-hour (kWh).⁷⁹ High costs require high electricity prices that limit the size of the market that can afford to pay for minigrid electricity and stand in the way of deploying minigrids at scale for rural electrification. In addition to high costs, multiple risks limit commercial sources of financing in Nigeria.

Market analysis shows that scaling up minigrid development using private investments is hindered by several barriers and risks as listed below.

Risk Category	Risk Description	Root Barriers Underlying the Risk in Nigeria
Energy Market Risk	Risks arising from limitations and uncertainty in the energy market regarding market outlook, access, price and competition	<ul style="list-style-type: none"> ▪ <i>Market outlook:</i> Conflicting internal targets and differing amounts of buy-in from different political stakeholders regarding national/state targets for electrification and renewable energy mini-grid investment ▪ <i>Market access, competition, and grid expansion:</i> Reluctance of mini-grid developers to enter the electrification market due to incomplete enforcement of minigrid regulations and uncertainty around grid planning and expansion plans ▪ <i>Competing subsidies:</i> Competition from subsidized diesel
Social Acceptance Risk	Risks arising from lack of awareness and resistances to renewable energy and minigrids in communities	<ul style="list-style-type: none"> ▪ <i>Public perception:</i> Resistance by general public and local community leadership due to association with poor quality solar systems in the market
Hardware Risk	Risks arising from limitations in the quality and availability of minigrid hardware, as well as the customs treatment of hardware	<ul style="list-style-type: none"> ▪ <i>Quality of hardware:</i> Lack of access to information on quality and reliability (performance) of minigrid component hardware; lack of clarity or uncertainty regarding government technical standards to ensure safety of mini-grid hardware; difficulties in following up on warranties for components due to lack of local presence of equipment manufacturers to service equipment; lack of access to information on quality and performance of productive use equipment ▪ <i>Availability of hardware:</i> Lack of a competitive market for buying electric productive use equipment; prohibitively high costs of imported minigrid components; limited local manufacturing or assembly of minigrid component hardware ▪ <i>Customs:</i> Cumbersome customs/clearing process for importing hardware, leads to delays in delivery; punitively high customs tariffs on mini-grid and renewable energy hardware, particularly in comparison to other sectors
Digital Risk	Risks arising from use of cellular networks for remote monitoring and	<ul style="list-style-type: none"> ▪ <i>Cellular networks and mobile money:</i> Lack of mobile money for small minigrid companies due to restrictive regulatory framework; lack of consistent cellular network availability in some rural

⁷⁸ Rural Electrification Agency, Nigeria Minigrid Investment Brief, December 2017

⁷⁹ Carlin, K, Ernst, K, Doig, S, Agenbroad, J. Minigrids in the Money: Six Ways to Reduce Minigrid Costs by 60%. 2018

Risk Category	Risk Description	Root Barriers Underlying the Risk in Nigeria
	payments; the use of software, and abuse of consumer data	communities appropriate for minigrid projects
Labor Risk	Risks arising from the lack of skilled and qualified potential employees	<ul style="list-style-type: none"> ▪ <i>Labor market:</i> Lack of a competitive labor market of educated, skilled, and qualified potential employees with equitable female representation, leading to higher costs, hiring non-local staff, and suboptimal performance
Developer Risk	Risks arising from limitations in the minigrid operator's management capability, and its creditworthiness and cash flow	<ul style="list-style-type: none"> ▪ <i>Management capability:</i> Lack of C-suite talent and experience to ensure effective execution (business planning, financial structuring, plant design—resource and demand assessment—installation, operations and maintenance), to manage challenges (limited information, unforeseen events), and introducing new business lines. This barrier stands in the way of scaling from small 3-5 person businesses to larger businesses managing various sites and employing around 100 people ▪ <i>Developer credit worthiness and cash flow strength:</i> Inability of most developer to secure low cost financing from investors due to lack of credit worthiness, or insufficient cash flows to meet investors' return requirements
End User Credit Risk	Risks arising from customers' willingness, ability, and methods of payment for electricity	<ul style="list-style-type: none"> ▪ <i>Poor credit worthiness and non-payment:</i> Risk of delayed, reduced, or non-payment by customers due to poor credit worthiness, lack of funds available, electricity theft, and social dynamics
Financing Risk	Risks arising from scarcity of domestic investor capital (debt and equity) for minigrids, and domestic investors' lack of familiarity with minigrids and appropriate financing structures	<ul style="list-style-type: none"> ▪ <i>Capital scarcity - competing incentives/ mandates:</i> Existing policies incentivize or mandate domestic financial sector (banks, pension funds) to invest in alternative, competing sectors to minigrids. Specifically, FGN supports the on-grid sector investing in generation, transmission, and distribution projects that otherwise might not be commercially viable. This creates competition and potentially does not select for least-cost pathway for electrification ▪ <i>Limited domestic investor experience with minigrids:</i> Lack of information, assessment skills, and track-record for minigrid projects amongst domestic investor community; lack of network effects (investors, investment opportunities) found in established markets; lack of familiarity and skills with appropriate finance structures ▪ <i>Capital scarcity - under-developed domestic financial sector:</i> Low number of well-capitalized actors (debt, equity, insurance, pensions); lack of regulatory clarity on legality of new financial products
Currency Risk	Risks arising from currency mismatch between domestic currency revenues and hard currency financing	<ul style="list-style-type: none"> ▪ <i>Foreign exchange:</i> Uncertainty due to volatile local currency; unfavorable currency exchange rate movements resulting in domestic currency revenues not being sufficient to cover hard currency debt/equity servicing; inability to economically hedge foreign exchange ('FX') exposure due to lack of FX derivative markets
Sovereign Risk	Risks arising from a mix of cross-cutting political, economic, institutional and social characteristics not specific to minigrids	<ul style="list-style-type: none"> ▪ <i>Political instability:</i> Limitations and uncertainty related to conflict, political instability, economic performance, weather events/natural disaster, legal governance, ease of doing business, crime and law enforcement, land tenure and infrastructure

Geographical location

The exact project locations for minigrid investments will be defined during PPG stage.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Various development partners are collaborating with FGN to support implementation and enforcement. The Nigerian Energy Support Program (NESP) II, funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) focuses on implementing and enforcing an investor-friendly minigrid framework.⁸⁰ The Decentralized Renewable Energy (DRE) Taskforce funded by Power for All is working with the Ministry of Finance to implement zero tariffs and duties on solar power equipment and fast-tracking Zero Import Duty Exemption Certificates for solar panels and components. They are also developing a handbook to clarify customs clearance procedures.⁸¹

Development partners and other agencies are also providing concessional financing to fund minigrid developers and projects. All On offers working capital, equity, quasi-equity, debt, and tactical grant investments to developers. Nigeria's Bank of Industry provides concessionary finance for solar PV installations. Power Africa, with support from General Electric and the U.S African Development Foundation (USADF) provided almost US\$1 million in grants to entrepreneurs in the off-grid space. All On and USADF are providing blended finance to off-grid companies through 2020. GIZ, through NESP, provided funding to develop six off-grid solar minigrids and test business models.

Yet the projects implemented with these sources of grant and concessional financing have not yet demonstrated the commercial viability of minigrids. Developer creditworthiness remains low and developers still struggle to attract commercial sources of financing. Above interventions have also been disjointed resulting in suboptimal impact.

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access and productive uses of electricity in some rural communities. Hence, the proposed project will complement baseline initiatives through the development of renewables minigrids in Nigeria using private investments, while leveraging on the attributes and results of baseline activities. The incremental reasoning

⁸⁰ Rural Electrification Agency, Nigeria Minigrid Investment Brief, December 2017

⁸¹ Power for All, "Nigeria Taskforce Seeks New Ways to Confront Energy Access Challenges," 2 Nov 2018, <https://www.powerforall.org/campaigns/nigeria/nigerias-energy-taskforce-seeks-new-ways-confront-industry-challenges>

underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Nigeria. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses in agriculture, agro-processing and measures to combat land desertification. The proposed project will, therefore, squarely support implementation of the Rural Electrification Strategy and Action Plan (2016). The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Nigeria. The minigrid child project will be implemented in close coordination with the GEF6 project entitled “Derisking sustainable off-grid lighting solutions in Nigeria”.

The project will generate ~177.3 ktCO_{2e} direct lifetime emission reductions and ~4,936 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Nigeria Child Project will be composed of four mutually reinforcing components:

- Component 1: Project and business model innovation with private sector engagement
- Component 2: Innovative financing
- Component 3: Convening, dissemination, and tracking progress (Knowledge management)

The first two components correspond to the thematic areas described in the PFD, while Component 3 serves as a knowledge management bridge between the Child Project and the Regional Program.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by reducing the cost and increasing the commercial viability of low-carbon minigrids in Nigeria.</i>	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only) <u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> <u>Mandatory indicator 3:</u> <i># of direct beneficiaries disaggregated by gender.</i>
Outcome 1 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in low-carbon minigrid development</i>	<i>Indicator 4: Number of solar-hybrid minigrids developed (by installed capacity and region)</i> <i>Indicator 5: Number of bidders with enhanced technical capacity</i>
Outcome 2 <i>Sustainable minigrid providers in Nigeria are operating and have access to working capital and equipment.</i>	<i>Indicator 6: Number of financing schemes for minigrids developed and operationalised under the REF</i>
Outcome 3 <i>Increased awareness and network opportunities in the minigrid market and among stakeholders, and lessons learned for scaling up rural electrification using low-carbon minigrids</i>	<i>Indicator 7: Number of knowledge networks strengthened</i> <i>Indicator 8: Number of replication plan, including detailed budget, for scaling up the deployment of off-grid technologies in Nigeria (based on annual lessons learned)</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project’s activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the

regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Nigeria project, and vice versa, and between the Nigeria project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Nigeria project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program will support the Nigeria project in the following ways:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Nigeria. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Nigeria with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (e.g. EEU and MOWIE) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 3 in the Nigeria project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	177,300				
	Expected CO ₂ e (indirect)	4,936,129				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	177,300				
	Expected CO ₂ e (indirect)	4,936,129				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	3.6				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	175,286				
	Male	182,440				
	Total	357,726				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Somalia
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	TBD
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	3,276,147	10,250,000
Total Project Cost		3,276,147	10,250,000

PROJECT COMPONENTS AND FINANCING

Project Objective Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Somalia.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<p>1.1. A minigrid regulatory framework, including tariff model and incentives is developed (complementary to WB & DfID initiatives)</p> <p>1.2 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments</p> <p>1.3. Domestication of quality standards for solar minigrid components and institutional capacity of Somali Bureau of Standards strengthened</p>	GEFTF	574,425	788,750

			1.4 Capacity building provided to public officials (regulator, ministries) specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models			
Component 2— Minigrid Project and Business Model Innovation with Private Sector Engagement	INV TA	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	2.1 Pilots developed, including on productive use/innovative appliances using innovative business models through calls for proposals based on lessons learned from the operationalization of the SREF under ESRES2 2.2 Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers	GEFTF	1,595,096 323,244	7,758,750
Component 3— Innovative Financing	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids	3.1 Design support, including development of operational guidance, for a new pooled fund to enable the diaspora and small investors to participate in vetted minigrid projects 3.2 Domestic financial sector capacity-building on business and financing models for minigrids	GEFTF	366,378	688,750
Component 4— Convening, Dissemination, Tracking (Knowledge Management)	TA	Increased awareness and network opportunities in the sustainable energy markets	4.1 Lessons learned captured and disseminated at the national and provincial levels	GEFTF	260,997	638,750

		and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	4.2 Replication plan (including investment plan) for scaling up rural energy access developed 4.3 Knowledge networks / Communities of Practice established to promote MG development 4.4 A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of MGs, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTC	3,120,140	9,875,000
Project Management Cost (PMC)				GEFTC	156,007	375,000
Total Project Cost					3,276,147	10,250,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
GEF Agency	World Bank	Grant	Investment mobilized	500,000
Recipient Country Government	Ministry of Energy and Water Resources	In-kind	Investment mobilized	3,500,000
Donor Agency	DfID	Grant	Investment mobilized	5,500,000
GEF Agency	UNDP	Grant	Investment mobilized	750,000
Total Co-financing				10,250,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Somalia	Climate change	CC STAR Allocation	3,276,147	294,853	3,571,000
Total GEF Resources					3,276,147	294,853	3,571,000

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approvedNo ☐ If no, skip this item.**PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS**

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFTF	Somalia	Climate change	CC STAR Allocation	100,000	9,000	109,000
Total PPG Amount					100,000	9,000	109,000

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	45,400 (direct) 967,392 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	183,168 (of which 50% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Situated along the Eastern coastline of Sub-Saharan Africa, Somalia has a population of about 13 million, of which roughly 60% are nomadic and semi-nomadic pastoralists. Somalia has been largely decimated in two and a half decades of conflict following the collapse of the Siad Barre government in January 1991. Most Somalis today live in poverty and vulnerability: 2.3 million live on the margins of food insecurity and 1.1 million are internally displaced. Poverty is estimated at 73% and extreme poverty at 43%. Gross Domestic Product (GDP) per capita is estimated to be only US\$288. Somalia needs infrastructure investments to enable basic service delivery to millions of its citizens.⁸²

Somalia has a dynamic and highly entrepreneurial private sector that has filled the void of government institutions. For instance, power, like many other services and infrastructure, is generated mainly by private companies. The economy is dominated by the livestock sector, which generates trade worth an estimated 40% of Somalia's GDP, and over 50% of exports. Important sources of export earnings include charcoal and agricultural products. The Somali economy relies heavily on overseas development assistance (ODA, US\$0.75 billion) and even more on financial remittances (US\$1.0 billion to US\$1.6 billion) from its sizeable Diaspora. Most sectors, including the power sector, remain largely unregulated.⁸³ A Power Master Plan is being formulated using World Bank financing. High quality solar maps have been developed under the Global Solar Atlas for Somalia, and the Lighting Africa initiative completed a market study for off-grid solar in 2017.⁸⁴

The child project will capitalize on the unique positioning of private companies in the energy market in order to drive down the cost of energy using a theory of change centered on cost reduction levers. In this context, the child project will be aligned with the Somalia Public Private Dialogue that was initiated in June 2016 and further supported by the Somalia London Conference in May 2017 for the reconstruction of the country.

The child project will squarely support the Nationally Determined Contribution (NDC) that mentions the great potential of Somalia to achieve sustainable development and to contribute to reductions of greenhouse gases (GHG) despite the prolonged civil conflict and least development status.⁸⁵

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

While it is acknowledged that energy access is an important lever for poverty alleviation, access to modern energy remains very low. The overall electrification rate is 15%, and it is only 1% in rural areas that host the vast majority of the population. About 90% of electricity generation relies exclusively on diesel minigrids. These minigrids are normally zoned with each operator building, owning and operating the generation, transmission, distribution,

⁸² World Bank (2018) Somali Electricity Access Project: Project Information Document / Integrated Safeguards Data Sheet; <http://projects.worldbank.org/P165497/?lang=en&tab=documents&subTab=projectDocuments> – accessed on 11 September 2019.

⁸³ Ibid., pg. 3.

⁸⁴ Ibid. pg.6.

⁸⁵ Federal Government of Somalia (2015) Somalia's Intended Nationally Determined Contributions.

maintenance and collecting tariffs. Tariffs can reach a maximum of \$1/kWh, one of the costliest in the world. Consequently, there is a dire need to increase the affordability of electricity in order to combat poverty.

Well designed, operated and maintained minigrids have the strong potential provide a basis through which a country-wide distribution system could be interconnected and linked to the national grid so that power can be wheeled and sold across the network. Nevertheless, there are significant barriers and information gaps regarding the status of the minigrids. Preliminary analysis of barriers and risks facing investors in minigrids has revealed the following:

- Lack of regulatory framework for minigrids and lack of visibility regarding policies and regulations across territories
- Low level of public institution capacities in the energy sector
- Low level of private sector knowledge of innovative business models based on cost reduction considerations that could increase the affordability of electricity
- Incumbent operators lack knowledge of technologies (renewable energies, loss reductions in distribution systems, smart and/or pre-paid metering) preventing cost reductions and improvements in service delivery
- Limited access to capital due to high level of country indebtedness, and high reliance on remittances and grants for development in general
- Poor customer credit worthiness and high default rates leading to poor cost recovery due to high levels of poverty
- Lack of quality standards and enforcement mechanisms for minigrid components
- Poorly developed insurance mechanisms to insure investors against sovereign risks
- Lack of information on appropriate greenfield sites for new minigrid installation
- Lack of market information regarding profiles of incumbent operators (number of customers, hours of service, tariffs, connection costs, generation technology, quality of service metrics, expansion plans)

Geographical location

The exact project locations for investments will be defined during PPG stage in close collaboration with SEAP that will carry out pre-feasibility studies for Greenfield sites identified in its geospatial mapping to undertake a more comprehensive inventorying of the current mini-grid situation in Somalia, identify potential future sites, and estimate future demand. The most probable geographical areas will be the provinces of Somaliland and/or Puntland that have put in place functioning institutions that have succeeded in maintaining political stability.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

Several initiatives are underway for developing the energy sector in Somalia. The World Bank is funding the Somali Electricity Access Project, SEAP (US\$5.5million; 2019-2022) that will focus on improving energy access via standalone solar solutions for both households and small enterprises by providing a package of incentives to support local entrepreneurs to develop new ventures or scale up existing activities. The World Bank is also financing the development of the Power Master Plan. The SEAP will also have a small component dedicated to minigrid development that is yet to be defined.

DfID finances the Energy Security and Resource Efficiency in Somaliland (ESRES) Program (£20million; 2015-2021). The first phase (ESRES1; £5million; 2015-2018) supported the hybridization of six minigrid sites, as well as supporting the Ministry of Energy and Minerals (MoEM) with policy and regulatory framework for the provision of electricity. ESRES2 (£15million; 2018-2021) will build on that success to expand investment in renewable energy through the Somaliland Renewable Energy Fund (SREF). It is supporting improvements of the six existing projects to maximize results, and operationalization (design and maintenance) of the SREF.⁸⁶

The Federal Government of Somalia (FGS) has created a Ministry of Energy and Water Resources in Mogadishu, to be focused on developing energy sector policy and regulation of the sector. In Somaliland, the Ministry of Energy and Mineral Resources is responsible for energy sector policy and oversight, and the Ministry of Public Works supervises the Somaliland Electricity Agency (SEA). Puntland has no equivalent energy ministry, but does have the

⁸⁶ <https://esres-somaliland.org/> accessed 11 September 2019.

Puntland State Authority for Water, Energy, and Natural Resources (PSAWEN), a semiautonomous agency reporting to the Presidency and mandated to oversee and regulate the electric power industry. Aforementioned initiatives are dedicating significant resources to strengthen human and institutional capacities.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 2 of the PFD will be used to develop country-specific Gender Action Plan (GAP). As the procurement and operations capacity of the government tends to be fairly weak, it is expected that there will be a need for support services. During the PPG stage, further analyses will be performed to determine who is the best entity to provide this support.

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access and productive uses of electricity in poverty-stricken rural communities. Hence, the proposed project will complement baseline initiatives through the development of renewables minigrids in Somalia using private investments, while leveraging on the attributes and results of baseline activities. For access to electricity, the incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Somalia. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture, agro-processing or trades). The proposed project will, therefore, squarely support the ambition of government to combat poverty through socioeconomic development in post-crisis Somalia. The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Somalia.

The project will generate ~45.4 ktCO_{2e} direct lifetime emission reductions and ~967 ktCO_{2e} consequential emission reductions (top down). All bottom up consequential emission reductions will also be carried out during the PPG stage.

Project components

The Somalia Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Minigrid project and business model innovation with private sector engagement
- Component 3: Innovative financing for minigrids

- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

The first three components correspond to the three thematic areas described in the PFD, while Component 4 serves as a knowledge management bridge between the Child Project and the Regional Program, and between the Somalia Child Project and other country projects.

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Somalia.</i>	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only) <u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i> <u>Mandatory indicator 3:</u> # of direct beneficiaries disaggregated by gender.
Outcome⁸⁷ 1 <i>Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids</i>	<i>Indicator 4: Number of DREI analyses and geospatial modelling of least-cost off-grid electrification options</i> <i>Indicator 5: Number of domesticated quality standards</i>
Outcome 2 <i>Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development</i>	<i>Indicator 6: Number of solar-hybrid minigrids developed (by installed capacity and region)</i> <i>Indicator 7: Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3 <i>An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids</i>	<i>Indicator 8: Number of financing schemes for minigrids developed and operationalised</i>
Outcome 4 <i>Increased awareness and network opportunities in the sustainable energy markets and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids</i>	<i>Indicator 9: Number of knowledge networks created</i> <i>Indicator 10: Number of replication plans, including detailed budgets, for scaling up the deployment of sustainable minigrids in Somalia (based on annual lessons learned)</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

⁸⁷Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Somalia project, and vice versa, and between the Somalia project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation. Components 1, 2 and 3 of the Regional Program will squarely support the first three components of the Somalia project as follows:

- Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country needs. The Regional program will support the Somalia project in the following ways:
 - ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Somalia. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Somalia with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
 - ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both public sector (SEA and PSAWEN) and private sector (e.g. mini-grid developers) and the overall minigrid market
 - ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses in Somalia, as well as standardized methodology for geospatial modeling of least-cost options for off-grid electrification using renewable energies
 - ✓ Providing a standardized methodology for carrying out market intelligence
- Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- The Program will support the development of a common monitoring and indicator framework for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Somalia project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	45,400				
	Expected CO ₂ e (indirect)	967,392				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	45,400				
	Expected CO ₂ e (indirect)	967,392				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.9				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	91,584				
	Male	91,584				
	Total	183,168				



GEF-7 CHILD PROJECT CONCEPT

CHILD PROJECT TYPE: FULL-SIZED CHILD PROJECT

PROGRAM: Other Program

Child Project Title:	National child project under the GEF Africa Minigrids Program
Country:	Sudan
Lead Agency	UNDP
GEF Agency(ies):	UNDP
Project Executing Entity:	Ministry of Energy and Mining
Project Duration:	48 months

INDICATIVE FOCAL/NON-FOCAL AREA ELEMENTS AND FINANCING

Programming Directions	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCM-1-1 Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized power with energy usage	GEFTF	2,637,247	1,550,000
Total Project Cost		2,637,247	1,550,000

PROJECT COMPONENTS AND FINANCING

Project Objective Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Sudan.						
Project Components	Component Type	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Co-financing
Component 1—Policy and Regulation	TA	Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	1.1. A minigrid regulatory framework, including tariff model, tax regime, concessions, and grid expansion risk is developed 1.2. Geospatial, techno-economic modeling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems) 1.3. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments 1.4. Institutional	GEFTF	401 866	311,125

			<p>capacity of Sudan Standards and Metrology Organisation (SSMO) strengthened to publicize and enforce domesticated standards</p> <p>1.5. Institutional set-up for rural electrification assessed and supported, and institutional capacity building provided to MEM, ERA and SEDC on technical, managerial, and regulatory issues</p> <p>1.6 Capacity building provided to public officials in MEM and ERA specifically to design procurement/tender processes that incorporate cost-reduction levers and innovative business models</p>			
Component 2— Minigrid Project and Business Model Innovation with Private Sector Engagement	<p>INV</p> <p>TA</p>	Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	<p>2.1 Pilots developed adopting innovative business models for social housing and productive uses (e.g. agriculture, agro-processing, animal production sub-sector)</p> <p>2.2. Capacity of winning tender bidders (private sector developers) strengthened to develop and implement innovative business models and cost-reduction levers</p> <p>2.3. Supporting the capacities of vocational training institutions to</p>	GEFTF	<p>1,306,065</p> <p>251,166</p>	600,875

			provide courses on the design and O&M of solar / hybrid minigrids 2.4 Economic and financial cost and benefit analysis performed			
Component 3— Innovative Financing for Minigrids	TA	An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids	3.1. Support identification and design of innovative minigrid financing solutions to support investments in PV minigrids 3.2. Domestic financial sector capacity-building on business and financing models for minigrids 3.3. Feasibility study support provided to minigrid developers, creating a pipeline of investible assets 3.4. Training provided to local developers on mobilizing financing 3.5 General market intelligence study on minigrids (based on results of Output 1.2) prepared and disseminated amongst public officials and finance community	GEFTF	251,166	311,125
Component 4— Convening, dissemination, tracking (knowledge management)	TA	Increased awareness and network opportunities in the sustainable energy markets and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	4.1. Lessons learned captured and disseminated at all levels 4.2. Replication plan (including investment plan) for scaling up rural energy 4.3. Knowledge networks /	GEFTF	301,400	249,375

			Communities of Practice established to promote minigrids			
			4.4. A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of minigrids, including GHG emission reductions is developed and operationalized			
Subtotal				GEFTF	2,511,664	1,472,500
Project Management Cost (PMC)				GEFTF	125,583	77,500
Total Project Cost					2,637,247	1,550,000

For multi-trust fund projects, provide the total amount of PMC in Table B, and indicate the split of PMC among the different trust funds here: ()

INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount (\$)
GEF Agency	UNDP	Grant	Investment mobilized	300,000
Recipient Government	Electricity companies	Equity Investment	Investment mobilized	500,000
Recipient Government	Ministry of Energy and Mining	In-kind	Recurrent expenditures	250,000
Recipient Government	Higher Council for Environment and Natural Resources	In-kind	Recurrent expenditures	250,000
Recipient Government	State Governments	In-kind	Recurrent expenditures	250,000
Total Co-financing				1,550,000

Describe how any "Investment Mobilized" was identified. TBC

TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES), FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/Regional/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b)	Total (c)=a+b
UNDP	GEFTF	Sudan	Climate change	CC STAR Allocation	2,637,247	237,352	2,874,599
Total GEF Resources					2,637,247	237,352	2,874,599

PROJECT PREPARATION GRANT (PPG)

Is Project Preparation Grant requested?

Yes ☒ If yes, PPG funds **have to be requested via the Portal** once the PFD is approved

No ☐ If no, skip this item.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee (b)	Total c = a + b
UNDP	GEFTF	Sudan	Climate change	CC STAR Allocation	100,000	9,000	109,000
Total PPG Amount					100,000	9,000	109,000

PROJECT'S TARGET CONTRIBUTIONS TO GEF 7 CORE INDICATORS

Provide the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet provided in Annex B and aggregating them in the table below. Progress in programming against these targets is updated at the time of CEO endorsement, at midterm evaluation, and at terminal evaluation. Achieved targets will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Project Core Indicators		Expected at PIF
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	27,500 (direct) 1,895,694 (consequential top down)
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	110,840 (of which 50% women)

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicators targets are not provided.

PROJECT DESCRIPTION

Country Context (*maximum 500 words*)

Describe the country's relevant environmental challenges and strategic positioning relative to the systems transformation proposed for the program, including relevant existing policies, commitments, and investment frameworks. How are these aligned with the proposed approach to foster impactful outcomes with global environmental benefits?

Sudan sits at the crossroads of Sub-Saharan Africa and the Middle East, and is bordered by seven countries: Egypt, Eritrea, Ethiopia, South Sudan, the Central African Republic, Chad, and Libya. Sudan also borders the Red Sea to the northeast. For most of its independent history, the country has been beset by conflict. The secession of South Sudan induced multiple economic shocks, of which the most important and immediate shock was the loss of the oil revenue that accounted for more than half of Sudan's government revenue and 95% of its exports.⁸⁸

Sudan has a population of 40.533 million (2017) with 34.2% living in urban centers. About 14.9% of the population lives in extreme poverty (less than US\$1.9 per day), and the Human Development Index is quite low at 0.502. The agriculture contributes 30.1% of GDP and it generates 52% of total employment. Access to electricity is low (at 38.5% in 2016), and there is a large discrepancy between the population with access to electricity in urban areas (70%) and those in rural areas (22%).⁸⁹ The residential sector consumed 56.7% of all electricity in 2015. Also, where it is available, the reliability of electricity is not assured.⁹⁰ To address the low electricity access, the Sudanese Electricity Distribution Company (SEDC) is undertaking "The Rural Area Electrification by Solar Energy Project", which aims to serve over one million households by 2031 with solar home systems (SHS).⁹¹

In line with the Paris Agreement, Sudan's Intended Nationally Determined Contributions include an objective to attain a 20% mix of renewable energy in their power system by 2030. The child project will support implementation of the Nationally Determined Contribution (NDC), and the national EE Strategy and Action Plan seeks to reduce electricity consumption by 26% (2025) and 35% (2035) relative to the business-as-usual scenario. The target set in Vision2035 to achieve universal access to electricity by 2035 will also be supported.

Project Overview and Approach (*maximum 1250 words*)

- a) Provide a brief description of the geographical target(s), including details of systemic challenges, and the specific environmental threats and associated drivers that must be addressed;

Despite the relatively low electrification rates in Sudan, there are few off-grids electricity generation and supply systems. Where they exist, these systems are run on diesel and are owned and operated by the Government. While on-grid electricity generation and supply is controlled by the public sector, the regulatory framework allows for private sector involvement in the off-grid segment. The Government's ambition to reach an electrification target of 75-80% by 2031 is premised on grid extension with an additional 12 GW of installed capacity. Despite the significant potential for solar energy in Sudan, its optimization remains very low in any of its technological forms. For instance, only 1,582 MW of renewable capacity (all renewable sources excluding large hydro) is expected to be added by 2031. PV minigrids can contribute towards increasing electricity access and support local socio-economic development, but there are significant barriers that impede deployment. The main barriers are:⁹²

⁸⁸ <https://www.worldbank.org/en/country/sudan/overview> - accessed 5 October 2019.

⁸⁹ GIZ (2018) Sudan: The Water-Energy-Food Security Nexus Country Profile.

⁹⁰ Dina Ghandour (2016) Struggles for electrical power supply in Sudan and South Sudan, International Journal of Business and Management Study 3(2), 28-34.

⁹¹ Sudanese Electricity Distribution Company (n.d.), 'The Rural Area Electrification by Solar Energy Project', Available from: <http://www.sedc.com.sd/en/-4> – accessed 6 October 2019.

⁹² The list of barriers has been derived mainly from indicators on Sudan available at: <https://rise.esmap.org/country/sudan> - accessed 6 October 2019; and applying UNDP off-grid DREI risks and barriers table.

- Lack of market visibility (e.g. coherent rural electrification plan) since there is no target or service level definition for off-grid electrification; nor is there any geographically-referenced least-cost electrification plan based on market demand; lack of spatial map regarding planned medium-to-long term grid extension
- Lack of regulatory framework for off-grid electrification, including cost-reflective tariff setting, concessions, transparent and standardized tendering processes and documents
- Lack of technical standards for grid connection of minigrids
- Low level of public institution capacities in the off-grid electrification market segment
- Low level knowledge among all stakeholders of innovative business models based on cost reduction considerations that could increase the affordability of electricity
- Lack of local expertise to design, operate and maintain PV-battery / PV-hybrid minigrids
- Incumbent operators (mainly public) lack of knowledge of technologies (renewable energies, loss reductions in distribution systems, smart and/or pre-paid metering) preventing cost reductions and improvements in service delivery
- Limited access to capital due to lack of knowledge of minigrid sector and weak macroeconomic performance
- Lack of information on customer credit worthiness and capacity to pay for electricity

Geographical location

The Ministry of Energy and Mining (MEM) was established in September 2019. While the UNDP has initiated discussions with the MEM regarding the selection of project site(s), this will be finalized during the PPG stage.

- b) Describe the existing or planned baseline investments, including current institutional framework and processes for stakeholder engagement and gender integration;

There have been very few initiatives dedicated to developing the energy sector in Sudan after 2013 given the economic downturn following loss of oil revenues and ongoing political changes since 2018. Baseline analysis has shown that there are very few diesel minigrids in Sudan and no renewable or hybrid minigrids.⁹³ The GEF has financed several projects in Sudan since 2011, none of which have focused electrification using solar minigrids.⁹⁴ The UNDP-GEF project on solar water pumping for farmers plans to install 1,468 PV pumps in off-grid regions with a total installed capacity of 6.5 MW. The Sudan Child Concept will build on and complement this ongoing project to target productive energy uses in agriculture.

The Darfur Solar Electrification Project (DSEP, US\$5,638,900; 2015-2017) is a sub-set of the Rural Area Electrification by Solar Energy Project mentioned above. The DSEP supported the installation of SHS (50-300 W) in different community services centres (solar systems for schools, health clinics, streets, police stations, women centers and water pumping) for 70 villages in Darfur. The DSEP was formulated within the broader ambit of the reconstruction of Darfur.

The Ministry of Energy and Mining (MEM) is the Government body responsible for electric power in Sudan. MEM manages the wholly public owned generation, transmission and distribution electricity companies. It hosts a General Directorate of Electricity Generation Using Atomic and Renewable Energy. The Electricity Regulatory Authority (ERA) regulates the power sector.

During the PPG stage, the preliminary stakeholder engagement that was initiated during PFD formulation will be enhanced in order to develop a Stakeholder Engagement Plan. Further, the gender analysis framework shown in Figure 5 of the PFD will be used to develop country-specific Gender Action Plan (GAP). As the Ministry of Energy and Mining has limited operations and procurement capacity, it is expected that support services will be required. During the PPG stage, further analyses will be performed to determine who is the best entity to provide these services.

⁹³ Baseline information provided by the UNDP Country Office.

⁹⁴ GEF-financed projects have covered: (i) utility-scale wind energy (PIMS 4726; 2014-2019; GEF Grant US\$3.536million), energy efficiency Standards and labelling (GEF ID 9083; 2018-2022; GEF Grant US\$1.77million), and solar water pumping for Sudanese farmers (PIMS 5324; 2016-2021; GEF Grant US\$4.366million).

- c) Describe how the integrated approach proposed for the child project responds to and reflects the Program's Theory of Change, and as such is an appropriate and suitable option for tackling the systemic challenges, and to achieve the desired transformation with multiple global environmental benefits; and

The GEF-7 Africa minigrids program (the 'program') – led by UNDP, RMI and AfDB – aims to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy minigrids ('minigrids'). **The program is focused on minigrid cost-reduction – across hardware costs, soft costs and financing costs – and innovative business models for minigrids.**

The program's theory of change – set out in Part II, Section 3.1 of the PFD - is premised on a baseline context where, while good progress is being made, renewable energy minigrids are currently not competitive with fossil-fuel based alternatives. This baseline context is described earlier in the PFD's baseline section. The program interventions - in large part through outputs in national child projects - are focused on three core thematic areas: (1) policy and regulations, (2) business model innovation and private sector, and (3) innovative financing. These interventions, focusing on cost-reduction levers and innovative business models, can improve the financial viability of renewable energy minigrids. When renewable energy minigrids are more competitive, private capital will then flow, resulting in various program benefits: investment at scale, GHG emission reductions, and electrification and lower tariffs and for end-users.

- d) Describe the project's incremental reasoning for GEF financing under the program, including the results framework and components.

While the baseline projects and initiatives will address some of the barriers outlined above, there will still be gaps regarding electricity access using renewable minigrids and productive uses of electricity. Hence, the proposed project will complement baseline initiatives for the development of PV-battery minigrids in Sudan by creating an enabling environment for attracting private investments. The incremental reasoning underlying the proposed project is through the implementation of derisking (policy and financial) instruments in order to reduce, eliminate or transfer the risks faced by private investors in minigrids in Sudan. The derisking approach will result in reductions in financing costs. In parallel, the project will also use levers to reduce the cost of hardware, especially by linking minigrid development to productive energy uses (e.g. in agriculture and post-harvest processing). The proposed project is also supportive of the climate change mitigation objectives of the Government of the Paris Agreement as indicated in the Nationally Determined Contribution (NDC) of Sudan.

The project will generate ~27.5 ktCO_{2e} direct lifetime emission reductions and ~1,896 ktCO_{2e} consequential emission reductions (top down). The bottom up consequential emission reductions will be calculated during the PPG stage.

Project components

The Sudan Child Project will be composed of four mutually reinforcing components:

- Component 1: Policy and regulation
- Component 2: Minigrid project and business model innovation with private sector engagement
- Component 3: Innovative financing for minigrids
- Component 4: Convening, dissemination, and tracking progress (Knowledge management)

Results framework

	Objective and Outcome Indicators
Project Objective: <i>Supporting access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Sudan.</i>	<u>Mandatory Indicator 1:</u> Number of households benefitting from clean, affordable and sustainable energy access (project will target rural households only)
	<u>Mandatory Indicator 2</u> (Lifetime direct project GHG emissions mitigated): <i>Direct project CO₂ emission reductions, metric tCO_{2e}.</i>
	<u>Mandatory indicator 3:</u> <i># of direct beneficiaries disaggregated by gender.</i>

Outcome⁹⁵ 1: Appropriate policies and regulations are in place that address policy, institutional, regulatory and technical barriers to facilitate investment in solar PV-battery minigrids	<i>Indicator 4: Number of DREI analyses and cost effective derisking instruments identified and included in policies</i>
	<i>Indicator 5: Number of geospatial studies completed (disaggregated by geography) and included in Rural Electrification Strategy and Action Plan</i>
Outcome 2: Innovative business models based on cost reduction operationalized to support and strengthen private participation in solar PV-battery minigrid development	<i>Indicator 6: Number of solar-hybrid minigrids developed (by installed capacity and region)</i>
	<i>Indicator 7: Number of organisations with enhanced technical capacity to develop procurement processes or bids for minigrids with focus on cost reduction</i>
Outcome 3: An innovative financing mechanism and accompanying financial instruments in place to incentivize investments in the development of solar PV-battery minigrids	<i>Indicator 8: Number of financing schemes for minigrids developed and operationalised</i>
	<i>Indicator 9: Number of market intelligence reports completed (disaggregated by geographical location)</i>
Outcome 4: Increased awareness and network opportunities in the sustainable energy markets and among stakeholders, and lessons learned for scaling up rural electrification using solar PV-battery minigrids	<i>Indicator 10: Number of knowledge networks created</i>
	<i>Indicator 11: Number of replication plans, including detailed budgets, for scaling up the deployment of sustainable minigrids in Sudan (based on annual lessons learned and geospatial modelling of least-cost technology options for off-grid electrification)</i>

National Child Project Budget Allocations for Program Activities

With the aim of contributing to collective ownership of the program, it is anticipated that each national child project will set aside between USD 50,000 to USD 100,000 for specific national-level activities which can contribute to the program and link up with the regional child project's activities. To be clear this will not involve any transfer to the regional child project, but will simply cover national child project costs. For example, this national child project budget can cover costs related to: (i) M&E to feed into program framework indicators, (ii) travel to participate in the regional child project's workshops/events; (iii) sharing of research and lessons learned to the regional child project; and (iv), contributions towards the regional child projects knowledge products.

Engagement with the Global / Regional Framework (*maximum 500 words*)

Describe how the project will align with the global / regional framework for the program to foster knowledge sharing, learning, and synthesis of experiences. How will the proposed approach scale-up from the local and national level to maximize engagement by all relevant stakeholders and/or actors?

Knowledge sharing, learning and synthesis of experiences will be multi-directional – i.e. flowing from the Regional Program to the Sudan project, and vice versa, and between the Sudan project and other child projects in the Program. The regional chapeau will connect countries to knowledge, resources and networks of best practice and will support the rapid deployment of expertise, solutions and tools to support on-the-ground implementation.

The Regional Program will support the Sudan Child Project as follows:

Thematic working groups (policies, private sector, financing) will be organized and communities of practice (CoP) will be established at the regional level targeting specific stakeholder groups and country. Support to national activities in Sudan will consist of:

- ✓ Providing tailored, hands-on, technical assistance to support all technical activities, both at the design and implementation stages. Readily-available experts at the regional level will be rapidly-deployable for either short-term or longer-term embedded support to Sudan. The regional project will help scope the technical assistance and will suggest experts. The regional project will support Sudan with key decisions and technical reviews at Child Project milestones and provide actionable, strategic recommendations to Child Project to increase adoption of minigrid cost-reduction opportunities and innovative business models
- ✓ Knowledge tools and good practices around minigrid cost-reduction in a variety of regulatory environments, and research and development tools, such as policy packages, template tender documents, and guidelines on productive use program designs will be made available. The toolkits will support both

⁹⁵Outcomes are short to medium term results that the project makes a contribution towards, and that are designed to help achieve the longer term objective. Achievement of outcomes will be influenced both by project outputs and additional factors that may be outside the direct control of the project.

public sector (MEM and ERA) and private sector (e.g. mini-grid developers) and the overall minigrid market

- ✓ Harmonized approach for implementing UNDP's minigrid DREI analyses and geospatial modeling of least-cost technology options for rural electrification in Sudan
- ✓ Harmonized methodology for carrying market intelligence to support renewable electricity access based on market demand
- ✓ Further, two global meetings will bring together key partners from all of the participating countries to facilitate the multidirectional flows of experience sharing
- ✓ The Program will support the development of a common monitoring and indicator framework (SDG impacts and GHG emission reductions) for all child projects, and country lessons learned will be used for sharing through the Regional CoPs and bilaterally between countries

The results of Component 4 in the Sudan project will feed the Regional Program for onward sharing with other participating countries. There will also be opportunities for these results to be shared directly with other countries through corresponding knowledge management activities built into each child project. This will serve better integration between child projects. Integration will also be enhanced through the programmatic approach proposed for child project design around three core thematic areas mentioned above.

GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, item F to the extent applicable to your proposed project. Progress in programming against these targets for the project will be aggregated and reported at anytime during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	27,500				
	Expected CO ₂ e (indirect)	1,895,694				
Indicator 6.2	Emissions avoided Outside AFOLU					
		Expected metric tons of CO ₂ e				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Expected CO ₂ e (direct)	27,500				
	Expected CO ₂ e (indirect)	1,895,694				
	Anticipated start year of accounting	2021				
	Duration of accounting	20				
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Capacity (MW)				
	Technology	Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Solar Photovoltaic	0.54				
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment				<i>(Number)</i>	
		Number				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
	Female	55,420				
	Male	55,420				
	Total	110,840				