GEF-6 PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Medium-sized Project
TYPE OF TRUST FUND:GEF Trust Fund

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PART I: PROJECT INFORMATION

Project Title:	Clean Rural Electrification for African Countries		
Country(ies):	Regional with potential application to Small Island Developing States	GEF Project ID:[1]	
GEF Agency(ies):	UNDP	GEF Agency Project ID:	6182
Other Executing Partner(s):	Rocky Mountain Institute	Submission Date:	18 Oct. 2017
GEF Focal Area(s):	Climate Change	Project Duration (Months)	12
Integrated Approach Pilot	IAP-Cities ☐ IAP-Commodities ☐ IAP-Food Security ☐	Corporate Program: SGP ☐	
Name of parent program:		Agency Fee ($)	90,250

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES[2]

Objectives/Programs (Focal Areas, Integrated Approach Pilot, Corporate Programs)	**Trust Fund**	**(in $)**	
		GEF Project Financing	**Co-financing**
CCM-1 Program 1	GEFTF	950,000	550,000
Total Project Cost		**950,000**	**550,000**

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: To develop a distinctive approach and accelerate the deployment of rural electrification utilizing renewable mini-grids

Project Components	**Financing Type[3]**	**Project Outcomes**	**Project Outputs**	**Trust Fund**	**(in $)**	
					GEF Project Financing	**Co-financing**
Design scaling mechanisms for minigrids funded by GEF 7 replenishment	TA	Launch scaling platforms for commercially-viable minigrids as part of GEF 7 replenishment, including a roadmap for cost reduction, policy, and financing for three-year initiative	Accelerated deployment, demonstration, and financing of low carbon technologies for electricity access in developing world, with a minimum of US$10 million for actual field installations by 2020.	GEFTF	600,000	225,000
Minigrid summit	TA	Accelerate adoption of innovative technologies and management practices for GHG	Prioritized pipeline of clean energy projects identified and financial	GEFTF	300,000	275,000

[1] Project ID number will be assigned by GEFSEC and to be entered by Agency in subsequent document submissions.
[2] When completing Table A, refer to the excerpts on GEF 6 Results Frameworks for GETF, LDCF and SCCF and CBIT guidelines.
[3] Financing type can be either investment or technical assistance.

		emission reduction through aligning stakeholders for action around shared roadmap, identifying specific regulatory, transaction, and financing needs and securing commitment from high-potential countries.	commitments made by key stakeholders from government, private sector, and development partners at the microgrid summit			
Subtotal					900,000	500,000
Project Management Cost (PMC)[4]				GEFTF	50,000	50,000
Total Project Cost					950,000	550,000

C. 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	Amount ($)
Donor Agency	The Rockefeller Foundation	Grants	200,000
Donor Agency	Virgin Unite	Grants	200,000
Donor Agency	Rocky Mountain Institute	In-kind	150,000
Total Co-financing			550,000

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

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	(in $) GEF Project Financing (a)	Agency Fee (b)b)	Total (c)=a+b
UNDP	GEFTF	Regional	Climate Change	(select as applicable)	950,000	90,250	1,040,250
Total GEF Resources					950,000	90,250	1,040,250

a) Refer to the Fee Policy for GEF Partner Agencies.

E. PROJECT PREPARATION GRANT (PPG)[5]

Is Project Preparation Grant requested? Yes ☒ No ☐ If no, skip item E.

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

Project Preparation Grant amount requested: $50,000				PPG Agency Fee: $ 4,750			
GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in $) PPG (a)	Agency Fee[6] (b)	Total c = a + b
UNDP	GEF TF	Regional	Climate Change		50,000	4750	54,750
Total PPG Amount					**50,000**	**4750**	**54,750**

F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS[7]

[4] For GEF Project Financing up to $2 million, PMC could be up to10% of the subtotal; above $2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

[5] PPG requested amount is determined by the size of the GEF Project Financing (PF) as follows: Up to $50k for PF up to $2 million (for MSP); up to $100k for PF up to $3 million; $150k for PF up to $6 million; $200k for PF up to $10m; and $300k for PF above $10 million. On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[6] PPG fee percentage follows the percentage of the Agency fee over the GEF Project Financing amount requested.

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO_{2e} mitigated (include both direct and indirect)	*Direct: none* *Indirect: 2 million metric tons*[8]

PART II: PROJECT JUSTIFICATION

Project Description. Briefly describe: 1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed; 2) the baseline scenario or any associated baseline projects, 3) the proposed alternative scenario, GEF focal area[9] strategies, with a brief description of expected outcomes and components of the project, 4) incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, CBIT and co-financing; 5) global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF); and 6) innovation, sustainability and potential for scaling up.

The global environmental and/or adaptation problems, root causes and barriers that need to be addressed

1. GHG emissions from the developing world are projected to rise rapidly. By 2040 sub-Saharan Africa is forecasted to consume 1,600 terawatt hours (TWh) of electricity and emit nearly 700 million metric tons of CO_2 ($MtCO_2$).[10] India's electricity consumption is expected to reach 3,000 TWh and emit more than 3,000 $MtCO_2$by 2040, accounting for 25 percent of global electricity demand growth.[11] For context, 2013 U.S. power sector emissions were 2,100 million $MtCO_2$.[12]

2. However, over 600 million people in sub-Saharan Africa lack access to reliable electricity, which in turn hampers their ability to climb out of poverty. Power consumption per capita in Sub-Saharan is just 180 kWh per year, compared to 6,500 kWh in Europe and 13,000 kWh in the United States. Unreliable electricity is estimated to cost Africa 2–4% of GDP annually. And because population is rising more raply then new electricty connections, Sub-Saharan Africa is the only region in the world where the number of people lacking access to electricity is set to rise.[13]

3. Energy access and GHGs are closely linked. SDG 7 calls for us to secure access to affordable, reliable, sustainable and modern energy for all by 2030. Organizations like SEforAll exist to convene partners to address this "dual challenge: reducing the carbon intensity of energy while making it available to everyone on the planet."

4. While pursuing traditional efforts of macrogrid, hub and spoke models for electrification have provided energy access to millions of people and businesses, it is clear that such a solution is not a panacea. This is true for three primary reasons: 1) deploying conventional technologies will increase the already dire impact of humans on

[7] Provide those indicator values in this table to the extent applicable to your proposed project. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the *GEF-6 Programming Directions*, will be aggregated and reported during mid-term and at the conclusion of the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF, SCCF or CBIT.

[8] Indirect impact was calculated assuming the workshop can catalyze $150M investment over the next 5–10 years for 1,000 minigrid projects. For each minigrid we assume 60kW installed solar capacity, producing 130,000kWh annually, with 75% utilization, and a 20 year lifetime. The emissions impact was calculated assuming solar generation will displace diesel or coal generation avoiding 1kg CO^2 per kWh. Over the longer-term, we believe minigrids can avoid much of the 700 $MtCO_2$ Africa and 3,000 $MtCO_2$ India are expected to emit by 2040 and help eliminate the 5-7 million tons CO_2 emitted annually by Nigeria's small scale petrol and diesel generators.

[9] For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which Aichi Target(s) the project will directly contribute to achieving.

[10] McKinsey. 2015. *Brighter Africa: The growth potential of the sub-Saharan electricity sector.*

[11] International Energy Agency. 2015. *World Energy Outlook 2015*, p2. https://www.iea.org/Textbase/npsum/WEO2015SUM.pdf

[12] U.S. EPA. 2014. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013*. http://www3.epa.gov/climatechange/ghgemissions/sources/electricity.html

[13] SEforAll Global Tracking Framework. AfDB New Deal on Energy for Africa.

climate change; 2) grid access for low density, low power demand and/or isolated communities is not economically affordable; and 3) grid expansion is too slow to meet the needs of rapidly burgeoning populations. From an economic perspective, simply connecting dispersed rural residents in places like Rwanda, Uganda, and Sierra Leone can cost between US$300 and US$800 per household that only use 20-50kWh/month leading to payback periods of the initial cost of 30 to over 100 months. For these reasons, grid expansion is leaving out many rural (and periurban) residents to the point where current estimates in sub-Saharan Africa are that the same fraction of people will be without electricity in 2040 as there are today. Furthermore, non-OECD countries are expected to contribute all of the approximately 30 percent increase in world energy consumption between 2015 and 2040 and therefore could be a major contributor to climate change inducing emissions.[14]

5. In order to combat poverty and provide access a number of efforts have been made to bring low cost, sustainable energy in form of solar lanterns and individual solar-based household lighting and mobile phone charging systems. These solutions are crucial for providing rapid access to remedial electricity services at lower costs than grid-tied power and some are knocking on the door of commercial viability. Off-grid solutions already supply electricity access for an estimated US$100 million.[15] As part of its New Deal on Energy for Africa, the AfDB has set goals to "increase off-grid generation to add US$75 million connections by 2025, 20 times what we have today."[13]

6. The ultimate goal of electrification and electricity access is to underpin economic development. However, in most cases household systems do not provide sufficient power to support small to medium sized enterprises (SMEs) at costs that are economically viable. For example, the real cost of power for household systems typically exceeds US$1/kWh. An alluring middle ground is the minigrid/microgrid. Ranging in size from a few kilowatts to over 100 kilowatts, these systems have the potential to generate low cost power that could underpin economic development of SMEs while meeting broader electricity access goals.

7. Isolated minigrids/microgrids have the potential to reach far beyond current grid infrastrucure and supply power for basic electricity access - while stimulating economic growth. Due to declining costs and improved supply chains, off-grid minigrids/microgrids create an opportunity to provide affordable electricity access to millions of people in Africa. These minigrids/microgrids are powered by a combination of solar and diesel generation, and often incorporate battery storage. Solar systems typically range from 30–150kW of installed capacity. In some systems, the battery storage and solar generation is sufficient to avoid the need for diesel generation, but this configuration can increase the total cost—including upfront, fuel, and operating expenses—for power production so we are not limiting our focus to solar-battery only systems.

8. Minigrids/microgrids can serve both residential and commercial customers. The ability to serve commercial customers, and in particular productive uses like a grain milling or irrigation, is a distinguishing feature for minigrids/microgrids compared with other off-grid alternatives like stand-alone solar home systems or lanterns. Stand-alone systems are often the only option for users with the inability to pay for anything other than basic electricity access (e.g. lights, cell phone charging, and a radio). Commercial and productive use customers are critical for long-term viability of minigrids/microgrids - as they have higher demand per connection, their loads are more coincident with solar generation, and they can provide immediate new income for the community to help afford the new electricity service.

9. **Overcoming Barriers:** Now is the time to demonstrate and scale a replicable solar PV minigrid model - with targeted demonstration projects underpinned by collaboration across stakeholders, and lessons learned from coordinated rapid-scaling initiatives like the Global Alliance for Vaccines and Immunization. In order to test their efficacy and bring them to commercial reality, millions have been spent to develop minigrids. While scores of systems have been installed, thousands have been electrified and numerous models have been tested, the fact remains that widespread adoption of minigrids remains a chimera. The reasons are five-fold:

[14] We define developing countries as non-OECD countries excluding China.
[15] IRENA. Off-grid Renewable Energy Systems: Status and Methodological Issues

- They are too expensive: typical levelized costs of energy (LCOE) are above $1/kWh – in some cases above $3/kWh, and at the low end above $0.50/kWh;[16]
- Too often they are not coupled to demand stimulation programs needed to drive up use or generate income that will allow newly energized customers to afford this change in lifestyle. Some leading companies are experimenting with demand stimulation with promising initial results, but more is needed to refine and scale these programs;
- Regulatory frameworks do not support their testing and maturation nor resolve critical future integration issues with the grid;
- Scaling models that meet local variations and needs are not developed; and
- The financing roadmap to bring them to maturity has not been well defined and supported.

10. Power is currently delivered at unaffordable rates and few if any minigrid businesses are economically viable. Even for today's best minigrids, the cost of power delivered to customers is more than double the price of power from the grid. This situation is exacerbated by the fact that new customers in rural areas have a lower ability to pay than those in urban areas with grid access. Major minigrid cost drivers include: system hardware - especially solar panels, batteries, distribution, and metering; generator fuel; other soft costs such as project development and customer acquisition.[17] Low capacity utilization also drives up cost, due to oversized systems or because daily load profiles do not match well with the design or operation of the system.

11. Minigrid companies focus primarily on supply of power and often do not pay enough attention to demand stimulation. Too often, new customers have been slow to connect and only use a small amount of electricity, leading to lost revenue and insufficient volume to spread fixed cost. The upfront cost to connect or for purchasing electric appliances may be too high, requiring financing or subsidy. Awareness and availability can also be a problem. Productive-use appliances, like grain mills, carpentry, irrigation, and cold storage, are particularly important because they are often coincident with cheaper generation from solar and have higher consumption than residential loads.

12. Policy and regulatory challenges include licensing, tariff setting, and grid integration. Slow, unclear, or unpredictable licensing and tariff setting processes create added risk from minigrid companies. Governments are hesitant to allow tariffs higher than those for utility customers on the grid, but utility infrastructure is more mature at larger scale, with larger customers, and often heavily subsidized. Minigrids cannot currently generate sufficient revenue at these prices. In addition, uncertainty about where the grid will be expanded creates risk that the grid will arrive sooner than expected. Some minigrid infrastructure might be integrated with the grid in the future, but the regulatory framework and technology compatibility is also uncertain.

13. Additionally, minigrid business models must be adjusted for local conditions, at the regional, national or even village by village. Customer behavior, economic activity, climate, and government are some of the key considerations. Minigrids companies will also need to build local capacity for installing and maintaining the minigrids.

14. Finally, financing is also uncertain. Most projects today are grant funded, but the amount and type of funding required over the next 5–10 years for transitioning toward concessional financing and market capital is poorly understood. Ultimately - for scale, competitiveness and sustainability - mini-grids will need to access low-cost, commercial debt financing. Furthermore, a reliable pipeline of projects is lacking, so upstream suppliers are hesitant to invest R&D for improving and scaling up their offerings despite potential for a multi-billion dollar off-grid market in the longer-term.[17]

[16] IRENA. Innovation Outlook: Renewable Minigrids
[17] Kelly Carlin, Josh Agenbroad, et al. Energy Within Reach: Growing the minigrid market in sub-Saharan Africa. (Rocky Mountain Institute, 2017). www.rmi.org/energy_within_reach

15. Five key forces can be united to take minigrids from grant funded dreams to a driving force for economic development: (1) plunging costs for crucial energy technology components, (2) economic productivity stimulated by high efficiency appliances for residential and commercial customers using demand stimulation programs that take into consideration ability and willingness to pay, (3) hundreds of millions of dollars in investor capital waiting in the wings, (4) entrepreneurs and governments poised to develop and support minigrids, and (5) an emerging understanding of the key business model challenges to be resolved to unlock rapid growth.

16. The U.S. proved in the 1930s that widespread rural electrification is possible in little more than a decade. President Franklin Roosevelt creating the Rural Electrification Administration (REA) in 1935, within 15 years, electricity reached more than 90% of farmers and other rural Americans."[18] Europe, China, Chile, and Thailand and others are also notable expamples that have achieved rapid success, rely on many of the same strategies, but tailored to local conditions, with unique local innovations, and adjusted for their respective politics and government.[19]Now, with 21st century technology, led by private-sector entrepreneurs and innovation, we can do the same all across the developing world, rapidly bringing the transformative power of electricity to hundreds of millions of people.

The baseline scenario or any associated baseline projects

17. Expanding traditional grids in developing countries will slow the progress being made in reducing greenhouse gas emissions and combating climate change, since most central power plants are powered by fossil fuels. Based on current trends, sub-Saharan Africa is forecast to consume 1,600 terawatt hours (TWh) of electricity and emit nearly 700 million metric tons of CO_2 (Mt CO_2) by 2040.[20] India's electricity consumption is expected to reach 3,000 TWh, with emissions of more than 3,000 Mt CO_2 by 2040, accounting for 25% of global electricity demand growth.[21] (For context, 2013 U.S. power sector emissions were 2,100 Mt CO_2.[22]). Depending on solar and battery system sizing, minigrids will reduce GHG emissions by 30–100% compared with diesel power generation and 20–100% compared with coal power generation.[23]

18. Sub-Saharan Africa is the only region in the world where the number of people lacking access to electricity is set to rise (population is growing faster than new connections). There are currently 630 million Africans without access to electricity. This is despite over $11 billion spent annually by African governments to cover utility deficits and $10 billion spent on energy expenditures by Africans making less than $2.50 a day.[24] Development partners have also invested heavily to expand electricity access.

19. Hundreds of millions of dollars have already been invested in minigrids as a solution for rural electricity access, with over a hundred of pilot projects now in operation across Africa, India, and elsewhere. Existing initiatives and policies, along with additional funding, are already working to address some of these barriers.
    a. The Rockefeller Foundation's Smart Power for Rural Development (SPRD) is a $75 million initiative aimed at accelerating development in India's least developed states. SPRD oversees Smart Power India, which has built over 100 minigrids in Uttar Pradesh, Bihar, and Jharkhand, with the aim of accelerating rural economic development and better understanding the impact and underlying economics of green minigrids.

[18] http://americanhistory.si.edu/blog/rural-electrification
[19] The Challenge of Rural Electrification. 2007. Douglas F. Barnes.
[20] McKinsey. 2015. *Brighter Africa: The growth potential of the sub-Saharan electricity sector.*
[21] International Energy Agency. 2015. *World Energy Outlook 2015*, p2. https://www.iea.org/Textbase/npsum/WEO2015SUM.pdf
[22] U.S. EPA. 2014. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013*. http://www3.epa.gov/climatechange/ghgemissions/sources/electricity.html
[23] Assuming that solar-hybrid minigrids will rely on 30–100% solar generation with the remainders supplied by diesel generation. Diesel generation is assumed to produce ~1 metric ton CO_2 per kWh while coal generation in India is assumed to produce 0.85 metric ton CO_2 per kWh. Source: U.S. EPA. Moti L. Mittal. 2012. *Estimates of Emissions from Coal Fired Thermal Power Plants in India*. https://www3.epa.gov/ttnchie1/conference/ei20/session5/mmittal.pdf
[24] 2014 World Energy Outlook; 2015 World Energy Outlook; Africa Progress Panel 2015

b. The Sustainable Energy Fund for Africa (SEFA) is a $90 million multi-donor facility supported by Denmark, the United Kingdom and the United States, hosted by the Energy, Environment, and Climate Change department fo the African Development Bank. As part of SEFA, the Green Mini-Grid Market Development Programme (GMG MDP) is implemented by the SEforALL Africa Hub, the GMG MDP's goal is to support the scale-up of investments in commercially-viable green mini-grid projects through a broad range of interventions to improve the enabling environment.
c. The World Bank's Global Facility on Minigrids supports the GMG MDP, along with minigrid initiatives within the Clean Technology Fund (CTF) and Scaling-Up Renewable Energy Programme (SREP) through two pillars: (1) Operational up-scaling via pre-investment activities based on operational and client demand, providing technical assistance and operational support, and support to supervision of projects under implementation with techical advice to project teams, and (2) providing global knowledge development and learning through knowledge development, case studies and technical notes.
d. The minigrid pilot project program in Kenya operated by Seattle-based impact investor Vulcan was expressly designed to test commercial viability of ten minigrid according to customer behavior, minigrid technology, and business model. The results of a demand stimulation-focused follow-up pilot project that looked at one minigrid site, are set to be released during the summer of 2017.
e. UNDP is extending its 'Derisking Renewable Energy Investment' (DREI) framework to off-grid renewable energy, including solar PV/battery mini-grids. DREI is a quantitative, risk-informed framework to assist policymakers to cost-effectively select and implemenent measures to promote reneweable energy investment. Initial DREI case studies for private sector mini-grids have been performed in Uttar Pradesh, India and Kenya. A report will be released in Autumn 2017.
f. Private sector minigrid companies like Husk Power, Sparkmeter, and PowerGen have installed projects in countries like Kenya, Tanzania, and Uganda while attracting funding from equity investors like Shell Foundation, Acumen Fund, and DOB Equity.

20. Despite this activity, a proven, commercially viable, and therefore scalable, business model has yet to emerge. While current projects have been able to prove that these small, isolated grids can deliver reliable power, and that electricity demand rises over time, even the best projects have not provided a sustainable return on invested capital. As a result, there are still critical questions about how to cut costs through standardized designs, how to create innovative upstream and downstream business models, how to stimulate demand, how to create a reliable pipeline of commercially viable and scalabe projects, and how to develop supportive policies.

The proposed alternative scenario, with a brief description of expected outcomes and components of the project

21. Main Activities: Develop a distinctive approach to developing nation electrification utilizing minigrids that can be funded by the GEF in GEF-7 (2018-2022). We propose two parallel Project Components that will enable GEF to begin to create a distinctive approach to electrification in developing countries while rallying early support across stakeholders crucial to its success. Both components fit within Program 1: Promote timely development, demonstration and financing of low-carbon technologies and mitigation options" under GEF Climate Change Focal Area Objective 1: "Promote innovation, technology transfer, and supportive policies and strategies".

22. **Component 1:** This component will conduct a number of activities in order to inform the design and garner partner support for an integrated capacity building and minigrid pilot program proposal for sub-Saharan Africa that will be prepared for funding under GEF 7. Activities will include: upstream diagnostics, integration of outcomes from a Minigrid Summit, desk top studies, review of effective financing models for minigrids and explore applicability to small island developing states (SIDS). Under this component, RMI will also attract and catalyze support across the donor electricity access space in sub-Saharan Africa to leverage and mobilize concessional and grant financing to accelerate development, demonstration, and financing of minigrids that will be subsequently developed by RMI under the proposed GEF-supported integrated capacity building and minigrid pilot program for sub-Saharan Africa.

23. Specific activities include:

- Review and synthesis of current minigrid efforts with a focus on their successes that could be amplified and their drawbacks that must be addressed;
- Develop a Theory of Change that clearly articulates how mingrids can be taken from isolated experiments in sub-Saharn Africa and SIDS to rapidly growing and economically viable participants of electricity access and economic development;
- Calculate LCOE for typical renewable energy (RE) based mini-grids taking into account technology advancement, with two sencarios with and without national governemnt duty free policy for RE equipment import.
- Create roadmap for scaling that begins with a robust set of pilots and competitive procurement to rapidly test, refine and ultimately scale up viable minigrid models;
- Outline financial evolution that makes clear the different types of funding, their magnitudes and their timing to quickly evolve from grant based experiments to commercially funded businesses;
- Identify regulatory constructs required to allow minigrids to flourish while ensuring cost effective power and increasing customer service at lower costs;
- Clarify ecosystem of players required for minigrids to succeed and the roles that each should play, including both electricity supply as well as regulation and demand stimulation programs for productive-use and economic development;
- Undertake an on-site survey to identify willingness for new poor customers in sub-Sahara Africa to pay for power supply;
- Form private and public partnerships in sub-Sahara Africa for minigrid/microgrid investments; and
- Estimate the market volume opportunity in sub-Sahara Africa for renewable microgrids/minigrids in communitites that currently lack access to electricity.

24. Activities under Component 1 will commence upon GEF approval of the Clean Rural Electrification for African Countries proposal and will aim to complete all activities in advance of the GEF 7 call for proposals. The output of component 1 will be a proposal focused on capacity building, policy recommendations, and minigrid pilots that will be submitted to the GEF (under GEF-7) that will aim to create a rapid-scaling platform for commercially viable minigrids in sub-Saharan Africa – with direct applicability to SIDS, including a roadmap for cost reduction and minigrid investment. It is expected that, if approved, the sub-Saharan Africa capacity building and minigrid pilot program would launch in mid-2018 and facilitate microgrid/minigrid investment that have the potential to achieve the following:
    - Leverage a minimum of $10 million co-financing;
    - Electrify 50–100 villages;
    - Provide electricity access to 200,000 people;
    - Create the data needed to develop a replicable minigrid model by the end of 2019; and
    - Demonstrate to all of the key actors that financially viable minigrids for rural electrification are possible.

25. **Component 2:** Under this component, RMI will develop, host and facilitate a multi-day summit with a goal to co-create a minigrid pathway that informs key aspects of Component 1 and garners critical support across stakeholder groups including funders, interested countries (that will participate in the proposed GEF-supported integrated capacity building and minigrid pilot program for sub-Saharan Africa), private sector players, system designers, renewable energy service companies (RESCOs), and entrepreneurs. The Summit will test and refine key hypotheses such as:

    • A very low cost, robust standardized power plant and associated enabling technologies (e.g. metering, pricing signals, billing) are the cornerstone of cost commercially viable systems and should be competed at the international scale. The solutions should be based on technologies already at scale, capture the benefits of global supply chains and be readily assembled and maintained by relatively low skill labor. Minigrid companies will buy these systems from large upstream players, like GE and ABB, who have the design expertise and access to high volume, mature, global supply chains that can reduce cost. One important goal for the summit is inspiring additional research and development investment from these large upstream players by clarifying the large size of the prize potential market that can be unlocked with a profitable minigrid business model.

- Standardized "franchise-like" tools, and business development mechanisms to scale the local minigrid business ecosystem and accelerate successful deployment in each country is required while accessing the economies of scale of upstream equipment/system providers.
- Key labor productivity and other demand stimulating technologies need to be identified, optimized for efficiency and brought to economic scale. Improving energy efficiency of appliances affects customer ability and willingness to pay because more efficient appliances often reduces energy consumption and operation cost by more than half without compromising the service being provided to users. Incorporating soft start motors can dramatically reduce instantaneous start-up loads, which are expensive to accommodate by focusing on supply-side equipment alone.
- Expore most appropriate funding mechanisms or models needed in specific countries in SSA, but over time, funding can shift towards concessional financing and blended commercial debt.
- A global procurement consortium and a global financing platform can enable rapid cost reduction, ensure a focus of local entrepreneurs on customer needs and services, and create a sustained and evolving source of financing to ensure rapid scaling.
- Engage domestic governments in good practice public interventions to promote private sector investment in mini-grids, systematically identifying risks that governments can target and mitigate. Regulatory models can be developed and standardized that will allow for rapid testing and improvement of minigrid business models while ensuring that customer needs, cost reduction and eventual grid integration.
- Demand stimulation programs, including outreach, financing, and increasing availability of quality and efficient appliances, are a critical to successful rural electrification and economic growth.
- High potential countries with a strong private sector, significant latent demand for productive use, and large portions of the country without grid infrastructure can take on leadership roles for the minigrid pilots that will provide the data needed to de-risk minigrid businesses so they can scale rapidly. This is also true for isolated SIDS – particularly in the Pacific.[25]

26. The Summit will provide a catalytic setting to rally the spectrum of stakeholder groups that minigrids can meet important cost, revenue and profit targets and underpin support for GEF to lead an effort by mid-2018 to rapidly test the solutions proposed during the summit and expand the effort in subsequent years. The Summit will also aim to develop a consortium of partners to develop a $10-$20 million GEF-supported program focused on deploying renewable microgrids/minigrids in sub-Saharan African and mobilize an additional $100-$200 million in co-financing from financing institutions and donor partners.

Incremental/additional cost reasoning and co-financing

27. The full cost for both Components is $950,000, which does not include the requested $50,000 in the form of a project preparation grant.

28. The cost breakdown is as follows:
    - Component 1: $600,000 of which ~$500,000 will be for direct RMI costs and ~$100,000 will be for expenses and contractor services
    - Component 2: $350,000 of which ~$100,000 will be for direct RMI costs and ~$250,000 will be for expenses, Summit participants, prototype development and contractor services.

29. We expect $550,000 in direct co-financing to support this effort. Funding will come from in-kind contributions from RMI as well as the Rockefeller Foundation and Virgin Unite - the primary funders of RMI's Sustainable Energy for Economic Development program, with ongoing activities focused on energy access and energy for economic development in Africa. In addition, contributions from other foundations are currently being explored. More importantly, this project will lay the foundation to leverage signficant private sector co-financing for future microgrid/minigrid investments identified during the Summit. It is estimated that future microgrid/minigrid projects identified by this project would average a 1 to 20 co-financing ratio.

[25] RMI is also working with island nations in the Caribean and Pacific, where the same technologies and business models also apply for isolated grids on smaller islands to provide affordable electricity access.

30. The timing for the Summit should be either late 2017 or early in 2018 in order to be in a position to develop and submit the sub-Saharan Africa capacity building and minigrid pilot program to the GEF as soon as GEF-7 is launched. Approximate funding and execution needs to be:
    - GEF approval of the Clean Rural Electrification for African Countries proposal by RMI no later than November 2017
    - RMI launches its effort December 2017 on both Component 1 & 2 in parallel
    - Summit agenda, participants, outcomes and location complete by December 2017
    - Minigrid Summit late January/early February 2018
    - Component 1 draft outline complete by February 2018
    - Summit complete by February 2018
    - Lessons and insights of Summit codified by March 1 2018
    - Presentations at SEforALL Forum in the Second Quarter of 2018 and in the GEF Assembly in June 2018.

Global environmental benefits (GEFTF)

31. Minigrids/microgrids have the potential to provide electricity access that underpins economic development, while reducing carbon emissions. The distinguishing allure of minigrids is that they can underpin economic development while reducing emissions and generating access to energy far from existing grid infrastructure. The activities described in this PIF will lay the foundation for a subsequent GEF proposal (to be submitted under GEF-7) focused on capacity building, policy recommendations, and minigrid investments, which will aim to create a rapid-scaling platform for commercially viable minigrids in sub-Saharan Africa. The project coupled with the subsequent proposed GEF program will contribute to the following outputs within the GEF programmatic framework:
    - Mobilize additional investment and align committed partners from government, development, and the private sector at Microgrid Summit;
    - Accelerate development, demonstration, and financing of low-carbon technologies for electricity access in the developing world: specifically targetting $10–20 million of foundation and development partner funding in addition to support from GEF 7 replenishment mobilized during the Summit to support actual field installations by 2020. These projects, which will be included in the subsequent proposal to be submitted under GEF-7 will aim to:
        - Reduce carbon emissions by *2 million metric tons* with the installation of 30–60 MWs of solar generation capacity; [8]
        - Provide electricity access to 2 million people and electritrify 500–1000 villages;
        - Leverage US$100–200 million in co-financing;
        - Further de-risk minigrid investment allowing a transtion to blended commercial financing as the market grows rapidly;
        - Create the data needed to develop a replicable minigrid model by the end of 2019; and
    - Demonstrate to all of the key actors that financially viable minigrids for rural electrification are possible. Clarify long-term funding requirements as minigrids transition from grant funded pilots to concessional financing and eventually to market capital. Additional concessional financing is likely needed for the next step of this transition after the grant funded pilots describe above. This funding would support an estimated 1,000 minigrid projects with the potential to offset 2000 metric tons of CO^2 over a 20 year project lifetime.[8]

32. For the GEF the minigrid need translates into an opportunity to build on but also leap frog the current efforts in the minigrid and rural electrification space. With the proposed set of activities and a fact-based proposal at hand, the GEF will be well positioned to take a distinctive leadership role beginning in 2018.

Innovation, sustainability and potential for scaling up

33. Innovative aspects of our proposed approach include:

a. Bringing together a diverse set of stakeholders required to breakthrough on this problem, including upstream and downstream, governments, and development partners.
b. A focus throughout on stakeholder alignment and collaboration. In particular, the minigrid summit will develop a shared vision and cost reduction roadmap
c. Whole-system approach focusing on both supply and demand, soft and hard cost, system design and operation, government and the private sector.
d. Setting up a clear pipeline of projects with funding to be implemented with competitive tender process, focusing on data collection and testing specific hypothesis around cost, operation, and business models.
e. Engaging consumer representatives from the poor households in local communities in SSA.

34. This project is scaleable and sustainable because of our focus throughout on commercial viability. The summit will create a credible roadmap for cost reduction and align stakeholders for working toward a multibillion dollar market opportunity. The Summit will design a pipeline of projects that can be used to test ideas and prove out those cost reductions and other business model improvements that can attract further investment. The summit will clarify funding needs for the longer-term, including a transition to concessional and market financing.

35. The full impact from rapid scaling of the minigrid model will become clearer over time, but current estimates suggest that minigrids can:
    - Provide enough power to meaningfully support economic development at CAGRs approaching 6-10%.
    - At scale they can underpin a quadrupling of GDP for rural poor in 15 years
    - Bring electricity access to hundreds of millions of people in developing nations in a 10-15 year time horizon
    - Can couple supply side solutions with demand side stimulation to create commercially viable businesses
    - Can avoid much of the 700 MtCO2 Africa and 3,000 MtCO2 India are expected to emit by 2040
    - Beat grid solutions for rural customers and support economic activity in ways that small-scale solar systems most often cannot
    - Scale the most promising approaches to reach millions by the end of the decade with a consortium of participants building off of lessons learned from those initial pilots.

2. Stakeholders. Will project design include the participation of relevant stakeholders from civil society organizations (yes ☒ /no☐) and indigenous peoples (yes ☐ /no☒)? If yes, identify key stakeholders and briefly describe how they will be engaged in project preparation.
Key governmental agencies responsible for national and sectoral national development programs who will participate in this project include:

36. Working with this spectrum of stakeholders and experts will ensure that we create a robust and fully supported proposal for the GEF 7 replenishment as well as critical participants in the Minigrid Summit that will generate excitement and energy for a clear path forward.

37. The following stakeholders will likely be included in this project (stakeholders will be finalized pending additional outreach).

38. Rural Electrification Agencies, Ministries of Energy, consumer representatives, and power sector regulatory bodies. The following countries were identified to target based on a combination of country priorities and enabling factors through an initial scoping exercise:
    - Ethiopia
    - Kenya
    - Ghana
    - Nigeria
    - Rwanda
    - Uganda
    - Senegal
    - Tanzania

- Zambia

Final country selection will be determined during the PPG and will include suitable countries in East and West Africa.

39. Private sector entities including (but not limited to):
    - The Africa Minigrid Developers Association (AMDA)
    - Various minigrid developers and operators
    - Major equipment suppliers
    - Experts with experience in scaling similar industries

40. Major sources of capital to fund pilots and a more fully functioning commercial market including:
    - Foundation capital providers (e.g., The Rockefeller Foundation)
    - Development finance institutions (e.g., The World Bank)
    - Patient equity providers (e.g., Acumen Fund)
    - Commercial debt providers (e.g., Stanbic)

41. Governments will be the beneficiary of the project and will ultimately be responsible for enabling and hosting minigrids. The private sector will be responsible for developing and operating minigrids. Major sources of capital will be responsible for providing various evolving forms of funding as the market moves from pilot stage to a fully developed market funded by commercial debt. RMI will be the executing agency the project. UNDP will be the implementing agency.

42. Gender Equality and Women's Empowerment. Are issues on gender equality and women's empowerment taken into account? (yes ☒ /no☐). If yes, briefly describe how it will be mainstreamed into project preparation (e.g. gender analysis), taking into account the differences, needs, roles and priorities of women and men.

43. Women are disproportionately hurt by lack of electricity access through need for greater labor on basic necessities (e.g. water) and lack of economic opportunity. Women disproportionately take advantage of access to electricity. Therefore, the minigrid solution could help reduce the burden on women and create economic benefits that will help lower gender inequality.

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

44. The risks of the project are assessed in the following table:

No:	Risk	Rating	Mitigation Measure
1	Lack of political will to move forward with proposed Sub-Saharan Africa capacity building and minigrid pilot program	Medium	Providing access to the more than 600 million people in sub-Saharan Africa is a top priority of African governments and donor partners. However, in order to mitigate a change in political priority, the project will aim to catalyze political will during the Minigrid Summit and galvanize donor grant and concessionary financing to ensure commitment to financing minigrids for rural communities without access.
2	Minigrid Summit is not well attended or does not lead to actionable outcomes	Low	The Minigrid Summit will be prepared and executed with a high degree of oversight and invitations will be dissiminated widely. RMI has already been working with many of the leading minigrid companies and several of the

			leading government agencies. These partners will be engaged early and often when designing activities and outcomes.
3	Minigrid Summit does not mobilize donor funding required to finance minigrids to be identified and prepared under the proposed Sub-Saharan Africa capacity building and minigrid pilot program	Medium	Direct outreach before, during and after the Minigrid Summit will help galvanize support from bi-lateral agencies, donor groups, and impact investors to agree to provide grant and concessional financing for minigrids identified and prepared under the proposed Sub-Saharan Africa capacity building and minigrid pilot program. This risk will be further mitigated with support from The Rockefeller Foundation and Virgin Unite who have both committed to mobilizing donor partners to contribute both debt and investor grant and concessional financing for identified minigrid pilot projects.

5. Coordination. Outline the coordination with other relevant GEF-financed and other initiatives.

45. This project will coordinate with other ongoing relevant minigrids projects in the countries that will be covered by this initiative (and others in Africa), either GEF funded or otherwise relevant. There are a number of ongoing and planned UNDP GEF financed projects in Africa that will be taken into account.

6. Consistency with National Priorities. Is the project consistent with the National strategies and plans or reports and assessments under relevant conventions? (yes ☐ /no☒). If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

N/A – Although this is a project that is regional in scope, as such these national planning documents are not of relevance. Nevertheless, once the actual pilot countries are known, we will ensure that the activities align with the national strategies, in particular the NDCs, of those countries.

7. *Knowledge Management.* Outline the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

46. All insights and knowledge gained from the Minigrid Summit will be captured and dissiminated to Summit participants, interested governments and pre-identified bi-lateral agencies, donor groups, and impact investors. In addition, applicable insights will be shared through sub-Saharan African regional organizations such as African Minigrid Developers Association or ECOWAS Center for Renewable Energy and Energy Efficiency as well the SIDS Renewable Community of Practice established by the GEF-supported Ten Island Challenge: Derisking the Transition of the Caribbean from Fossil Fuels to Renewables (Project ID: 8006), which currenty has over 400 active users from over 40 island countries across the Caribbean, Pacific, Indian and Atlantic oceans.

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

A. RECORD OF ENDORSEMENT[26] OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):

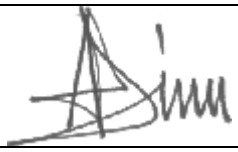
(Please attach the Operational Focal Point endorsement letter(s) with this template. For SGP, use this SGP OFP endorsement letter).

[26] For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

N/A

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies[27] and procedures and meets the GEF criteria for project identification and preparation under GEF-6.

Agency Coordinator, Agency name	**Signature**	**Date** *(MM/dd/yyyy)*	**Project Contact Person**	**Telephone**	**Email**
Adriana Dinu UNDP-GEF Executive Coordinator, UNDP		October 18, 2017	Marcel Alers, EITT – PTA	212-906-6199	marcel.alers@undp.org

C. ADDITIONAL GEF PROJECT AGENCY CERTIFICATION (APPLICABLE ONLY TO NEWLY ACCREDITED GEF PROJECT AGENCIES)

For newly accredited GEF Project Agencies, please download and fill up the required **GEF Project Agency Certification of Ceiling Information Template** to be attached as an annex to the PIF.

[27] GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, SCCF and CBIT