United Nations Development Programme

Project Document template for projects financed by the various GEF Trust Funds

Project title: National child project under the GEF Africa Minigrids Program - Eswatini		
Country: Kingdom of Eswatini	**Implementing Partner (GEF Executing Entity):** Ministry of Natural Resources and Energy	**Execution Modality**: National Implementation Modality (Full-NIM)
Contributing Outcome (UNSDCF[1] and CPD[2]): **UNSDCF priority areas:** **Outcome 1: Promoting Sustainable and Inclusive Economic Growth.** By 2025, women, men and youth, including marginalized persons, contribute to and benefit from economic progress, through greater access to decent employment, equitable social economic opportunities, sustainable enterprise opportunities as well as resilient, financially sustainable social protection systems. **Outcome 4: Strengthening Natural Resource Management, Climate Resilience and Environmental Sustainability.** By 2025, Eswatini is on an inclusive low-carbon development pathway that is resilient to climate change and in which natural resources are managed sustainably, and community adaptation to climate change is enhanced, for improved livelihoods, health and food security, especially for vulnerable and marginalized communities **CPD identified national priority or goal and cooperation framework outcome involving UNDP:** Echoing the UNSDCF with the goal to have: Economic recovery underpinned by inclusive and sustainable growth. Outcome 1: By 2025, women, men and youth, including marginalized persons, contribute to and benefit from economic progress, through access to decent employment, equitable social economic opportunities, sustainable enterprise opportunities as well as resilient, financially sustainable social		

[1] 2021 – 2025 United Nations Sustainable Development Cooperation Framework for Eswatini, replacing the Swaziland United Nations Development Assistance Framework (UNDAF), 2016 – 2020

[2] Country Programme Document for Eswatini (2021 – 2025)

protection systems.	
UNDP Social and Environmental Screening Category: Moderate	**UNDP Gender Marker:** GEN2.
Atlas Award ID: 00134785	**Atlas Project/Output ID:** 00126286
UNDP-GEF PIMS ID number: 6432	**GEF Project ID number:** 10413
LPAC[3] meeting date: 21 April 2021	
Last possible date to submit to GEF: 19 June 2021	
Latest possible CEO endorsement date: 19 December 2021	
Project duration in months: 48 months	
Planned start date: June 14 2022	**Planned end date:** June 13, 2026
Expected date of Mid-Term Review: N.A.	**Expected date of Terminal evaluation:** March 13, 2026

Brief project description:

The UNDP-supported, GEF-financed Africa Minigrids Program (AMP) aims to support African countries, including Eswatini, to increase energy access by reducing the cost and increasing commercial viability of renewable energy (RE) minigrids.

For Eswatini, the AMP focus is on establishing a springboard for RE minigrid development, building data and knowledge resources and 'proof of concept' business models that can inform planning, de-risk investments and encourage private sector participation in the country. This aligns with the country targets for renewable energy (RE) and the expectation that minigrids will contribute to goal to achieve universal energy access, as set out by the National Energy Policy (2018) and the Kingdom of Eswatini Energy Masterplan, 2034.

This contribution will be achieved through three outcomes: (i) appropriate policies and regulations addressing policy, institutional, regulatory and technical barriers to investment in RE minigrids; (ii) innovative business models, based on cost reduction, operationalized; and (iii) increased awareness and network opportunities in the minigrid market and among stakeholders as well as lessons learned for scaling up rural electrification using RE minigrids.

The number of direct project beneficiaries is expected to be around 459 persons, of whom approximately 234 women. The lifetime global environmental benefits that will accrue from the

[3] Local Project Appraisal Committee, consisting of Country Office, Implementation Partner and key country and development partners, convened just before endorsement as a final step to ensure alignment.

adoption of clean energy minigrid technologies is estimated at 2,444 tCO_2e. Indirect emission reductions amounting to 54,000 tCO2e are expected due to investments in minigrids completed during the 10-year influence period following project completion, predominantly through the replication of the sustainable technology value chain.. The project yields a GEF abatement cost of 1,086 USD/tCO_2e. This abatement cost takes into consideration overall upfront and replacement CAPEX of both pilots, as well as CAPEX for PUE overlay.		
FINANCING PLAN		
GEF Trust Fund grant	USD 863,242	
UNDP TRAC resources	USD 50,000	
Confirmed cash co-financing to be administered by UNDP	USD 0	
1. Total Budget administered by UNDP	**USD 913,242**	
2. Total confirmed co-financing	**USD 19,374,228**	
3. Grand-Total Project Financing (1)+(2)	**USD 20,287,470**	
SIGNATURES:		
Signature: print name below Thabisile Mangeni	**Agreed by Government Development Coordination Authority4**	**Date/Month/Year:** *within 25 days of GEF CEO endorsement*
Signature: print name below Dorcas N. Hamisi NOHamisi	**Agreed by Implementing Partner**	**Date/Month/Year:** *within 25 days of GEF CEO endorsement*
Signature: print name below ROSE K. SSEBATINDIRA	**Agreed by UNDP5**	**Date/Month/Year:** *within 25 days of GEF CEO endorsement*
Key GEF Project Cycle Milestones:		

4 Other evidence of government agreement may be accepted in lieu of a signature, unless the programme country government requires a signature.

5 For NIM projects this is the Resident Representative.

Project document signature: within 25 days of GEF CEO endorsement
First disbursement date: within 40 days of GEF CEO endorsement
Inception workshop date: within 60 days of GEF CEO endorsement
Operational closure: within 3 months of posting of TE to UNDP ERC
Financial closure: within 6 months of operational closure

I. TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF BOX INSERTS

ACRONYMS AND ABBREVIATIONS

The following acronyms, listed in alphabetical order, are used in this document:

Acronym	Description
AMP	Africa Minigrids Program
CCU	Climate Change Unit
CO_2	Carbon Dioxide
COD	Commercial Operation Date
CSER	Centre for Sustainable Energy Research
CSO	Central Statistics Office
DREI	Derisking Renewable Energy Investment
EA	Executing Agency
EEA	Eswatini Environment Authority
EEC	Eswatini Electricity Company
ESCO	Energy Services Company
ESERA	Eswatini Energy Regulatory Authority
ESMF	Environmental and Social Management Framework
FSP	Full Sized Project
GCF	Green Climate Fund
GEF	Global Environment Facility
GEFSEC	Global Environment Facility Secretariat
GHG	Greenhouse gas
GoKE	Government of the Kingdom of Eswatini
HEAS	Household Energy Access Survey
IP	Implementing Partner
IPP	Independent Power Producer
IRBD	International Bank of Reconstruction and Development
IRENA	International Renewable Energy Agency
kWh	kilowatt hour
MCIT	Ministry of Commerce, Industry and Trade
MEPD	Ministry of Economic Planning and Development
MNRE	Ministry of Natural Resources and Energy
MSME	Micro Small and Medium Enterprises
MSP	Medium Sized Project
MTAD	Ministry of Tinkhundla Administration and Development
MTEA	Ministry of Tourism and Environmental Affairs
MW	Megawatt

Acronym	Description
NDC	Nationally Determined Contribution
NEP	National Energy Policy
NREL	National Renewable Energy Laboratory (United States of America)
PARES	Partnership for Affordable Renewable Energy in Eswatini
PFD	Program Framework Document
PIF	Project Identification Form
PIR	GEF Project Implementation Report
POPP	Programme and Operations Policies and Procedures
PPG	Project Preparation Grant
PV	Photovoltaic
QAF	Quality Assurance Framework
RE	Renewable Energy
REAESWA	Renewable Energy Association of Eswatini
REP	Rural Electrification Program
RES	Royal Eswatini Sugar Corporation
RETs	Renewable Energy Technologies
RMI	Rocky Mountain Institute
RRA	Renewable Readiness Assessment
SAPP	Southern African Power Pool
SCP	Standard Consumption Package
SEFA	Sustainable Energy Fund for Africa
SE4ALL	Sustainable Energy for All
SEB	Swaziland Electricity Board
SESP	Social and Environmental Screening Procedure
SHS	Solar home systems
SIPPP	Eswatini Independent Power Producer Policy
STAP	GEF Scientific and Technical Advisory Panel
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USL	Ubombo Sugar Limited

II. DEVELOPMENT CHALLENGE

The Kingdom of Eswatini (Eswatini) is a landlocked, small open economy in Southern Africa with a land area of 17,364 km^2 and a population of 1.1 million. The average population density, at 66 people per km^2 is slightly higher than the average for Africa (45 ppl per km^2), with 24% of the population located in urban and 76% in rural areas. Rural settlements are characterized by homesteads dispersed across the countryside with nucleated or clustered areas limited to a few towns and city centers. The country is largely mountainous, bordered on the east by Mozambique and on all other borders by South Africa with some more remote, inaccessible 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 USD3,200, Eswatini is classified as a lower middle-income country. This average per capita statistic obscures the great contrast in incomes and living standards experienced by various parts of the population. Poverty is widespread, with approximately 40% of the population estimated to be living under the international USD1.90 poverty line and more than 60% of the population as poor overall[1]. Income inequality is also high, with an estimated Gini coefficient of 54.6% in 2016[2]. Accordingly, poverty, inequality and unemployment remain the most stubborn primary development challenges for Eswatini and overcoming these is a Government priority.

Similarly, the economy displays a marked duality of large-scale intensive production and small-scale semi-subsistence activities. This is also reflected in the vibrant Micro-, Small, Medium Enterprise (MSME) sector in Eswatini. Approximately 10% of the adult population owns a MSME and the sector employs ~93 000 individuals (16% of the total working-age population. The vast majority (93%) are independent entrepreneurs and micro-businesses, with only about 8% qualifying as small- or medium businesses. Many MSMEs are run from residential premises (55%) and located in a rural area (75%). Activities are largely clustered in the agriculture (23%) and retail (39%) sectors and a significant number is owned by women (65%).

The global coronavirus pandemic (COVID-19) has been far more than a health crisis, affecting societies and economies at their core. The policy measures to limit the spread of the disease have resulted in substantial economic impacts, and a significant contraction in the global economy is expected. The situation in developing countries is even more tenuous. While the widespread economic impact of the COVID-19 crisis will only be evident in time, it is expected to increase poverty and inequalities at a global scale, exacerbating the challenges already faced in the country. The IEA estimates that across Africa, COVID-19 has pushed 30 million people back into energy poverty. Despite timely instituting a response package to contain the spread of the pandemic and mitigate its impact on vulnerable households and businesses, the impact on economic activity and growth[3] in Eswatini is already noted[4]. Early work from the region provided some of the first evidence[5] on the socio-economic impacts among households and individuals in Sub-Saharan Africa. It points to the socio-economic effects of the pandemic, such as food insecurity, being disproportionately borne by households that were already impoverished prior to the pandemic.

Delivery of infrastructure projects, such as the minigrid pilot projects included under the AMP, are particularly vulnerable to supply chain disruptions, availability of construction teams, access to rural communities, logistical and cost impacts of meeting health and safety compliance. At the broader project level, if a vaccine program in Eswatini is delayed or if variants emerge that can escape the existing vaccines, this could lead to knock-on effects in advancing key activities. Specifically, carrying out in-person training activities or outreach to rural communities where physical presence is preferable could also prove difficult if some sanitary risks materialize. This project document considers that at this stage, COVID-19 risks to the project are moderate and contains mitigation measures to minimize any

[1] Live below the 2011 purchasing power parity (PPP) $3.20 per person per day poverty line for lower middle-income countries.
[2] https://knoema.com/atlas/Eswatini/topics/Poverty/Income-Inequality/GINI-index
[3] Economic growth is projected to contract by 2.8 percent in 2020, mainly due the negative economic impacts associated with COVID-19 on key sectors. World Bank. Eswatini COVID-19 Response Emergency Development Policy Financing (P174447).
[4] IMF. Press Release No 20. of 274. IMF Executive Board Approves US$110.4 Million in Emergency Support to The Kingdom of Eswatini to Address The COVID-19 Pandemic. 29 July 2020; Lees, Adrienne; Mascagni, Giulia; Santoro, Fabrizio. 2020. Simulating the Impact of COVID-19 on Formal Firms in Eswatini. MTI Practice Notes;. World Bank, Washington, DC. © World Bank.
[5] Josephson, Anna Leigh; Kilic, Talip; Michler, Jeffrey David. 2020. *Socioeconomic Impacts of COVID-19 in Four African Countries*. Report No.: WPS 9466. World Bank Group. Published: 3 November 2020.

potential disruption. Continued vigilance and risks assessments will however be required as the global situation continues to evolve.

The availability of vaccines requiring storage and transport at below zero temperatures underscores the importance of electricity for cold storage. Access to energy at health centers will be an immediate priority. Access to energy at health centers will be an immediate priority across the region. Over the medium to long term, access to affordable, clean energy will be crucial to support economic recovery, highlighting the significant potential opportunities for co-benefits from rural electrification in the fight against COVID-19. The multidimensional COVID-19 crisis also creates opportunities to contribute toward green recovery and building back better while leveraging global responses to COVID-19 to deliver global environmental benefits and/or climate adaptation and resilience benefits. Access to reliable, affordable, clean energy will be crucial to support economic recovery. Not only are investments in off-grid renewable energy important levers to create jobs and generate financial savings but increasing energy access for the most vulnerable population creates opportunities for local economic development that enhance resilience to shocks and crises.

More generally however, the importance of energy as a critical input resource for economic growth and development and key to poverty alleviation had already been recognized and targeted with the goal to reach 100% access to clean energy at household level by 2030[6]. Eswatini has made significant progress in increasing the electrification rate, from only 5% of the population with access to electricity in 2003, to 75% in 2017[7]. The electricity access rate is estimated at 80% for 2020. This is in large part due to the Rural Electrification Program (REP) under the Ministry of Natural Resources and Energy (MNRE), with dedicated funding from the Eswatini Government as well as the Republic of China (Taiwan). It has been complemented by community-led[8] electrification projects for which funding was accessed through the Rural Development Fund and Microprojects Programme that are supported bygovernment.[9]

The high national electrification rate masks the variance between urban centers (90%) and rural areas (69%). The Kingdom of Eswatini Energy Masterplan 2034 notes that most households are within a kilometer of the national grid, but it is increasingly expensive to extend the network to remote areas.

These realities drive rural use of traditional fuels, especially wood and paraffin – with wood fuel providing approximately 90% of total rural energy. UNEP estimates that Eswatini's primary fuel mix contains 66% traditional fuels[10], 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 for the country may reach 4.7 $MtCO_2e$.[11] Domestic and commercial use of wood fuel is unsustainable and associated with indoor pollution[12], which contributes to the burden of respiratory diseases as well as deforestation. This situation is exacerbated by the increasing number of small businesses such as butcheries that roast meat for sale as well as a high number of individuals that are increasingly setting up along the country's roads to roast and sell meat and green mealies to the public.

[6] Kingdom of Eswatini, Energy Masterplan 2034. Ministry of Natural Resources and Energy. October 2018. A high growth scenario would see this achieved by 2022, in line with the ambitions of the Government of the Kingdom of Eswatini's Vision 2022.
[7] Kingdom of Eswatini, Energy Masterplan 2034. Ministry of Natural Resources and Energy. October 2018.
[8] These funds are not dedicated to rural electrification, but can be accessed by communities for any development initiatives including electrification projects. Consequently, many communities have submitted applications for electrification projects.
[9] Government implementing agencies such as the Eswatini Electricity Company (EEC), Microprojects Unit under the Ministry of Economic Planning and Development (MEPD) and the Rural Development Fund (RDF) under the Ministry of Tinkhundla Administration and Development (MTAD).
[10] 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 28 November 2020.
[11] A figure of 1.5 kg CO2 per kWh of wood-produced energy was used, per: http://blueskymodel.org/kilowatt-hour.
[12] 2003 National Energy Policy

Eswatini is a net importer of electricity, both directly from South Africa[13] EDM in Mozambique and the Southern African Power Pool (SAPP). During the 2018/19 financial year, 326.7 GWh of electricity were locally produced by four hydro power stations (60 MW). An additional 941.7 GWh of electricity were imported[14], mainly from South Africa where power generation is dominated by coal, to supply the system requirement of 1,259.9 GWh for the year. This represented emissions of ~1,063 $MtCO_2$[15] According to SAPP, Eswatini's electricity demand is expected to grow to 1,863 GWh by 2025 and peak demand by 72 MW from the current level of 237 MW. Amidst this growing electricity demand, the national power utility plans to expand capacity, however only 40 MW of new generation projects were noted in the 2019[16] Annual Report at various stages of planning or development. Another 40 MW solar PV and 40 MW of biomass power is being procured under the country's Independent Power Producer (IPP) procurement programme[17]. The shortfall between the growing demand and current build programme indicates that imports will likely continue for the foreseeable future.

Renewable energy (RE) minigrids have been noted as a potential part of the solution to address both the last mile electrification challenge and the growing electricity demand, while also contributing to the renewable energy targets and climate change commitments for the country. The context for and expected contribution from renewable energy minigrids is reflected in several key policy and planning documents:

Table 1: Policy context for renewable energy minigrids in Eswatini

Policy / planning document	Relevance
Electricity Act, 2007	The Electricity Act makes a provision for the inclusion of minigrids in the rural electrification programme, signaling the anticipated role that minigrids can play in providing access to clean energy in remote areas. It also makes provision for the Minister responsible for energy affairs to declare an exemption from the obligation to hold a license. In terms of this Act, a Rural Electrification Access Fund is being developed and has been capitalized since April 2017 through a levy on electricity tariffs. It is understood to be earmarked to support equitable regional access to electricity to maximize economic, social and environmental benefits and specifically considers renewable energy and minigrids as likely beneficiaries of the fund. Regulations are being developed to guide the administration of this ringfenced fund and are far advanced.
National Gender Policy, 2010	The National Gender Policy outlines strategies to ensure that women and girls have equal opportunities and access to, and control over productive resources including land and credit. This includes promoting self-employment and building women's capacity in small and medium enterprises. Access to productive resources, agency-based empowerment, and MSME support are critical to ensuring women can benefit from productive use opportunities stemming from MG development at the same rates as men.
Nationally Determined Contribution (NDC), 2015	For the electricity sector, Eswatini committed to doubling the share of renewables in the energy mix by 2030, relative to 2010 levels. The NDC, highlights the significant role played by access to clean energy in improving social equity and economic development of the livelihoods of the people of Eswatini. The mitigation contribution under the energy sector entails the implementation of small scale, decentralized RE technologies in rural areas in order to contain the unsustainable use of wood fuel. This corresponds to the use of RE minigrids for rural electrification purposes.
National Climate Change Policy (NCCP), 2016	The goal of the NCCP is to support the development of a sustainable, climate-resilient and inclusive low-carbon green growth economy. It is accompanied by the National Climate Change Strategy and Action Plan that provides a roadmap to support greater integration of climate change and its associated impacts into Eswatini's national development. It

[13] Eswatini has a Power Purchase Agreement with ESKOM 9South Africa) where it buys its bulk of electricity (59%) and a smaller percentage from the SAPP (15%, mostly through the Day Ahead Market). Information based on 2018/19 EEC Annual Report.
[14] Eswatini Electricity Company Annual Report 2018/19
[15] An emission factor of 0.8438 tCO_2/MWh has been derived using data from the GCF Concept Note for the Eswatini Energy Programme.
[16] 10MW Luvumisa solar PV plant committed and feasibility studies for 30MW expansion at Lower Maguga hydro power plant.
[17] Expected commercial operation date (COD) for solar project is 2022 and for biomass is 2024.

Policy / planning document	Relevance
	contributes to climate resilience by seeking to: i) improve national capacity for climate change integration, adaptation and mitigation; ii) create an environment that will empower vulnerable communities to actively participate in uplifting their living standards; iii) strengthen partnerships among national structures and stakeholders; and iv) create an enabling environment through technical assistance, workshops and meetings.
Kingdom of Eswatini Energy Masterplan, 2034.	The masterplan anticipates that renewable energy sources will play an important role in providing for the country's electricity needs. It is specifically noted as a source of, affordable and environmentally sound energy that can enhance energy access - including through decentralized solutions. It also sets a target of 100% access to clean energy at household level by 2030.
Eswatini Independent Power Producer Policy (EIPPP)[18], 2016	The EIPPP points to the expectation for minigrid projects utilizing renewable energy resources to serve areas least likely to benefit from the national grid access in the short to medium term. By inclusion alongside IPPs, it also suggests an expectation for private sector participation in minigrids systems.
National Energy Policy (NEP), 2018	The 2018 update of the 2003 NEP sets out eleven broad policy objectives for the energy sector. Some of the most relevant objectives (concerning off-grid clean energy) are to: • Ensure the efficient and cost-effective electricity supply integrating pricing for economic efficiency and financial sector viability. • Support the development of renewable energy resources for a target of 50% of the electricity generation mix. • To strive to provide all households with access to modern energy.
National Energy Policy Implementation Strategy (NEPIS), 2018	The NEPIS was developed in parallel with the updated NEP, to support the implementation of adopted policy positions. The NEPIS' goal is to 'meet the energy needs of the country in a sustainable manner that contributes to economic growth and wellbeing of the population', with the following stated objectives: • Ensuring universal access to affordable energy • Enhancing employment creation • Ensuring security of energy supply • Stimulating economic growth and development • Ensuring environmental health and sustainability In relation to rural electrification, the NEPIS seeks to reduce household reliance on wood - one of the main contributors to deforestation. Energy access is also identified as the main driver of economic activity and thus contributes to job creation through productive uses of energy.
Programme Framework for Affordable Renewable Energy in Swaziland (PARES), 2018.	In 2018, the Ministry of Natural Resources and Energy (MNRE) in conjunction with UNDP produced a framework to achieve affordable clean energy for all known as the Programme Framework for Affordable Renewable Energy in Swaziland (PARES). Under the framework, UNDP seeks to facilitate investment in renewable energy and build generation capacity through public-private partnerships. The framework aims to assist Eswatini in attracting investment into both on-grid and off-grid renewable development projects.

In November 2020, the energy regulator in Eswatini formally initiated a process to develop a minigrid and off-grid regulatory framework for the country. The scope is comprehensive, covering a range of topics that can help to reduce risks to developers and facilitate investment in RE minigrids[19]. It also includes the development of processes and procedures necessary to implement the framework. The targeted completion date was originally targeted for the

[18] Previously Swaziland Independent Power Producer Policy (SIPPP).

[19] Scope includes, among others, development of a licensing framework, ownership and operation of minigrids, pricing models, tariff setting, safety, compliance, monitoring requirements, standards, power quality, service quality and grid integration.

first half of 2021. As at September 2021, development had been initiated, but not yet completed. While a specific delivery model (refer Box 1, Section III) has not been selected by the Ministry of Natural Resources and Energy or the Regulator, the Ministry has indicated its intention to encourage private sector participation in the sector. It is expected that the development of the regulatory framework will begin to shape the preferred direction and will represent a significant milestone for minigrid development in the country. It is a base assumption of the Africa minigrids program (AMP) national project that this framework will be in place at implementation to guide the AMP activities.

The Eswatini Electricity Company (EEC)[20] recently initiated the first minigrid pilot installation for the country to provide electricity to a small, isolated rural village. The expectation is for the 35 kWp, 200 kWh Solar PV battery system to be commissioned before the end of 2020.

Unlike many countries in the region, Eswatini has not had a spontaneous uptake of minigrids. This is ascribed to a number of factors:

- The already high electrification rate in the country (80%), with most settlements within a kilometer of the national power network.
- The national electricity tariff for residential consumers is relatively low at USD 0.10 per kWh[21] and applies to 80% of the country. It makes it likely that residential consumers would object to higher tariffs from minigrids even if the regulatory environment allowed.
- Very low electricity usage even among electrified consumers, with only 27% of the adult population using more than 1,460 kWh per year.[22]. A further 36% have opted to continue using biomass for cooking as a cheaper option to using electricity[23].
- Electricity delivery to the 'last mile' in energy access involves reaching people who live in isolated and often impoverished rural communities where electricity demand is expected to be very low, making it difficult to attract private-sector investment.
- The dispersed nature of settlements in Eswatini, in combination with the previous points, suggests that off-grid solutions, such as solar home systems (SHS) combined with clean cooking solutions, may be a more likely solution for a large share of remote, rural households.
- Consequently, the remaining market potential for minigrids is likely small, suggesting the scaling necessary to make minigrid operations financially viable and attractive to private sector operators may not be available.

This context does not present an obvious market for conventional minigrid developers, pointing to numerous underlying investment risks for RE minigrids.

It is noted that under the National Energy Policy, Eswatini has committed to migrate to cost-reflective tariffs in the electricity sector. Historically, the electricity tariff structure has allowed cross-subsidization, thereby sheltering some consumer categories from the full cost of supply. Within the current structure, clean energy minigrids could potentially offer more cost-effective opportunities for commercial, agricultural and industrial consumers. While the country is still grappling with the practicalities of this intended migration and no timelines have been committed, it is likely to increase tariffs for domestic customers and may ease the cost burden on commercial and industrial consumers. In this event, new opportunities for minigrids may again emerge. In either context, minigrids will be well placed when serving both commercial farming or forestry and residential consumers and/or where it can be embedded into agricultural value chains.

[20] Vertically integrated, state owned power utility.
[21] Lifeline tariff, prepaid SZL 1.65/kWh and residential tariff, prepaid: SZL 1.75/kWh.
[22] ESMAP/SE4All measures the affordability of grid electricity by comparing the cost of a Standard Consumption Package – defined as 365kWh per year – to a maximum energy threshold, set at 5% of total household expenditure. At this threshold, all households should be able to afford the SCP, however FinScope (2018) data shows that 45% of adults spend less than the cost of the SCP on utilities – including water – per year, and 20% spend even less than a quarter of the cost of the SCP.
[23] eSwatini. Energy and the poor, unpacking the investment case for clean energy. 2020. UNCDF and UNDP

A survey[24] circulated to potential developers in the country further highlighted the ability to generate revenue from the electricity sales to recover the investment and access to affordable financing as the most significant barriers and expected risks to developing minigrids in the country. The availability of skills to develop and operate a system as well as an uncertain policy environment also raised concerns. Respondents unanimously agreed on the relevance of minigrids for parts of Eswatini, but noted the critical linkage to productive uses including health care, agriculture, education or tourism to improve viability. Addressing some of these barriers could help open the market for private sector participation in the sector.

The active MSME sector in rural areas, coupled with high mobile phone penetration levels (86%) and mobile network coverage estimated at 90%, suggests that there is an opportunity for electrification to effectively couple with productive uses in rural areas. The significant involvement of women in the MSME sector would mean that women not only stand to benefit from the electrification of household activities, but may also gain the benefit of energizing and growing their small businesses.

Other opportunities to create an enabling environment for minigrids to meaningfully contribute to rural electrification exist in:

- The Rural Electrification Access Fund, as a possible means to subsidise minigrid developments and operations.
- The minigrid and off-grid regulatory framework, providing a level of policy and regulatory certainty and clarity across a broad scope of important issues.
- Proximity to South Africa with several service and technology providers.
- The cost competitive pilot installation by EEC, comparing well against the AMDA minigrid cost benchmarks for the region – suggesting realistic hardware and development costs.

RE minigrids can bring together the converging interests of the Ministry of Commerce, Industry and Trade (MCIT), Ministry of Economic Planning and Development (MEPD), the Ministry of Tinkhundla [25] Administration and Development (MTAD), Ministry of Tourism and Environmental Affairs (MTEA) and the Ministry of Natural Resources and Energy (MNRE) towards the objectives of the NEP, 2018 i.e.: (i) Ensuring universal access to affordable energy; (ii) Enhancing employment creation; (iii) Ensuring security of energy supply; (iv) Stimulating economic growth and development; and (v) Ensuring environmental health and sustainability .

Eswatini is prone and particularly vulnerable to natural disasters, likely to be affected by climate change in both occurrence and scale. While RE minigrids contribute greater resiliency to the overall energy system (refer Annex 17, Climate risk screening for resiliency benefits) they are themselves vulnerable to the impacts of climate change. Climate hazards and risks such as higher temperatures, strong winds and prolonged periods of drought interspersed with flooding, will threaten generation and distribution infrastructure and impact consumer demand. These risks are aggravated by the logistical challenges facing remote, rurally located communities with limited access to technical support, spare parts, and maintenance capacity to address mini-grid issues and disruptions. As climate risks are expected to increase to 2050, climate risks will demand due consideration in project planning, design and operation. Accordingly, consideration was given to the climate risks at regional, national and pilot project level (Annex 17) to inform risks and mitigation measures for the project and particularly pilot systems.

In Eswatini, two legal frameworks apply. The first is uncodified Eswatini law and customs (together known as customary law), and the second is a combination of partly codified Roman and Dutch legislation (civil law)[26]. The 2005 Constitution guarantees basic rights, and the country's international human rights commitments. Historically, the role of women and other vulnerable groups was minimal in decision making at household level and in the development process. To address this anomaly, Government developed a national gender policy which aims to

[24] Four respondents completed the survey. All four had considered developing a minigrid in the country. They rated 6 risks related to the policy environment, technology and finance on a scale of 1 – 5 where 5 indicated high and 1 low risk.

[25] In Eswatini, an inkhundla (plural: Tinkhundla) is an administrative subdivision at the third level of governance and effectively functions as a local government institution. The Ministry of Tinkhundla Administration and Development website presently lists 59 Tinkhundla centres in Eswatini.

[26] Social Institutions and Gender Index, "Kingdom of Eswatini."

achieve gender equity in Eswatini and advocates for gender mainstreaming through other sectoral policies and programmes.

Eswatini's is a patrilineal culture where, according to tradition, women join their husbands' households. In 2019 the Eswatini High Court ruled that the common law doctrine of marital power (giving a husband the ultimate decision-making power over his wife and the matrimonial property) is unconstitutional as it discriminates against women and denies their constitutional right to equality. This ruling builds on progressive legislative reforms initiated in 2018 to further the promotion and protection of women and girls' rights. Eswatini has also committed itself to a number of regional and international instruments to promote gender equality, including the Convention for the Elimination of All Forms of Discrimination Against Women (CEDAW), which Eswatini ratified without reservation, and the Southern African Development Community (SADC) Declaration on Gender and Development. AMP project measures supporting gender equality in Eswatini will have to be cognizant of the recent timing of these reforms. Annex 11 provides a detailed gender analysis and gender action plan to accompany the AMP project implementation.

III. STRATEGY

Technology advances and cost reductions in the most recent decade have made RE, most notably solar PV, the most affordable source of energy available[27] when developed at utility scale. Coupled with the flexibility and modularity offered by RE systems, solar PV increasingly also offers affordable, clean energy solutions for electrification of more remote, rural communities and activities. Accordingly, solar PV minigrids have been recognized as a key part of the portfolio of options available to countries towards achieving universal access to clean, modern and affordable energy.

Minigrids lie at the nexus between rural electrification, climate resilience and sustainable development. The African Mini-Grid Community of Practice (AMG-CoP)[28] – a collaborative network of 16 African country governments – identified minigrids as a central element of developing a decarbonized, climate-resilient energy services sector for the millions of people in Africa who lack access to affordable, safe and clean energy. Green minigrids deliver climate change mitigation and resilience, while also advancing economic and social development benefits. A 2020 EEP Africa study of the climate co-benefits from clean energy projects[29], highlighted the significant potential for resilience co-benefits[30] offered to communities by off-grid solar home systems (SHS), minigrids and powering productive uses. It also pointed to the importance of initial, small-scale risk-taking, through clean energy innovation, business model testing, and demonstration projects, for assessing long-term viability.

While technology advances and downward cost trends have markedly improved the business case for RE minigrids, in many countries, they are not yet competitive with fossil-fuel based alternatives. The AMP Theory of Change (TOC) is premised on the understanding that the high costs of RE minigrids are partly attributed to a range of risk factors, each of which contributes a premium to the development costs of minigrid systems.

The hypothesis follows that by significantly reducing the investment risks for RE minigrids in a partner country, the levelized cost of electricity (LCOE) can be reduced, which in turn will accelerate and scale up the adoption of RE minigrids as part of the effort towards achieving universal energy access in the country and the broader region. Accelerating the adoption of clean energy also contributes greater GHG emission reductions.

The AMP has adopted a common architecture of four key components, a combination of enabling policy and regulations, business model innovation with private sector involvement, innovative financing and digital innovation as the levers to lower investment risks, thereby reducing financing, hardware and soft costs while increasing revenues and improving system efficiencies. Within this architecture, AMP will emphasize - and seek to develop comparative advantages - in three 'key areas of opportunity' (national dialogues on delivery models; productive use; digital). This approach, illustrated below in Figure 1, is structured to advance the program objectives of cost-reduction and innovation for minigrids and give effect to the TOC.

[27] Lazard Levelized Cost of Energy Analysis, version 14. October 2020.
[28] https://africaledspartnership.org/2019/01/30/african-mini-grids-community-of-practice-amg-cop/
[29] EEP Africa. 2020. Energising Resilience, Climate Co-Benefits from Clean Energy Projects.
[30] Co-benefits including local value chains and diverse livelihoods, Self-reliance including food and energy security, and resilient infrastructure such as health care.

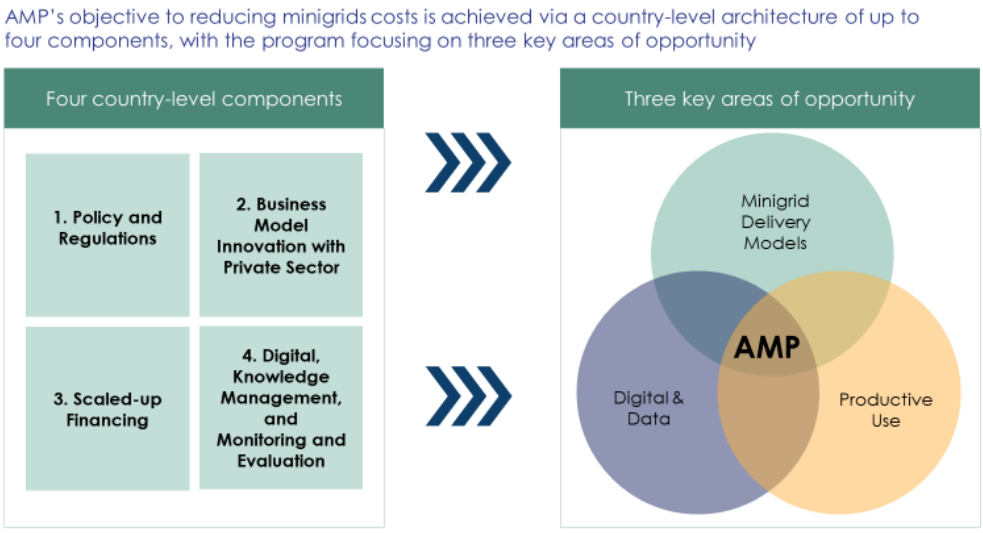


Figure 1: AMP's objective, architecture and areas of opportunity

The TOC draws on the Derisking of Renewable Energy Investment (DREI)[31] methodology and standard categories of risk. As noted earlier, these risks have been shown to translate into higher development costs that in turn increases the cost of electricity to the consumer and/or discourages investment in the sector. Various cost reduction levers across the themes of policy and regulation, business model innovation and private sector as well as innovative finance can be employed to reduce risk (e.g. policy derisking), compensate for risk (e.g. financial incentives) or transfer risk (e.g. financial derisking). Less risk contributes to simplified feasibility assessments, lower development costs and lower financing costs, improved revenues and system efficiencies, among others. This, in turn creates a more attractive investment environment conducive to scaled up investment in the sector.

De-risking the investment environment and attracting and leveraging private and public-sector resources to increase energy access, promote RE and enhance energy efficiency (EE) in a manner that is inclusive and responsive to the needs of different sectors of the population, will support the Government of the Kingdom of Eswatini in its transition to sustainable energy systems in line with its stated ambitions and the aspirations of Sustainable Development Goal 7. Access to clean energy is also expected to play a critical role in combatting the pandemic and catalyzing an economic recovery in the wake of the COVID-19 pandemic, particularly in African countries[32]. At a project level, this understanding is expected to shape the review of the investment risks and policy instruments (Outputs 1.2 and 1.4). Power to healthcare facilities, supply of clean water for essential hygiene, enabling communications and IT services for education or more broadly connect people while maintaining social distancing, have been noted as potential opportunities to adapt and respond to the pandemic. These have been recognized as preferred interventions at pilot sites (Outputs 2.1 and 2.2), as appropriate. Furthermore, in collecting and analyzing data for the planned GIS-based modelling there will be an opportunity to capture metrics highlighting the relative "situational" vulnerability of a given location (Output 1.1). Considerations and opportunities relating to COVID-19, clean energy minigrids and the AMP are included in Annexure 19 to support COVID-19 sensitive planning during implementation.

The concept (refer Box 1) of a minigrid 'delivery model' (specifically: who finances, builds, owns and operates the minigrid asset) as well as the closely related issues of tariff levels and subsidies, is a key concept and area of focus for AMP projects and the program as a whole. Clearly defined delivery models, with associated tariff structures and subsidy mechanisms, are considered an essential pre-requisite for financial scale-up in the mini-grid sector.

[31] UNDP & ETH Zurich (2018). Derisking Renewable Energy Investment: Off-Grid Electrification. United Nations Development Programme, New York, NY and ETH Zurich, Energy Politics Group, Zurich, Switzerland.
[32] Multiple sources including: https://www.seforall.org/covid-19-response and https://ecdpm.org/events/green-gender-driven-covid-19-recovery-africa/

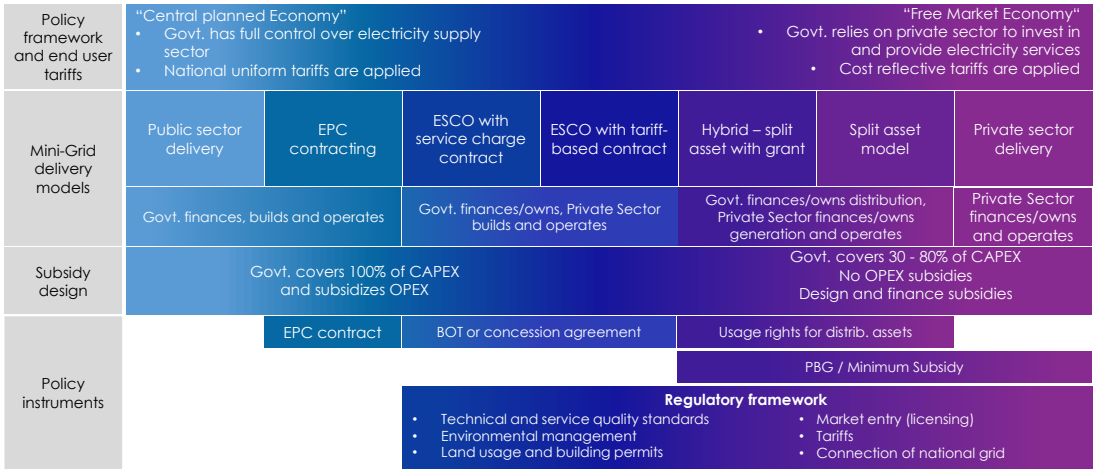
Accordingly, the AMP framework makes provision for a National Dialogue in each partner country to review and define, confirm or refine the chosen delivery models for the country, as appropriate.

Box 1: The Concept of a Minigrid Delivery Model

The concept of a minigrid 'delivery model' is a key concept for this project. This text box seeks to set out a common understanding of the concept and its importance to the project. The current status of the minigrid delivery model in Eswatini is noted in a separate Text Box, below.

Definition: *A minigrid delivery model, determined by the national government, is the cornerstone of a country's over-arching minigrid regulatory framework. It defines who finances, builds, owns and who operates and maintains the minigrids. Where applicable, it seeks to engage the private sector. A minigrid delivery model is closely associated to other key components of a minigrid framework, including tariff structures/mechanisms and subsidy levels/mechanisms.*

In each country, identifying one (or more) delivery models will provide a framework for all sector stakeholders to plan for the longer term, particularly with regard to mobilizing private investment as one of the main objectives of the project. **Error! Reference source not found.** below describes the spectrum of design options for delivery models, across a number of different elements (ownership, policies, finance etc.)



Source: JAKOB SCHMIDT-REINDAHL, Mini-grids Policy Expert, INENSUS

Figure 2. Conceptual outline of minigrid delivery models

This decision-making process around identifying a delivery model is complex and should ideally be done in the form of a national dialogue involving all relevant stakeholders to varying degrees (different ministries such as energy, finance, health and environment, local authorities, the public, the media, the beneficiary communities, utilities, the private sector, and other key stakeholders) in order to build a national consensus on the basis of which large-scale deployment of mini-grids can be accelerated and have a sustainable impact.

Pilot projects planned under this project will also seek to fit into this framework. The more clarity there is on the part of the government regarding the choice of delivery model, the easier it is to develop or plan business models which can reduce minigrid costs. A clearly identified delivery model minimizes the risk of investments being made based on assumptions that are not in line with government expectations and may lead to conflicts and economic losses down the line. It also helps the government to answer the important questions related to the rural electrification sector to provide clarity for private investors and operators and build confidence.

As already noted, the absence of spontaneous commercial minigrid developments points to a range of risks and barriers to private sector participation in the country that make it unlikely for conventional minigrid developers to develop, own and operate a minigrid system in the country. Early indications are that an Energy Services Company (ESCO) model could be an appropriate delivery model to attract private sector participation. Additional guidance and clarity are however expected to emerge from the minigrid framework currently under development by the Eswatini Energy Regulatory Authority (ESERA) to further shape the delivery context and model for the country (refer Box 2, below).

Box 2: Current Status of Minigrid Delivery Models in Eswatini

As the market in Eswatini is not yet very developed, key aspects of the mini-grid delivery models are still undefined and should be evaluated from scratch. Despite the very early stage of the minigrid market in Eswatini, the Energy Regulatory Authority has already identified the need for and initiated the process of developing a regulatory framework for both off-grid and minigrid in the country. This will complement the broad existing policy framework that recognizes minigrids as part of the overall energy strategy for Eswatini. It is anticipated that the process of developing the off-grid and minigrid regulatory framework will give shape to the preferred direction. Table 2 provides a summary of the current status of key aspects of minigrid delivery models in Eswatini based on the current, broad policy and regulatory framework.

Table 2. Current status of minigrid delivery models in Eswatini

Aspect	Current Status
Ownership and Operation	Not defined. At this stage, the country has not identified a preferred delivery model(s). Private sector participation in the sector is foreseen and will be welcomed, but the format or approach has not been articulated. Early indications are that an Energy Services Company (ESCO) model could be an appropriate delivery model to attract private sector participation. Additional guidance and clarity are however expected to emerge from the minigrid framework
Tariff mechanisms	Not defined. The first minigrid pilot project developed and operated by the national power utility had not finalized tariffs, but was not expecting to charge tariffs above the two residential tariff options. With over 80% of the country connected to the national grid, cost reflective tariffs will likely present a social acceptance risk.
Subsidy mechanisms	Not defined. A fund to support rural electrification was established and could potentially be utilized to support minigrid developments.
Regulations/Regulatory Instruments	Off-grid and Minigrid Regulatory Framework for Eswatini in development as at mid 2021.

Given the critical importance of the minigrid delivery model with its associated tariff structures and subsidy mechanisms in attracting private sector investment, Eswatini will have the opportunity to draw on the resources of the regional project to identify the delivery model[s] most relevant to the country context, most feasible and with the best prospects of success. The possible options for each aspect need to be thoroughly understood by stakeholders and substantiated with real examples. The decisions for/against certain options must be openly discussed and weighed up in terms of the interplay between the aspects and the resulting consequences for the sector. These decisions are often influenced by the historical and cultural background on the one hand, and by the current political and economic situation of a country on the other.

To this end, one of the first activities envisaged in the project is to get all relevant stakeholders on board and initiate a process of national dialogue to weigh up all aspects of mini-grid delivery models (Output 1.2) with the aim of defining one or several sector-wide delivery models. The project's second pilot will also explore delivery models by inviting private sector players in different capacities and likely for continued system operation.

If a preferred delivery model(s) had already emerged during the development of the Minigrid Regulatory Framework, the pilot project can be used as a trial and the national dialogue process used to assess any gaps, challenges and refinements, and the national dialogue can develop constructive proposals and make contributions to close them through respective measures

Within the untested and as yet undefined market environment, at this very early stage for minigrids in the country, the AMP aim is on pre-emptively addressing risks and creating a universally relevant set of resources, thereby establishing a platform that can support any preferred policy direction.

Accordingly, the AMP will focus strongly on developing data and knowledge, including (i) detailed mapping, to help determine the size and nature of the addressable minigrid market, (ii) demonstrating innovative business models more likely to contribute to cost-effective delivery of electricity to remote rural areas and attract private sector

interest, and (iii) establishing a digital platform to support data collection and knowledge creation and facilitate operations.

The already active small business community in the country presents an important opportunity for enhancing the viability of minigrid operations. Demand for electricity from small industry and businesses, which is defined as the productive use of energy[33] (PUE), presents a key success factor for minigrids. Because of the typically low energy usage of residential customers, without linkage to and support for these 'productive' energy users, minigrids are likely to struggle to reach the critical revenue needed for financial viability – essential to encourage private sector players. Productive users are also important to enhance the economic and social development impacts of micro-grids and rural electrification programs more broadly. Support for affordable domestic appliance uptake, though lacking the income generation potential of PUE, is an additional strategy for load growth and revenue enhancement.

Successful minigrid developments therefore require both the delivery of the technical infrastructure and enhancing PUE in parallel. For this reason, a strong emphasis of the AMP pilot initiatives will be on encouraging productive use and supporting small business activities alongside the development of minigrids.

Data, experience and learnings from the two pilots will serve as important inputs to inform and advance/refine the country's chosen vision for minigrids. Data also serves a broader purpose as an enabler for more efficient and cost-effective minigrid operations. An emerging theme from lessons across minigrid systems is the importance of digital tools and solutions as a key driver for minigrids and minigrid cost-reduction as described below in Box 3. Digitization is proving a key enabler for individual systems and national planning and decision making. Practically, in the context of AMP projects, a key mechanism for realizing this opportunity will be each project's use of a digital platform. Accordingly, a digital platform has been included in the AMP design for Eswatini under Component 3 (Output 3.2) with close links to both Components 1 and 2 and the AMP regional project.

Box 3: Digitalization Minigrids

Digital technologies and solutions are fundamental to enabling off-grid electrification. In fact, the emergence of minigrids as a viable solution to electrify remote and isolated communities relies strongly on certain digital technologies such as *remote monitoring* of minigrid operations and the use of *digital money* to collect customers' payments. Figure 3 below represents an initial categorization of the digital and data opportunities for minigrids under the AMP.

Digital opportunity for minigrids. It's increasingly clear that digital is a key entry point across minigrid market development. Figure 3 below shows different categories of digital solutions in the minigrid sector: (i) digital planning, (ii) digital operations, (iii) digital aggregation platforms, and (iv) digital payments. In common to all these is the potential of digital technologies – whether used by policy makers, financiers or minigrid developers - to lower minigrid costs, reduce risks, and address barriers to scale.

Data use opportunity for minigrids. Many opportunities around digitalization are related to leveraging the large amount of data generated by minigrid projects to surface actionable insights, learning and optimization to consolidate business models and technical solutions for scaling-up minigrids. For instance, the use of operational performance information from existing systems to forecast demand and design future minigrid can help avoid a very common pitfall of many minigrid systems which are significantly oversized and hence not financially viable.

[33] PUE can be found in: agriculture (e.g. irrigation, grain milling, electric fencing), manufacturing (e.g. carpentry, tailoring, welding, and looming), and the service sector (e.g. bars and restaurants using electric lights, sound systems, refrigerators, charging stations for mobile phones). Common use applications include electricity used for potable water, public lighting, education, health (e.g. refrigeration of vaccines and anti-venom).

Box 3. Digitalization Minigrids (continued)

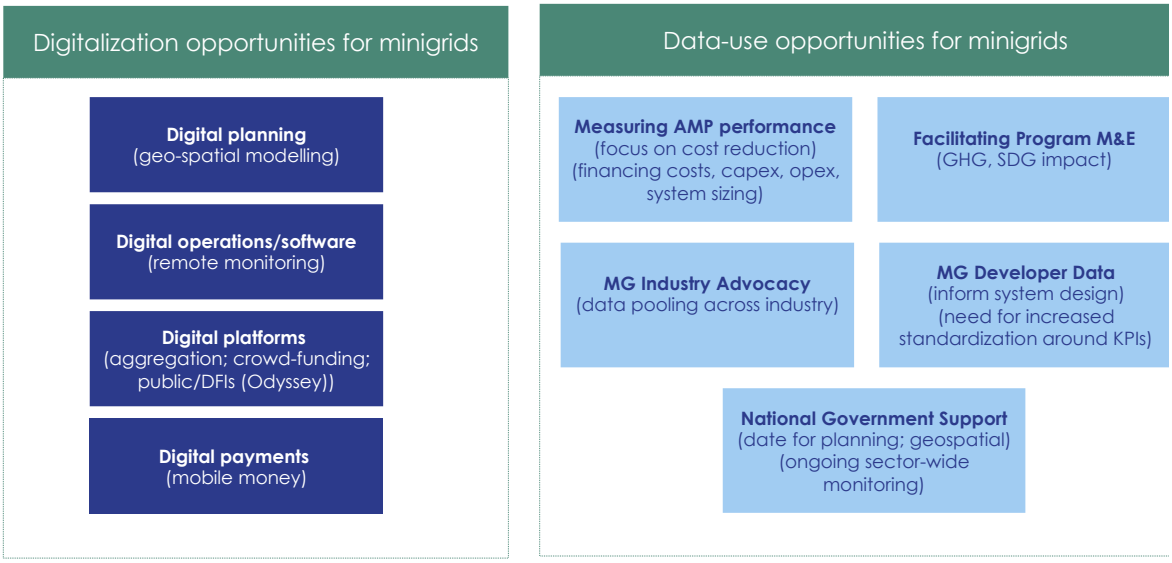


Figure 3. Digital and data opportunities for minigrids in the AMP

The potential for using data and digital tools and solutions to add value at various stages of the minigrids value chain remains largely untapped. With enhanced capacity, **minigrid developers** could streamline their operations though smart metering and remote control of their assets and potentially reduce operations and maintenance costs by about 15% to 30%(*) through reduced site visits, labor and component replacement costs. **Government stakeholders** could leverage digital solutions for energy sector planning, to streamline licensing, monitor quality of service and broadly improve sector oversight. However, data of sufficient quality is not always available for these purposes, and government stakeholders often lack the necessary technical capacity. And while data could be a tremendously valuable asset in the minigrid sector, this potential that remains largely underutilized due to the lack of standardization and common data reporting protocols and the fact that this sector is still very nascent and remains relatively fragmented.

Opportunities across the Program, and with the AMP regional project. The AMP provides a unique opportunity to develop a single set of metrics and guidelines for data collection, and use them to collect data from minigrid investment pilots across different national projects which the AMP Regional Project can then aggregate, derive insights from, and systematically disseminate knowledge with participating AMP countries and with the broader minigrids sector in Africa. At the same time, the link between the regional project and the total of eighteen (18) national child projects provides a unique 'distribution channel' opportunity across Africa for AMP to mainstream the use of digital tools and solutions for minigrids cost-reduction and scale-up.

(*) AMMP Technologies. "Reducing the cost of operations and maintenance for remote off-grid energy systems." September 2018.

Within the broader framework of the AMP Theory of Change, the specific focus for Eswatini is illustrated in a national Theory of Change (Figure 4).

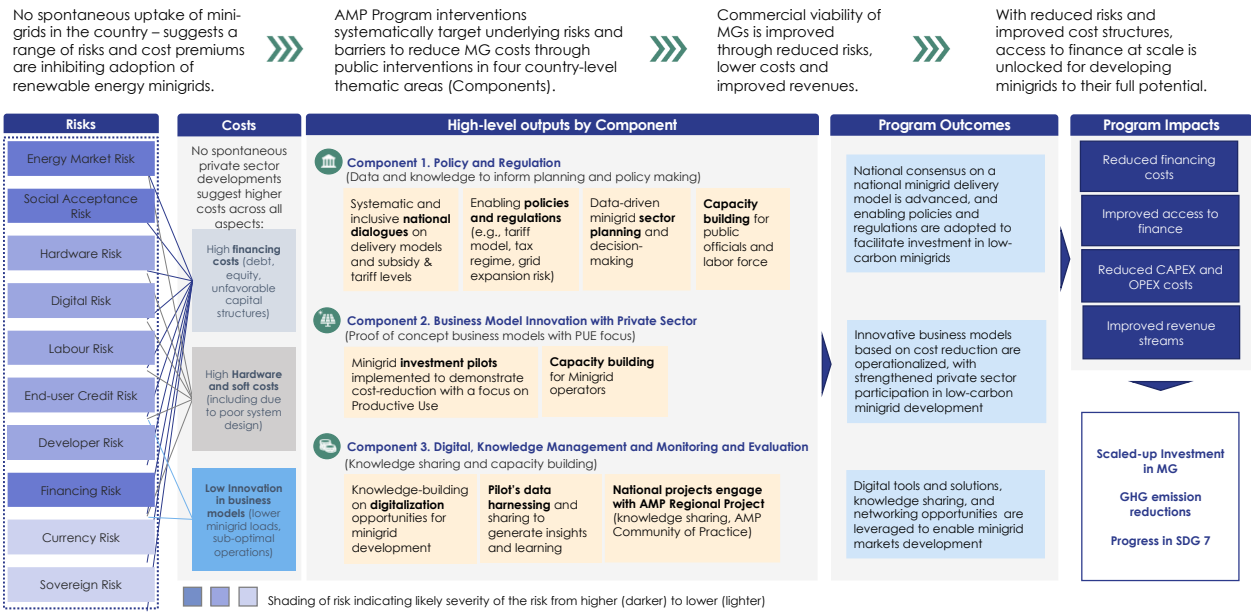


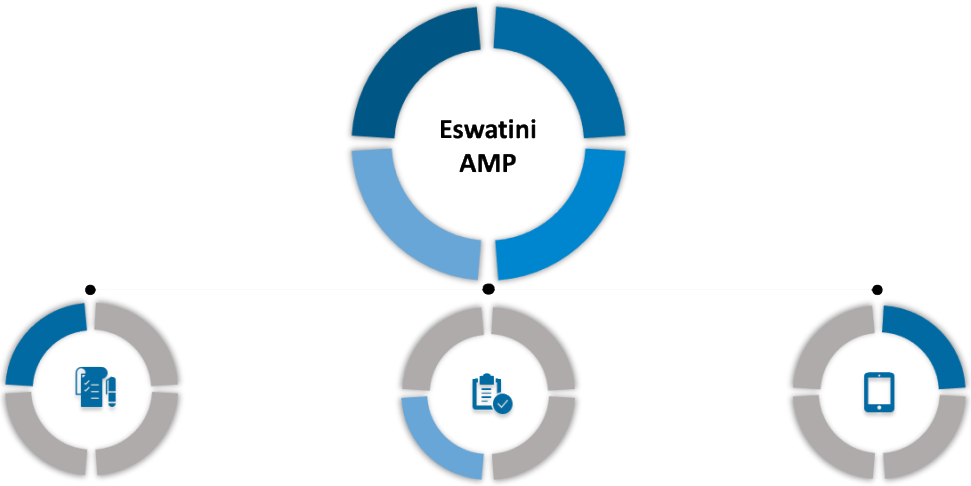
Figure 4: Eswatini AMP Theory of Change

Linkages to the AMP Regional Project: The project will also align with the AMP Regional Project to foster knowledge sharing, learning, and synthesis of experiences in a multi-directional manner– i.e. flowing from the AMP Regional Project to the Eswatini project, and vice versa, and between the Eswatini project and other national projects within the Program. The AMP Regional Project 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 main role of the AMP Regional Project is to make best practices in regulations and policies, innovative and inclusive business models, digitalization and financing available to all AMP beneficiary countries.

IV. RESULTS AND PARTNERSHIPS

Expected Results: The objective of the AMP is to support access to clean energy by increasing the financial viability and promoting scaled-up commercial investment in minigrids in Eswatini.

With the guidance provided by survey feedback and broader stakeholder consultation, the AMP in Eswatini will focus on a selection of interventions intended to lower risks and reduce the costs for all future minigrid developments in the country. These interventions have been structured according to the thematic areas described by the AMP TOC (Figure 5). The envisaged contributions from these interventions are unpacked in the subsequent section.



Targeted outputs per component		
1.1 Geospatial mapping	2.1 Pilot 1: PUE overlay	3.1 Quality assurance framework
1.2 National Dialogue	2.2 Pilot 2: Greenfields solar PV-battery	3.2 Project Digital Strategy
1.3 Capacity building (public sector)	2.3 Capacity building (private sector)	3.3 Digital Platform
1.4 DREI Analysis		3.4 Regional Interface
		3.5 Local Knowledge Network
		3.6 M&E and reporting

Figure 5: Overview of the AMP interventions in Eswatini

Linkages to the AMP Regional Project: there are strong linkages with the AMP Regional Child Project across all project components, in particular with the Regional Project Component 2 which will provide access to (if requested) a variety of dedicated technical and operational support as described in Box 4 below.

Box 4: Linkages to the AMP Regional Project –Access to technical and operational support

As part of the AMP network, the project will have access to (if requested) a variety of dedicated technical and operational support from the AMP regional project as follows:

1) **Access to specialized expert international consultants in selected areas** (DREI, data, GIS modeling, mini-grid business models, etc.) hired, retained, contracted and paid for by the AMP regional project and made available to all participating national project staff and selected beneficiaries on as needed basis. The areas of support, listing of available firms/individual consultants under contract by the regional project and protocol for how the project can request and/or access such expertise (if needed/requested) will be elaborated in the first year of regional project implementation and disseminated to this project and the staff of all other participating AMP national projects. This support may range from virtual assistance to in-country missions. All requests for such assistance must be approved by the project manager of the AMP regional project management unit.
2) **Provision of a database of qualified international consultants and firms** disaggregated by their expertise in the four main components of this national project and other key operational areas (procurement, M&E, communications, etc.). These individuals will not be retained or contracted under the regional project but rather provided to the project for informational purposes only in an effort to assist in identifying high-quality experts and firms who may be available for contracting by national governments under their own procurement rules and modalities.
3) **Provision of generic terms of reference (ToR) for various standard activities** (mentioned above) under the four main components of the national project.
4) **Advisory support by the AMP regional project management unit** to staff of the project on trouble shooting (operational support, ToR reviews and problem solving) on an ad-hoc and as-needed basis. These services will be paid for the regional project and available on a first-come/first-serve bases under a protocol to be established by the regional project.
5) **Specialized advisory support for implementing UNDP's minigrid DREI analyses.** During project implementation, the UNDP DREI Core team, working with the regional project, will make available to national teams and consultants the resources and tools to conduct full quantitative DREI applications, and will provide ongoing support and quality assurance.

A full detailed elaboration of these offerings and the protocols attached to each service will be communicated to the project at the inception workshop of the regional project and at the inception workshop of each national project.

Component 1. Policy and regulation.

The first component seeks to address barriers to cost-effective minigrid development within the policy and regulatory environment. With the development of a comprehensive minigrid and off-grid regulatory framework initiated, but not yet finalised, the AMP contribution under this component will focus on establishing universally relevant resources and strengthening capacity to complement the policy and regulatory direction as it evolves. It aims to empower the key decision-makers and role-players to effectively navigate the development of this nascent market with access to good information resources and the experience available to the AMP from the regional project. It is envisaged that, under the leadership of the MNRE, these resources will support the formulation of a shared vision and roadmap to enable minigrid development in the country.

This is considered particularly important given the limited local experience with minigrid developments.

The anticipated outcome is an environment where stakeholders have taken ownership in a national minigrid delivery model and where appropriate policies and regulations have been adopted to facilitate investment in RE minigrids.

Within this context, four outputs have been foreseen to make valuable contributions that can benefit all future minigrid developments in the country:

- Output 1.1: Geospatial, techno-economic modelling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)

- Output 1.2: An inclusive national dialogue to identify minigrid delivery models, a vision and roadmap is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification.
- Output 1.3: Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.
- Output 1.4: Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments and contribute to AMP Flagship Report on Cost Reduction

Output 1.1. Geospatial, techno-economic modelling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)

The AMP will contribute to a map identifying suitable sites for minigrid development where the national electricity network does not provide an immediate or cost-effective option. As an overlay to detailed grid expansion planning, a map that demarcates areas well-suited to minigrids is a valuable contribution from a planning perspective, both for the MNRE and other potential role players in the market. Akin to how solar and wind resource maps reduce the cost of preliminary feasibility work for all developers in the market and can help direct developments to more optimal locations, a minigrid potential map can provide a screening of potentially suitable sites with associated cost savings to all future developments. It also provides important guidance in terms of potential market size and sector planning for Government.

Work planned by the World Bank funded Network Reinforcement and Access Project (NRAP) will include a GIS based component, mapping infrastructure, consumers, potential consumers (densities) and other infrastructure, to identify the least cost options for providing electricity to specific areas. This will provide an initial indication of locations with potential for minigrid installations. Supplementing this work, the AMP will develop additional GIS-based mapping information that is key for the identification of viable minigrid sites and to enrich the planning information readily available to both public and private sector developers. This will include (i) MSME activity, including location, size and sector, (ii) productive uses, those active and with potential to scale, and (iii) mobile network coverage and infrastructure. The first two layers will be gender-sensitive to enable a gender analysis of potential opportunities and assist in establishing a balanced portfolio of eventual sites.

If additional co-finance can be mobilized during implementation, the map will be greatly enhanced by a value chain analysis, developed in collaboration with the MCIT, to identify areas of electricity demand growth in rural areas as well as productive uses and communities that can benefit significantly from electrification.

Output 1.2. An inclusive national dialogue to identify minigrid delivery models, a vision and roadmap is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification.

The second priority is the establishment of a National Dialogue between key government role-players in the sector, led by the MNRE as custodian of energy policy. The regulator (ESERA), the power utility (EEC), the Ministry of Natural Resources and Energy (MNRE), the Ministry of Tourism and Environmental Affairs (MTEA), Climate Change Unit, Ministry of Agriculture, Ministry of Commerce Industry and Trade (MSME Unit) and the Gender Coordination Unit in the Deputy Prime Minister's Office each bring invaluable experience and hold parts of a coordinated minigrid development strategy for the country.

Experience in minigrid markets has shown that the policy and regulatory development process is an iterative one, informed and refined by market experience[34]. With Eswatini taking an early position with regards to the policy and regulatory environment, prior to any significant market experience, this iterative process will benefit from active and continued engagement between these key role-players, and with industry players when they become active, during the rollout phase. Appropriate structuring of subsidies, tariff structures and grid integration have been among the policy areas that have benefited from market experience and dialogue. If not suitably sensitive to the country context, these could present a risk for the advancement of minigrids in the country. Certainly, in Eswatini the significant footprint of the electricity network suggests that clear, transparent and fair structure for grid integration will be an important consideration for minigrid developments. These, and other topics, will likely benefit from

[34] GIZ, GET.transform. A Renewable Energy Minigrid Technical Assistance Guide. Take-aways from 15 years of GIZ support in minigrid market development. April 2020.

consideration at the National Dialogue and subsequent clarifications or refinements as learnings from potential developers / industry responses and the pilot projects emerge. If findings of the National Dialogue merit further consideration, the focus of studies and consultation under the AMP and regional Community of Practice (Output 3.4) can be steered to address questions.

Cognizant of the broader significance of having clean, affordable energy available to rural communities in terms of social impacts, environmental considerations, economic activity, opportunities for small business development, and empowering women and other vulnerable groups, this platform will benefit from establishing functional interfaces or workstreams that contribute these perspectives. The Ministry of Finance, Ministry of Tinkhundla Administration and Development, Ministry of Economic Planning and Development, Ministry of Commerce Industry and Trade, Ministry of Tourism and Environmental Affairs and Ministry of Agriculture are foreseen as stakeholders for these workstreams.

By linking strongly with the regional project support (coordinated under Component 3, Output 3.4 below), organized to benefit from the pool of expertise, experience, best practices and lessons learned from the region and 14[35] other countries that are part of the AMP, this platform can actively steer the development pathway, potentially leapfrogging many of the sustainability challenges from earlier generation minigrid developments and resolving any remaining policy, institutional, regulatory and technical barriers identified during implementation as limiting the desired investment in solar PV-battery minigrids.

It is expected that the collective expertise at National Dialogue level, supported by global and regional experience and the collated country specific information (including the minigrid potential map and DREI study), will inform a clear vision[36] and a national Minigrid Roadmap for minigrid development in the country. A clear line of sight on policy developments and planning in itself reduces the risk for private sector investors.

Output 1.3. Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.

The third intervention relates to capacity building made available to public officials, men and women both, to support the practical implementation of best practice, specifically as it pertains to the design of procurement or tender processes that incorporate cost-reduction levers and innovative business models.

While, the exact scope of the capacity building will be dictated by the specifics of the minigrid framework and direction provided by the National Dialogue, the aim will be to ensure that the electrification contribution from minigrids is cost-effective and sustainable. Again, the expectation is that Eswatini will greatly benefit from the shared knowledge, material and events hosted by the regional project (coordinated under Component 3 below). It is foreseen as a series of webinars or online training events, through the regional project's Learning Management System, addressing selected topics and relevant challenges, facilitated by technical experts at regional project level. The project will support the tailoring of generic training materials available at this platform, into targeted training sessions that focus on innovative measures and models to reduce the viability gap for minigrids in Eswatini and stimulate private sector participation.

Output 1.4. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments and contribute to AMP Flagship Report on Cost Reduction

A derisking renewable energy investment (DREI) analysis is included for Eswatini to identify the most cost-effective basket of policy and financial derisking instruments required for the country. As suggested by the TOC, a range of perceived risks increase the development costs for small-scale RE, which in turn impacts the cost of electricity and the sustainability of installed systems. The DREI minigrid methodology assesses risks across 10 pre-defined risk categories[37], quantifying the impact on development costs, identifying the underlying barriers and suggesting the

[35] The original 11 AMP countries: Angola, Burkina Faso, Comoros, Djibouti, Eswatini, Ethiopia, Madagascar, Malawi, Nigeria, Somalia, Sudan and further inclusion of Benin, Mali, Sao Tome and Principe, and Zambia.

[36] Anticipated to build on scenario planning developed within the broader national context and the changing technology landscape.

[37] At a technology or sector level, eight risks including energy market risk, social acceptance risk, hardware risk, digital risk, labour

most appropriate policy and financial derisking instruments to address the risk-return profile of minigrid investments.

A *full quantitative DREI analysis* will be conducted for each country in the first year of the project implementation.

The PMU will assemble a task team to perform the national DREI analysis including consultants (international, national), government stakeholders, and members of PMU. Deliverables will include interviews, completed financial models, and national reports/knowledge products. Initial TORs for these consultants are included in the Procurement Plan, Annex 12 to the project document (ProDoc). This national analysis will be funded by the national project. The AMP Regional Project can in turn provide various support on DREI to the national project: including finalizing TORs for the country-level, recommendations (in the form of a vetted roster of consultants) on international consultants that are trained on DREI already, as well as resources and tools (Excel models etc.) to conduct the DREI analysis. Results from the full quantitative national DREI analysis will be shared with the regional project to feed into a regional flagship AMP knowledge product, across all AMP countries, on DREI and lowering mini-grid costs. This regional AMP knowledge product will be funded by the regional project.

The analyses will cover all four stages of DREI and produce all standard outputs (see Figure 6): LCOEs, financing cost waterfalls, package of selected instruments, life-cycle cost assessment and key performance metrics. These will be summarized in the following publicly available deliverables: an Executive Summary (20 pages) report, a slide deck report, and an annex capturing the assumptions behind the analysis for full transparency.

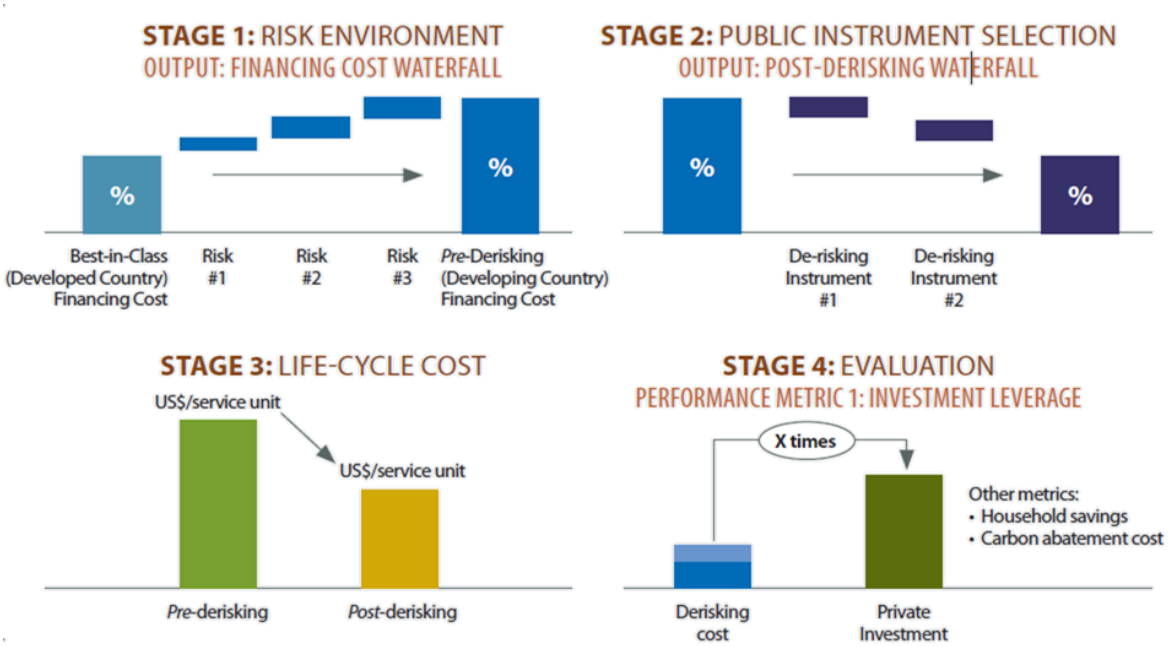


Figure 6: Stages of a full quantitative DREI application.

Findings from the DREI analysis will provide critical input for consideration by the National Dialogue (Output 1.2), with this initial assessment intended to facilitate the policy dialogue between key role players in the sector early on. While the DREI assessment will be collecting information related to the minigrid and off-grid sector specifically, it should also provide valuable insights into the risks facing RE investments[38] in Eswatini more broadly that might

risk, developer risk, end-user credit risk and financing risk. At a macro level, two risks: currency risk and Sovereign risk, as well as two that overlaps with the technology/sector level, i.e. end-user credit risk and financing risk.

[38] This expectation is based on the current context where (i) there is no differentiated policy and regulatory environment in place for mini- and off-grid developments as yet, with minigrids currently clustered under the independent power producer strategy, and (ii) there are no dedicated minigrid developers active in the country and the stakeholder group interviewed in the assessment

encourage a policy discussion and unlock RE investments more generally. Findings from the DREI analysis may also inform adaptive management of project activities to incorporate derisking measures identified in the DREI analysis.

National DREI analysis data will feed into a regional flagship AMP knowledge product on DREI and lowering minigrid financing, hard and soft costs. This consolidated knowledge resource / product will in turn be available to national projects for cross-country comparisons and further learning.

The national project will benefit from implementation support provided by the DREI Core team, working with the regional project. National teams and consultants will have access to the resources and tools to conduct the full quantitative DREI applications, and will receive ongoing support and quality assurance. The development of the regional flagship AMP knowledge product will be led and funded by the regional project.

A second, follow up or 'light' DREI analysis will be conducted in the final year of implementation. This 'light' analysis will build on the earlier materials, refreshing data to track evolutions in financing costs as well as in hardware and soft costs. Updated data on the risk environment and financing costs will be collected and key financial modelling inputs updated with the latest hardware and soft costs. The outputs will be a brief update note of 2-5 pages per country, specifically focusing on changes in (i) the risk environment, (ii) financing costs, hard and soft costs, and the Levelised Cost of Electricity (LCOE). The second analysis should reflect the impact of the newly implemented minigrid regulatory framework and point to any remaining opportunities to reduce risks and encourage clean energy minigrid investments in the country.

Component 2. Business Model Innovation with Private Sector

The second component aims to demonstrate innovative business models, based on cost reduction, that can encourage private sector participation in RE minigrid development in the country. Noting again the risks that present hurdles to private sector participation in minigrid investments, lessons from two decades of minigrid developments in the region and the specific challenges for feasible minigrid operations presented by the Eswatini country context, the ability to demonstrate innovative business models will be critical to open the market.

Two key lessons inform the focus of this component:

1. The critical importance of incorporating PUE in improving the financial viability of minigrids, as discussed under the AMP Strategy (Section III).
2. Experience showing the benefits of electrification cannot be assumed, particularly where programmes to provide access have a narrow focus on the delivery of energy infrastructure alone. Rather, if electricity is to provide the multiple development benefits on offer, it should be delivered as part of wider development programmes that place community needs at the center.

Business model innovations introduced under this component aim to incorporate these lessons, demonstrating two 'proof of concept' business models, their relevance in the country, the enhanced associated economic and socio-economic impact and the contribution on financial viability – essential to encourage private sector players.

The targeted outcome for this component is to have innovative business models based on cost reduction operationalized to support and strengthen private sector participation in RE minigrid development.

Towards this objective, the AMP focus will be on 'proof of concept' to encourage early adoption of innovative business models relevant to the Eswatini country context. Three outputs are included for this component: two pilot projects demonstrating two different business models, and a third based on capacity building among potential minigrid developers.

- Output 2.1: Expansion of public utility minigrid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of minigrid systems for rural households.

will likely also represent larger scale and standalone solar PV developers. Many of the risks would therefore be seen from this broader perspective.

- Output 2.2: Greenfields pilot developed demonstrating productive uses use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids.
- Output 2.3: Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects.

Output 2.1. Expansion of public utility minigrid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of minigrid systems for rural households.

The first minigrid system in the country has been developed by the Eswatini Electricity Company (EEC) for a small, remote village[39] in Mvundla, near Sigcineni, in the Manzini region. The 35 kWp, 200 kWh solar PV-battery system was developed solely for residential and community use: 21 homes and two churches. As a public sector pilot project, intended to assess system performance for rural electrification, it was implemented as a public service with no apparent business case[40]. Development costs are approximately USD 6,570/kW[41], comparing favorably to the 2019 benchmark range of minigrid development costs (USD 4,000 – USD 11,000/kW) in sub-Saharan Africa published by the Africa Minigrid Developers Association (AMDA) [42] . The installation incorporates advanced metering infrastructure that will allow remote monitoring and data collection and can support flexible and innovative tariffs.

Objective(s). The first AMP pilot will be developed in collaboration with the EEC, augmenting the Mvundla pilot installation to demonstrate (i) the contribution of productive uses of energy and efficient appliances on minigrid capacity factor, revenue and business case, (ii) the benefit of business development support partnerships for minigrid projects, and (iii) the impact on socio-economic indicators. In terms of the AMP areas of opportunity (Figure 1), piloting a PUE overlay seeks to demonstrate productive uses of electricity to reduce costs and enable minigrid development at scale. Data collected from the pilot may also be used to opportunities around digitization and the use of data for minigrid cost reduction for future developments.

Assuming commissioning of the Mvundla pilot as planned, during the first half of 2021, the smart metering system will provide a detailed usage baseline with at least half a year's data. The impact of introducing productive uses of energy[43], value addition[44], small business development and access to EE household appliances can be assessed relative to this baseline consumption. It will be critical to define, monitor and report on impact throughout, monitoring the impact of different interventions and the sustained contribution and benefits. Data and findings will feed into Component 3 for the development of case studies with recommendations and guidelines based on learnings to inform future minigrid developments by all role-players. Data sharing is a key consideration of the AMP and a prerequisite (described in Principle 6, Output 2.2) for accessing support under the project (refer Box 4).

[39] The village is isolated by the Ngwempisi river and accessible only by footbridge (no road access) with GPS coordinates: 26°41'45.26" S, 31°17'25.96" E, elevation 461m

[40] Capital investment was approximately USD 230,000. A simple payback calculation applying the national tariff and the standard consumption package (SCP = 365kWh per household per annum) suggests a 282-year payback period for the capital investment alone. No cost data for O&M is available at this stage.

[41] E3.56 million at an exchange rate of 15.5:1 as at 15 November 2020

[42] AMDA. 2020. Benchmarking Africa's Minigrids.

[43] Preliminary discussions from the developers indicated potential to introduce a community workshop where trades people have access to electricity to manufacture wares, sewing services, and a hammer mill to process green mealies (corn) grown in the village. Other opportunities noted by developers include an internet café and printing services to also service communities from across the footbridge. Egg incubation may also offer a viable small business opportunity. Prioritising and selection of options would require further investigation, a cost benefit analysis and consultation with the community.

[44] Finding a market for agricultural produce and diversification of crops can further enhance farming in the area. Already an opportunity to grow groundnuts (or process nuts produced by surrounding areas) to produce peanut butter for markets, has been raised. Availability of cold storage will also make the production, processing and packaging of meat, including chicken, possible. Again, subject to community consultation and cost benefit analysis.

Box 5: Digital data sharing for mini-grids

Pilot beneficiaries (e.g. minigrid operators) receiving support from the project will be required to share minigrid performance data with the national and regional project.

Specific terms and conditions for data-sharing and how best to operationalize the commitment and its adoption by the beneficiaries will be defined and agreed upon with minigrid operators during project implementation, including details of what data can and cannot be used, based on consultations with industry stakeholders and with support from the AMP Regional Project.

The specifications around the data generation by the demonstration pilots supported by the project will consult and follow guidance/standards provided by the AMP Regional Project. A standardized Quality Assurance and Monitoring Framework (QAMF) for application in all minigrid pilots supported under the project will be developed in year 1 of the regional project and disseminated to all national projects.

A data platform will be procured by the project (under Component 3, Output 3.3) to serve different purposes including: (1) running digital tenders by which minigrid developers will be selected as beneficiaries to receive support under the project and (2) managing all technical and financial data related to minigrid sites.

Through the implementation of this data management platform, minigrid developers selected to implement minigrid pilots with support from the project will have access to a set of best-in-industry tools for analyzing minigrids (e.g. demand forecasting, system optimization, distribution network design, detailed financial modeling at the site and portfolio level). Similarly, as part of the roll-out of the data platform, minigrid developers (as well as key government and other stakeholders) will receive capacity-building and in-depth training to use analytical tools and data management technologies.

The minimum requirements for hardware and software for data-sharing are specified in Box 5. The Mvundla pilot already has comprehensive smart infrastructure installed for remote metering. It is therefore anticipated to meet all the provided specifications to make data sharing possible. If not, the necessary upgrades will be done by the AMP.

Box 6: Initial Specifications for Minigrid Digital Hardware and Software

Table 3: Minimum requirements and costs references for hardware/software for data-sharing

Offering	Details
1.1 Hardware requirements per site	• Inverter monitoring (monitoring & control) • Distribution monitoring • Optional current transformers for energy meter if more than 10 kW (single phase) or 30 kW (three-phase) • 24V power supply (50€) • Various data cables and installation material • Optional: 24V backup battery (50€) • Optional: Cabinet for the complete monitoring system • Industrial internet router • Industrial or high quality Ethernet Switches -
1.2 Hardware requirements per connection	• Smart meter

Since 2013, multiple studies in sub-Saharan Africa[45] underlined the importance of PUE and showed that targeted activities promoting or improving PUE in rural areas are needed to achieve the required uptake of electricity. Thus,

[45] Noting two: (1) *Productive Use of Energy (PRODUSE), Measuring Impacts of Electrification on Small and Micro-enterprises in Sub-Saharan Africa. 2013*. Developed as a joint initiative of the Energy Sector Management Assistance Program (ESMAP), the

an essential component of this pilot is parallel development support for small businesses, with a particular focus on women-owned businesses. For this purpose, the project will partner with the MSME Unit and the Department of Cooperatives, both within the Ministry of Commerce, Industry and Trade (MCIT) to support the establishment, formalisation and growth of small businesses and cottage industries through training and mentoring, value chain development, developing linkages to market and opening trade opportunities to regional and global networks.

Another element foreseen for the pilot is making available EE cooking appliances to households. One option includes subsidizing the purchase of electric pressure cookers[46] to displace less energy and time efficient, costly cooking fuels. Again, the exact scope and focus will be dependent on a status quo and needs assessment and consultation with the community.

In terms of providing financial support for the purchase of productive use equipment (GEF INV), three requirements will apply for the use of GEF funding (refer also Principle 4, Output 2.2):

- It is required that the project only provide support via a third-party ownership model, as opposed to a self-ownership model. Third party ownership models involve the minigrid asset owner purchasing the productive use equipment, and then effectively leasing it back to the end-user, as part of an energy as a service offer. This third-party ownership model is necessary to justify the use of climate finance, as the funding can be presented holistically as part of the overall system design required for an economic minigrid.
- The amount of GEF Budget allocated to technical assistance for building capacity for productive uses associated with the pilot investment and general productive use should be limited and moderated. This is due to the related issue that climate finance should be directed to activities that specifically reduce emission reductions. It is therefore anticipated that the element of technical assistance will draw on support from the MSME Unit.
- The continued operation of the minigrid over its 20-year design life should be ensured to secure the emission reductions that is the basis for the GEF funding. This should include ongoing operations and maintenance as well as responsible handling of waste as documented in the Initial Environmental Evaluation of the project. An added requirement is for the recycling of spent batteries to be put in place when replaced every 7 – 10 years.

Output 2.2. Greenfield pilot developed demonstrating productive uses use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids.

Objective(s). The second pilot will focus on demonstrating productive uses of electricity to reduce costs, coupled with a private sector EPC and/or elements of an ESCO delivery model (refer Box 1) that can potentially attract private sector actors into the market. It will also seek to demonstrate opportunities around digitization and the use of data for minigrid cost reduction. Should the site or delivery approach foreseen during design stage present a challenge, the country will have the opportunity to trial the use of digital tools and solutions (via a comprehensive data management platform) to run minigrid tenders and monitor minigrid pilot performance.

This pilot will likely also be one of the first to benefit from the structure provided by the new Minigrid Regulatory Framework. As such, it can also serve to assess whether the framework is effective in promoting the national objectives for minigrid developments, intended outcomes for the sector and the precision of processes and procedures. In particular, considerations such as the adequacy of provisions related to the arrival of the national power grid can be tested. This experience will provide valuable feedback for consideration by the National Dialogue platform (link to Component 3 below noted).

A requirement of accessing the GEF funding is that a mechanism is established to ensure the minigrid is designed and operated for at least 20 years. It is required that a suitable governance structure, ownership structure, operations and maintenance model and equipment replacement plan be established that will ensure this is achieved.

Africa Electrification Initiative (AEI), the EUEI Partnership Dialogue Facility (EUEI PDF) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). (2) *Productive Use of Energy in African Micro-grids: Technical and Business Considerations*. *2018*. A Product of the USAID-NREL Partnership. National Renewable Energy Laboratory (NREL) and Energy 4 Impact.

[46] A successfully executed, small scale example is available at: https://storage.googleapis.com/e4a-website-assets/Accelerating-Microgrid-E-Cooking-Through-Business-and-Delivery-Model-Innovations.pdf

Should the Minigrid and Off-grid Regulatory Framework not make provision for such a mechanism and structures to be established, it is required that this be developed for the pilot project during the design stage.

Six principles have been prescribed in developing the minigrid pilot and particularly for the application of GEF investment (INV) funding. These principles, described below, set important direction for the project and a departure from these principles during implementation will be subject to a process of review and decision by the project's board.

Principle 1. Categorization of project. The pilot will be developed as a greenfield solar PV-battery minigrid.

Principle 2. Private sector involvement in project. The delivery model for the pilot will seek to incorporate private sector involvement to the highest degree possible. Based on the initial assessment of potentially suitable minigrid delivery models for the country, and the Government's aim to encourage involvement by the private sector (Box 2), it is anticipated that the pilot will demonstrate the potential role of the private sector players in Engineering, Procurement and Construction (EPC) and Operations and Maintenance (O&M). At design stage, the expectation is that the ESCO model, or elements thereof, can be demonstrated using an Energy Hub to establish an operating model attractive for private sector operation. The Energy Hub Concept is introduced in Box 6 with further details of the model and approach included in Annex 18.

Box 7: Energy Hub Pilot concept for Eswatini

Within the specific country context, it is expected that a strong productive use anchor off-taker will be a key element of a self-sustainable minigrid system[1]. Building an Energy Hub expands on the idea of a single central productive use to power a value chain or hub of productive uses that diversifies economic activity and increases resilience. This might take the form of an energized facility that can house various forms of agro-processing of crops for own use and resale and/or cold storage facilities for processed produce, creating opportunity for higher production volumes and linkages to larger markets.

The ideal model is for productive uses of energy to generate 80% of the revenue needs to operate the system. This would enable the minigrid to supply electricity to households at affordable rates and offset the lower tariff, lower consumption and higher relative operating costs of the residential component. Taking a modular approach, the generation capacity and grid can be extended over time to include additional households as it becomes feasible i.e., as new businesses establish and grow and their electricity needs and ability to pay increases. Additional detail regarding the Energy Hub, project approach and stakeholders and partners are provided in Annexure 18 to this ProDoc.

The 'Energy Hub' approach will allow the second pilot to assess its relevance for isolated, rural, unelectrified communities in Eswatini. It is noted that the same challenges that face grid expansion will challenge the construction of the minigrid and related 'Energy Hub' infrastructure, as well as the timely transportation of products to market. This is however likely to be a common challenge for the remaining pockets of unelectrified areas in the country and therefore this represents a good pilot project to test the extent to which a minigrid system can serve similar communities and be operated cost effectively. If successfully demonstrated in this context, this model will also apply to more commercial PUE applications in the forestry, sugar cane or other small commercial farming in the country, where the productive use to residential ratio will more readily exceed the 80 : 20 minimum target. In this way, the pilot will also serve the agriculture sector and inform opportunities for energizing agro-processing and agricultural value chains.

If the pilot incorporates a relatively significant agro-processing component, an opportunity may exist to link in with the EU GET.Invest/ElectriFI initiative focused on supporting electrification of agricultural value chains. The GET.Invest/ElectriFI initiative is at an early stage of development with details of what they will offer still being finalized.

During project design a potential site was identified for the pilot project (Box 7). Should the identified site prove unsuitable to piloting a minigrid that complies with the stated objectives and principles of the AMP, Eswatini can utilize the digital platform for both site selection and tendering (refer Principle 3).

Box 8: Potential project site for the Energy Hub Pilot in Eswatini

For the Energy Hub, a preliminary site has been identified in Ekubekezeleni, Bulimeni area (Location with GPS coordinates: 26°45'29"S; 31°18'33"E). The community of 92 households is remotely located with no electricity and limited road infrastructure. Approximately 30 households can be electrified through grid extension, while grid extension to the remainder, approximately 60 households, presents a significant challenge because of limited accessibility. A minigrid is proposed to supplement grid expansion. The exact boundary between the minigrid and the national grid will have to be identified in consultation with the EEC. It is duly noted that in identifying the boundary, due consideration will be required of the business case for the minigrid, quality of service and the comparative tariffs of minigrid customers and grid electrified customers to ensure customers benefit from equivalent or comparable service levels and standardized tariffs across the community.

There are currently no businesses operating within the community, with the closest shop 3 – 5 kilometers away. Water is readily available with piping to most households. Maize is being grown for own use and land is available for commercial agriculture. The nearest hammer mill is located more than 5 km away and only operates on alternate days. The community currently relies on a mobile hammer mill that comes to the village every Saturday.

While the land and water rich environment suggests opportunity to increase production for resale, the remoteness and inaccessibility limits the movement of goods and adds costs.

Principle 3. Digital platforms. The use of digital platforms for tendering the pilots is a central element of the overall AMP and digital strategy (Box 3, Section III). With digital platforms emerging as critical enabler for procurement and operation of cost-effective and viable minigrids, using a digital platform for pilot projects provides an opportunity to build capacity of key stakeholders in using this facility which can then set the foundation for later using digital platforms for sector-wide, large-scale tenders.

Digital platform software can manage the selection, Monitoring and Evaluation (M&E) and payments of pilots including capacity building of the Implementation Partner, Project Management Unit and minigrid developers. The expected steps for procuring and implementing the digital platform are provided in Table 4 below and included in the multi-year workplan (Annex 4).

Table 4: Summary activities related to the key process steps for tendering of a pilot

Step / Activity	Description	Responsible party	Targeted timing
Activity 1. Develop a detailed project plan (the project's 'Minigrid Pilot Plan') for advancing the project's minigrid pilot.	The PMU will lead and develop, in close collaboration with other stakeholders and support from the AMP Regional Project, a detailed project plan (the project's 'Minigrid Pilot Plan') for advancing the pilot. Once prepared, the project's Minigrid Pilot Plan will first be reviewed for clearance by UNDP (CO and BPPS NCE), and then shared with the Board. This activity should be completed by the end of year 1. The project's Minigrid Plan Pilot Plan will determine, among other aspects, the following: • Clear objective for the pilot • The minigrid delivery model which will be demonstrated in the pilot • The proposed type of pilot(s), which can include: (i) greenfield pilots, including productive use and (ii) productive use overlays, on existing pilots. • Inputs, as necessary, on site selection, including based on geo-spatial mapping, for the pilot • Site-specific assessments and other requirements (e.g., demand sizing, social and environmental safeguards (SES) assessments, gender assessments, e-waste disposal). Some assessments may be needed to be performed by the project ex-ante, to inform follow-up competitive tenders • The use of the digital platform for o Competitive tendering, as necessary.	Led by the PMU, in close collaboration with other stakeholders.	End of Yr 1

Step / Activity	Description	Responsible party	Targeted timing
	○ Ongoing data collection from the pilot, including data-sharing requirements (Box 4, above) as well as digital hardware requirements (Box 5, above) • The project's approach to ensure minimal concessionality for the level of GEF INV support to the pilot (when there are private sector beneficiaries) • Review of the IP's modalities for transfer of GEF INV support to the pilot(s), ensuring they are aligned with UNDP's policies and financial rules. • If a pilot includes GEF INV support for productive use, ensuring the pilot takes a third party ownership model to productive use equipment • Brief summary updates, at the time of drafting the plan, on the status in Eswatini of ○ (i) any other minigrid pilots (specifications, any results/findings to date), and ○ (ii) any other examples of minigrid productive use applications (specifications, any results/findings to date).		
Activity 2 Design of tender process for pilot using a digital platform.	The pilot may involve private sector engagement in various forms, including models involving private sector minigrid ownership, private sector EPC, and private sector O&M services. Where there is private sector engagement in the pilot, a competitive tender process will be executed using the digital tendering feature of the digital platform procured under Component 4. Under this activity, the PMU, working with the digital platform vendor, specialist engineering, financial, procurement, and legal expertise, and the AMP regional project, will translate the approach set out in the project's Minigrid Pilot Plan into the design of a customized tendering process on the digital platform, including requirements, specifications and evaluation criteria. At the end of this activity, the tendering process on the digital platform will be ready to launch. The tender process itself should be launched before the end of Year 2. This activity may also include capacity building for government personnel with the digital platform. , as well as planning for capacity building to be available to private sector developers who will participate in the tender.	Led by the PMU, in close collaboration with other stakeholders.	End of Yr 2
Activity 3 Execution of tender, contracting and payments to the selected pilot organisations	In year 2, the tender will be launched and executed according to the design finalized in activity 2, resulting in pilot organisations being selected. Submissions to the tender will be competitively assessed against evaluation criteria (engineering, financial), with the PMU supported by appropriate expertise. Following selection of beneficiaries, the PMU/IP will enter into legal contracts with the selected minigrids, again supported by appropriate expertise, and make payments on pre-defined milestones, including on commissioning of minigrid plants. The digital platform will validate payment milestones. [This activity may also include capacity building for government personnel with the digital platform, as well as capacity building to private sector actors to engage with the competitive tender.]	Led by the PMU, in close collaboration with other stakeholders.	Launched in Yr 2 Aim is for pilots to be commissioned early in Year 3, to allow two years of data and learning to be gathered from the pilot.

Step / Activity	Description	Responsible party	Targeted timing
Activity 4 Monitor pilot, collect and aggregate data shared by pilot	Data generated by the pilot will be collected using the digital platform, connecting directly to remote monitoring and smart metering equipment. Data collected from the pilot will be used at the project level to, among other purposes: (i) track the performance of the mini-grid systems in real-time; (ii) validate the underlying pilot assumptions and business case; (iii) track performance enhancement in mini-grid capacity utilization; and (iv) generate insights and lessons learned to share with other national stakeholders, as well as the AMP Regional Project. Data collected from pilot will be shared with the AMP Regional Project for aggregating and analyzing data across all AMP national child projects. The regional project will use these data to: (i) generate region-wide insights and lessons learned; and (ii) inform the development of knowledge products, both to be disseminated across AMP participating countries and the broad mini-grid sector.	Minigrid operator and PMU in close interface with regional project	Ongoing throughout operation

Principle 4. Productive use: third party ownership model; limited technical assistance (TA). For pilots that will financially support the purchase of productive use equipment using an allocation under the GEF INV (i.e. both Eswatini pilots), it is required that the project will only provide its support via a third-party ownership model, as opposed to a self-ownership model. Third party ownership models involve the minigrid asset owner purchasing the productive use equipment, and then effectively leasing it back to the end-user, as part of an "energy as a service" offer. This third-party ownership model is necessary to justify the use of climate finance, as the funding can be presented holistically as part of the overall system design required for an economic minigrid.

Similarly, projects may also provide TA building capacity for productive uses associated with the pilot investment. While this is not a principle, please note that the amount of GEF budget to technical assistance programs for general productive use should be limited and moderated. This is due to the related issue that climate finance should be directed to activities that specifically reduce emission reductions. Again, support from the Microprojects unit, MSME Unit of the MCIT, MNRE and other Government role players is expected to address this principle by contributing to the development of economic activities, business development support and overall development of the minigrid system.

Principle 5. Clear methodological basis for additionality for calculating the level of GEF INV/financial support for capital expenditures. It is critical that the appropriate use of GEF donor funding to the pilots be ensured, requiring a methodological basis for which the level of GEF INV will be determined during implementation. In the context of an Energy Hub, as considered during the design phase, the following approach is proposed for the GEF funding allocation across elements:

- -'Core' investment in minigrid system, productive use equipment (third party ownership) and household connections: GEF INV can be provided for these areas using the principle of minimal concessionality. Suitable methodologies for minimal concessionality can include calculating the level of GEF INV support on the basis of achieving (i) Levelised Cost of Electricity (LCOE) parity with a diesel mini-grid, (ii) LCOE parity with pre-existing residential tariffs, or (ii) LCOEs based on the willingness to pay of the end-users (via surveys etc). During implementation, the AMP regional project may also provide updated guidance on suitable minimal concessionality methodologies.
- 'Top up' investment in metering infrastructure above the baseline (as installed at the Mvundla pilot) to meet the requirements of the regional project and link into digital platform.
- Ensuring UND social and environmental safeguards, gender equity requirements and action plan are fully met.

The above principles should guide the determination of GEF INV for capital expenditures. Should the project depart from the above principles this should be cleared in consultation with the AMP regional project and cleared with the Steering Committee.

Principle 6. **Digital data: obligation to report; inclusion of digital equipment**. As already stated for pilot 1 and detailed in Box 4, it is required of the asset owner of the minigrid benefitting from the GEF INV support to share digital data from the minigrid's performance with the AMP national project. It is therefore a requirement that the minigrid system be fitted with metering infrastructure that meets the requirements of the regional project with minimum specifications as provided in Box 5.

Principle 7. Compliance with UNDP Social and Environmental Safeguards and Gender requirements. Pilot projects funded by the GEF INV are required to comply with all the relevant national standards of the country as well as UNDP standards as it pertains to social and environmental safeguards and gender equity. In support of this principle, an Environmental Safeguards Management Framework (ESMF), developed for the program, and a gender action plan accompany this ProDoc (Annexes 10 and 11). The ESMF is structured as a program-wide framework that provides guidance that is both generically applicable to all AMP country projects as well as country specific. This guidance will have to be incorporated and considered in developing the environmental and social management plans for pilot projects. A critical consideration under this framework is the need to ensure environmentally sound management of replaced equipment, including batteries, inverters and solar panels, after their usage. The responsible handling of waste with recycling of batteries and other recyclable equipment, should be clearly documented, budgeted and monitored in compliance with national and UNDP safeguards requirements.

Output 2.3. Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects

The third output under this component will focus on capacity building for potential developers and operators, including public sector players involved in project design and evaluation of proposals. Drawing from the practical, in-country experience of these two pilot projects and the extensive resources and knowledge available at the AMP regional project level, capacity building will focus on design parameters, innovative business models and cost-reduction levers and opportunities to improve project feasibility. The expectation is that potential developers will be capacitated to take the demonstrated experience and learnings into the design and planning of future minigrid developments in the country.

It is envisaged that the training material and modules will be developed in partnership with the Centre for Sustainable Energy Research (CSER), to be incorporated into the centre's Energy Short Course offering. For maximum reach and benefit, these training modules will have to be kept adequately practical, accessible and affordable for potential minigrid developers. The suitability of using the centre's short course platform to house the training more permanently will have to be assessed in terms of these objectives, but will provide a valuable permanent resource for capacity building in the country.

Inclusion of women and youth in training will be given priority, targeting at least 50% participation by women and appropriate representation by youth and other vulnerable groups, as relevant.

Component 3. Digital, Knowledge Management and Monitoring and Evaluation

As a newcomer to minigrids, Eswatini stands to benefit enormously from minigrid experience gained across the continent. Harvesting both local and regional experience is key to inform future decision-making and shape policy interventions to optimize the broader contribution by minigrids in the country and region. The regional project can help facilitate access to past and current learnings as well as best practices.

Linkages to the AMP Regional Project: Component 3 is a key interface with the AMP Regional Child Project. As such, details on linkages to the regional project as relevant for digital, knowledge management and monitoring and evaluation activities under the project are described in Box 9 below.

Box 9: Linkages to the AMP Regional Project – Component 3 – Digital, KM and M&E

The project will receive support and guidance from, as well as participate in activities led by the AMP Regional Project in the following key areas of interface between the AMP regional project and the AMP national projects:

- **Digital.**
    a. **Knowledge building/sharing.** The regional project will build and share knowledge with the project on the potential for use of digital tools and solutions, including leveraging minigrid projects' data to improve the commercial viability of renewable energy minigrids.
    b. **Data aggregation platform.** The AMP Regional Project will make a data management platform available to aggregate data from all national project pilots based on a common M&E framework to track Results Framework indicators as well as program objectives, SDG impacts and GHG emission reductions for all child projects.
- **Knowledge Management**.
    a. **Information sharing**. The AMP regional project will support and facilitate knowledge management and information sharing between the regional child project and national child projects, among national child projects, and between the program and the larger minigrid community.
    b. **Insight Briefs.** National projects will gather data and audio-visual content (video footage, photos, etc.) highlighting national project activities which will be the subject of an 'insight brief' to be developed by the AMP Regional Project. The 'insight brief' will be disseminated by the regional project to regional stakeholders and published on the AMP website.
    c. **Communities of Practice**. One of the primary ways national project staff will interface with the regional project is via the 'Communities of Practice' (CoPs) and associated activities/platforms. While it is expected that many of the activities will be undertaken virtually (via internet-based platforms, webinars or digital platforms) it is also expected that the CoPs will include actual in-person workshops, meetings or training events that project staff will participate on.
- **Monitoring and Evaluation (M&E).**
    a. **Common M&E Framework/QAMF.** The AMP Regional Project will develop, with inputs from national projects, a common M&E framework with SMART indicators to ensure that the program is able to track progress toward its overarching objective. This common M&E framework will include both the Results Framework indicators as well as additional Key Performance Indicators (KPIs) which will be adopted by the national projects to track progress toward project and program objectives (i.e. minigrid cost-reduction). The project will thereafter provide on an annual basis (and to the extent feasible if requested on an ad-hoc basis) the following M&E information to the AMP regional project staff: (a) Standard reporting on all indicators in the results framework; and (b) Reporting on all additional Key Performance Indicators (KPIs) adopted by the project under the common M&E framework.
    b. **Operational support for national project M&E activities.** The AMP Regional Project will provide support to the project, through its PMU staff or by hiring or recommending subject matter experts, for the project to execute M&E activities such as the inception workshop, ongoing monitoring, and project evaluations. Further details provided in Section VI. MONITORING AND EVALUATION (M&E) PLAN.

The results of Component 3 in the Eswatini project will feed into the AMP Regional Project 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 national projects. Integration will also be enhanced through the programmatic approach proposed for national project design around the three core thematic areas mentioned above.

The third component has therefore been structured to link into the knowledge resource of the regional project, both to access available resources and support and to contribute to the knowledge sharing.

The targeted outcome for this component is formulated as: Digitalization and data mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefitting from linkages to international good practice.

Accordingly, six outputs have been defined to ensure the contribution of the AMP is adequately captured and communicated to support future developments:

- Output 3.1: A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of all minigrids pilots supported, including GHG emission reductions, is adopted and operationalized based on standardized guidance from the regional project.
- Output 3.2: A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project.
- Output 3.3: Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction.
- Output 3.4: Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt.
- Output 3.5: Knowledge network established to promote minigrid development / rural energy access.
- Output 3.6: M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation

Output 3.1. 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 based on standardized guidance from the regional project

A prescribed intervention for the AMP is the development and operationalization of a Quality Assurance and Monitoring Framework (QAMF) for measuring, reporting and verification of the sustainable development impacts of minigrids, including GHG emission reductions. Building on the minigrid Quality Assurance Framework developed by NREL, SEFA and others as well as the considerable data gathering, pooling and analysis work ongoing by many including RMI, SE4All and AMDA, a Quality Assurance and Monitoring Framework will be developed and operationalized, as necessary. Depending on guidance from the regional program, a more likely outcome is that a standardised QAMF is adapted to Eswatini rather than developed as new.

The requirements of stakeholders across the spectrum will be considered and the QAMF tailored accordingly. For example, in Eswatini, integration with the systems and protocols of the Central Statistical Office (CSO), the national sector M&E requirements of EEC, socio-economic indicators (e.g. female employment) and the site-specific monitoring needs of any private sector partners and community groups. The framework will also consider the GEF and AMP regional level M&E and reporting requirements and, if appropriate, will be integrated with similar projects being undertaken in other AMP focus countries. Examples of this higher-level data harvesting include standardized emissions reductions figures and cost saving indicators.

Operationalising this platform will include supporting developers on the installation and use of the required equipment (as well as on the use of the data) and capacity building for the project Steering Committee, National Dialogue, national agencies and knowledge network (local Community of Practice) on the use of a resulting national dashboard. This activity will also include support to integrate the data feeds with incumbent national systems, including that of the CSO.

Output 3.2. A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project

Both pilot projects are expected to make a significant and invaluable data contribution to inform the future development of minigrids in the country. By building on the EEC pilot and the first year (2021) of baseline data, the value and contribution of adding PUE to a residential minigrid can be accurately assessed. The second pilot, the Energy Hub, will demonstrate building household electrification around an 'anchor user' and can again be compared with data from the minigrid at Mvundla, both in its original form and following the introduction of PUE.

Recognising the importance of digital tools and solutions as a key driver for minigrids and minigrid cost-reduction (refer Box 3, Section III), it is imperative that smart metering and other remote monitoring equipment be installed, and other data collection instruments (e.g. interviews, surveys, satellite data, etc.) are identified during design stage and used to actively collect and monitor data for both sites throughout implementation and operation.

Following guidance from the regional project, the AMP project will support the development of a digital strategy for the project in year 1 which will be implemented thereafter. The Project Digital Strategy will updated on an annual basis or as needed to reflect learnings from project implementation, guidance received from the AMP Regional Project on digital tools and solutions, and insights gained from minigrid pilots data. Upon implementation of the Project Digital Strategy and based on lessons learned around opportunities to leverage digital tools and solutions for minigrid sector development, the project will develop a set of evidence-based recommendations for rolling out digital solutions for minigrids at the national level. These recommendations will be shared with key national stakeholders and provide the basis for developing a digital strategy for minigrid development post-project.

This process includes aggregation of smart metering data into a central database that links to the aggregated regional view. It will also be important to consider data security and confidentiality at this early stage to facilitate future data sharing also from private sector players.

Output 3.3. Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction

The project digital strategy and QAMF will be supported by a digital platform that will provide key functionality for the project in terms of acting as the (i) national digital convening platform for key stakeholders (public/private), (ii) providing ongoing data gathering and M&E on minigrids, including linking to the AMP regional project and (iii) acting as the mechanism for tenders for minigrid developers/sites. This platform will serve as an important integration point between outputs and between the national and regional project.

Given the digital platform's central importance to the project's functioning, it should be established as a priority in the first half of the first year of implementation. A set of generic specifications was developed as initial guidance to assist urgent procurement at implementation (refer below) and any further guidance will be available from the regional project at the time of procurement. These specifications are also essential to facilitate seamless data integration across the interfaces with other countries and the regional project.

Table 5. Initial Specifications for the Project's Digital Platform

Offering	Details
National digital convening platform for key stakeholders	• Set up of a country-specific, web-based platform to manage all technical and financial data related to minigrid sites at the site and portfolio level • Single site register of minigrid sites, with geospatial views and technical/financial benchmarks for site assessment • Set of best-in-industry tools for analyzing minigrids, including demand forecasting, minigrid system design and optimization, and financial modeling • Capacity-building and in-depth training of key government and other stakeholders to use analytical tools and data management technologies
National monitoring and evaluation platform (remote monitoring & analytics)	• Direct integration with smart meters and remote monitoring systems for live data feeds and monitoring (with options to address lack of remote monitoring systems or other restrictions) • Big data analytics and customized reporting to calculate and report on standardized metrics for pilot performance, based on project QAMF • Quality assurance of data quality, accuracy, relevance, consistency • Interactive tools to analyze data, filter, and view at varying levels of granularity • All pilot-specific data can be rolled up into national view, and all country-specific data can be rolled-up into regional view
Financing platform for running tenders to select minigrid pilot beneficiaries	• Complete end-to-end management of e-tenders for mini-grids customized to specific project/pilot needs (e.g. customized technology solutions, customized workflow, customized KPIs for pilot monitoring) • Automated proposal analysis for quantitative proposal components • Remote verification of connections through smart meter integrations • Automated M&E analytics for all RBF program indicators (connections deployed, amounts paid, gender/environmental impact metrics, etc.)

While the digital platform will be cross-cutting in terms of its applicability in the project, a key linkage is to the data collection systems for the pilot sites under Outputs 2.1 and 2.2. As already highlighted under the two pilot projects, data and findings from the pilot will feed into this component, both for the development of case studies to inform future minigrid developments and expand the data and knowledge resources aggregated by the AMP regional project. This digital platform provides the primary point of integration.

To be of value for future developments, consumption data collected by smart meters should be analysed to develop unitized profiles for different end users and consumer categories in rural areas. Information should facilitate modelling of utilization factors, the contribution of different interventions in terms of electricity usage and payback periods of newly introduced electrical appliances. It can also help identify suitable opportunities for growth and inform improved operating regimes to optimize the available electricity supply. In addition to published load profiles and findings, the data can inform further research, technical and policy papers, industry briefs and case studies (Output 3.4).

Data monitoring and reporting for both pilot projects should further include improved feasibility of the project, economic and social (including gender, youth and other vulnerable groups) impacts and environmental impacts.

Drawing from this data, a simple online dashboard that tracks and reflects impacts, both technical and socio-economic, will be an invaluable communication tool as well as a knowledge tool to support planning and decision-making related to the project and future developments and collaborations. Technical and training support from the regional platform can support the establishment and utilization of the national dashboard as well as the integration of data into existing data collection systems (e.g. the data feeds of the Central Statistical Office (CSO)[47]). An allowance has been made for capacity building among country stakeholders to make full use of the potential of the digital platform.

Four feedback loops for this output are important, namely to: (i) the National Dialogue, to inform the identification of suitable delivery models and development of the vision and Roadmap; (ii) the AMP regional project, to inform developments in similar markets in the region; (iii) development of lessons learned and insight brief(s) (refer Output 3.4, below); as a knowledge resource for the local knowledge network (refer Output 3.5, below); and (iv) to inform the development of training and course material, contributing practical experience and localized knowledge (Output 2.3).

Output 3.4. Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt at national and regional level.

The programmatic approach of the AMP presents a significant opportunity for each participating country to harness the wealth of knowledge aggregated at the regional knowledge platform while strengthening South-South cooperation and learning, contributing to and drawing on the experiences of participating countries in minigrid cost reduction and deployment. The Eswatini AMP will link with two mechanisms established at the regional level to encourage optimal utilisation of this knowledge resource:

- **Communities of Practice (CoPs).** One of the primary ways national project staff will interface with the regional project is via the 'Communities of Practice' (CoPs) and associated activities/platforms. The regional project will host CoPs structured to support knowledge sharing and facilitate the development of solutions to challenges that are common within the African minigrid sector. The CoP focus is on key institutions, i.e. ministries, government agencies, and electric utilities, within partner countries. While it will offer a web platform that may be accessible to the wider sector, membership of the CoP dialogue space will be confined to participants from ministries, utilities and regulators of partner countries. From within the CoP, technical cohorts (or working groups) will be established to focus on major challenges identified by the CoP members. Technical cohorts will benefit from the experience of nominated participants, but will also have access to heavy facilitation and support from the AMP in developing solutions to the identified challenges.

[47] Ministry of Economic Planning and Development, Central Statistical Office: http://www.gov.sz/index.php/departments-sp-388544304/78-economic-planning-a-development/economic-planning-a-development/687-central-statistics-office

This model has proven immensely successful to encourage collaboration and knowledge sharing to advance renewable energy with the creation of RE communities[48] among Caribbean Island nations.

Under the AMP, Eswatini will have the opportunity to nominate suitable representation from key institutions to participate in the CoP. Participation in the CoP and technical cohorts, if selected to serve on one, will require a time commitment by the nominated participant(s) as an investment from the respective institutions. From the National Dialogue (Output 1.2), a representative from each ESERA, EEC, and MNRE (and possibly MTEA if it makes sense) will be nominated to participate in the regional Community of Practice. In addition to participating, both virtually and actively in the regional Community of Practice events and engagements, delegates will be responsible for both (i) taking up national sector challenges with the wider expertise pool available in the regional community of practice, as well as (ii) providing feedback, facilitate knowledge sharing and disseminating information to the National Dialogue and/or broader government or industry forums as directed by the Steering Committee.

While it is expected that many of the activities will be undertaken virtually (via internet-based platforms, webinars or digital platforms) it is also expected that the CoPs will include actual in-person workshops, meetings or training events. The AMP will provide for logistics and costs to enable participation by at least one representative from the country. In exchange, Eswatini will benefit from contributing to and having access to best-in-class, locally relevant experience and approaches for accelerating cost-effective minigrid deployment. Participants and partner countries will further benefit from having access to a network of practitioners across the region and from actively growing internal, institutional ability to deploy available tools and learnings.

- **Lessons learned captured and disseminated.** The expectation is that lessons learned, at national and regional level, will enable scaling up of rural electrification using low-carbon[49] minigrids, both within the country and in the region. Towards this objective, information will be collated and shared to be available to serve as knowledge resource to both public and private sector players.

  The AMP will create a dynamic and focused learning environment for Eswatini. By deliberately using extensive regional experience and complementing it with country-specific experience, an informed and tailored minigrid implementation approach can be developed for the country. It is therefore important to link these learnings and information into the anticipated vision and roadmap of Output 1.2. Similarly, these learnings will contribute towards the knowledge products collated by the regional project.

  In addition to the numerous opportunities for data collection and learning presented by the two pilot projects (refer Outputs 2.1, 2.2, 3.2 and 3.3), opportunities for lessons are expected to lie in:
  - Practical implementation of the minigrid framework and how it aligns with and advances national objectives.
  - Interest, participation and feedback from the private sector in training, community of practice and tenders.
  - Funding and financing of developments.
  - Environmental as well as economic and social (including gender and other vulnerable groups) impacts.
  - Special gender and youth concerns and considerations to achieve equitable distribution of positive impacts.
  - Performance against regional benchmarks related to comparable costs for different components, delivery models, ownership models, improved feasibility and cost-effective delivery of electricity to end users.

  Information, communication and training material will be shared with the AMP regional project, to inform developments in similar markets in the region. Equally, regional data will be available alongside country-specific information and shared with industry role-players both in the public and private sector through electronic communication and active engagements with stakeholders.

  Under this output, data and learnings from various outputs will be captured and developed into lessons, case studies, communication and training material to inform future minigrid developments by all role-players.

[48] An example is the CARILEC Renewable Energy Community, available at: https://community.carilec.org/

[49] While noting that the AMP focus is on Solar PV hybrid systems, learnings pertaining to policy & regulations, finance, and new business models are expected to be relevant to clean energy mini-grids more broadly.

Accordingly, lessons learned from pilot interventions will be captured, suitably packaged and shared through electronic communication and active engagements with stakeholders.

The country projects will develop content based on the country experience. The link with the regional project will help shape and inform the development of insight briefs, enriching and affirming content with common experiences across the AMP countries. It will also support packaging and standardization into a format that is consistent and commonly branded across the program.

Output 3.5. Knowledge Network established to promote MG development / rural energy access

Based on the interest expressed by potential minigrid developers and the expectation of an enabling environment being created with the introduction of a minigrid regulatory framework, a Knowledge Network (or local Community of Practice) will be established among active and interested industry role-players to encourage information sharing, collaboration and innovation related to minigrid development and rural energy access.

In addition to networking and information sharing by members, it is recommended that this forum have access to the AMP knowledge resources and that regular knowledge events be facilitated, corresponding with a framework of topics agreed within the community itself. It is also foreseen that the Knowledge Network will have the opportunity to participate in online events and workshops hosted by the regional project.

Output 3.6: M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation

Ensuring compliance with all mandatory monitoring and reporting requirements of the GEF, including the following specific outputs:

- **Project inception meeting and report**. In accordance with GEF monitoring and reporting requirements, a project inception workshop will be held within 60 days of project CEO endorsement to officially launch the project. The scope and objectives of the inception workshop are detailed in the Monitoring and Evaluation section (Section VI) of this project document. The confirmed and, if relevant and substantiated, adapted project implementation structure and approach will be captured in the inception report, providing the practical foundation for project implementation and governance over the 4-year implementation period.

- **Project Monitoring and Evaluation.** In addition to the data collection and monitoring frameworks described earlier (Outputs 3.1, 3.2 and 3.4), progress monitoring of project management parameters is required for compliance with GEF requirements. An annual Project Implementation Report (PIR), detailing progress against the objective and outcomes, annual workplans, planned expenditure, among others, must be produced and submitted to the GEF and the Project Board / Steering Committee for review.

  Annual progress reporting should also cover monitoring of any gender, environmental and social risks and related management plans.

  Earlier outputs largely already incorporate the GEF Core indicators (Annex 15) and should support progress to be reported to the GEF as required. Monitoring of these indicators should however be a deliberate focus of the project monitoring and reporting efforts, as it represents a critical requirement of the GEF.

- **Project Evaluations.** Project performance and delivery of all major project outputs and activities will be subject to independent evaluations, following the standard templates and guidance for GEF-financed projects. Section VI, Monitoring and Evaluation, provides guidance for the scope of the evaluations and appointment of independent evaluators. The project team will be responsible for maintaining all relevant data records and facilitating access to all information necessary for the evaluators to assess project outcomes against all indicators.

It will be helpful for the project team to review the evaluation framework during the inception phase and ensure performance is consistently tracked, documented and can be demonstrated across all dimensions at the time of the mid-term review and terminal evaluation.

The AMP Regional Project will provide support to the project, through its PMU staff or by hiring or recommending subject matter experts, for the project to execute M&E activities such as the inception workshop, ongoing monitoring, and project evaluations. Further details provided in **Error! Reference source not found.** (Section VI).

It is important to note that some of the abovementioned project results will be realized by co-financing activities with resources that do not flow through UNDP accounts. In particular, the minigrid pilots to be built in the projects (Output 2.1 and Output 2.2) will be funded through a CAPEX (partial) subsidy from the project budget (GEF funds and UNDP TRAC), and the remaining of the CAPEX will be funded by third parties (who includes the Eswatini Electricity Company (EEC), the Ministry of Natural Resources and Energy (MNRE), but may also include contributions from other partners identified during implementation). While the funds from third parties will not flow through UNDP accounts, they will directly contribute to the same mini-grid pilots the GEF and UNDP funds are contributing to and will be essential to realizing the project objectives.

Similarly, the geospatial mapping (Ouput 1.1) will build on the data contribution made by the UNCDF to inform the development of data overlays that will assist with identifying suitable minigrid sites.

For this AMP child project, these are "co-financing activities included as project results". The precise sources and amounts of these co-financing activities will only be known at implementation stage. UNDP is accountable to monitor all project results, including results to be delivered by these co-financing activities, to ensure consistency with UNDP and GEF policies and procedures, including social and environmental safeguards policies and requirements (SES). This is further detailed in the ESMF (Annex 10).

For these co-financed activities included as project results with resources that do not flow through UNDP accounts (captured on Table 6 below), the following procedures will need to be applied before co-financing activities start:

1. The co-financing partner's capacities will need to be assessed through the Partner Capacity Assessment Tool (PCAT) and the co-financing partner will need to develop a risk management strategy if gaps are identified, for UNDP's approval and subsequent oversight/assurance.
2. The co-financing partner will need to sign a legal agreement with UNDP or the Implementing Partner to confirm accountabilities, mentioning in particular the following sentence: "*The co-financed activities will be undertaken in full compliance with [co-financing partner's] policies and procedures. However, because the activities are included in the results of the project the [co-financing partner] commits to monitor these activities consistent with the UNDP Project Document. The Project Board and UNDP will also assume an oversight and assurance role to further ensure the project, including the co-financed activities covered by this letter, remains consistent with UNDP policies and procedures. These arrangements will be confirmed through [signature of Project Document OR signature of Responsible Party Agreement with reference to the Project Document].*".
3. Risks stemming from and/or to co-financed activities – as with risks from/to all other project activities – will be included in the project risk register and monitored accordingly. The risk description will clarify relation to the specific co-financing.
4. Social and environmental risks associated with the co-financed activities will be identified during project design and included in the SESP and relevant safeguard management plans. Relevant safeguards instruments prepared by the co-financing partner will be reviewed by UNDP for consistency with UNDP's SES, during project development and implementation; any gaps will be resolved in discussion with the co-financier.

Once the co-financing activities will have started, risks will need to be monitored (as per item 3 above) and results achieved through co-financed activities will be monitored and reported in the annual GEF PIR, the independent mid-term review and the independent terminal evaluation.

Table 6: List of co-financed activities included as project results

Co-financing source	Co-financing type	Co-financing amount (USD)	Included in project results?	If yes, list the relevant outputs
Eswatini Electricity Company (EEC)	Public Investment	USD 256,000	Yes	Output 2.1
Ministry of Natural Resources and Energy (MNRE)	Public Investment	Share of the total co-finance amount USD 13,605,442.18 (to be confirmed at implementation stage)	Yes	Output 2.2
Other development partners or government entities (to be confirmed at implementation stage)	Grant, Loan and/or Equity investment	To be confirmed at implementation stage	Yes	Output 2.2
UNCDF	In kind	910,000	Yes	Output 1.1
UNDP	Grant	50,000	Yes	Output 1.4
TOTAL		**To be confirmed**		

Partnerships

For optimal impact and contribution in the country, the AMP will rely on collaboration across multiple stakeholders drawing on different capabilities, skill sets and resources. Formalised and/or close partnerships are foreseen with a few key players in the sector and related areas of expertise. The table below (Table 7) provides a list of partners to the MNRE in implementing the AMP in Eswatini, with the details of direct, active partnerships already described in the preceding section. The table also indicates the specific outputs to which a partnership will contribute or that a partner will deliver.

Table 7: Identified partners for the AMP in Eswatini

Partner name	Description and contributions	Relevant project outputs
Eswatini Energy Regulatory Authority (ESERA)	Eswatini Energy Regulatory Authority is a statutory Energy Regulatory Body established through the Energy Regulatory Act, 2007 (Act No.2 of 2007). Its mandate is the administration of the Electricity Act, 2007 (Act No.3 of 2007), with the primary and core responsibilities of exercising control over the electricity supply industry (ESI) and regulation of generation, transmission, distribution, supply, use, import and export of electricity in Eswatini. ESERA is leading the development of the Off-grid and Minigrid Regulatory Framework for the country and has been nominated by the MNRE as responsible party to implement the AMP in Eswatini.	Overall implementation of the AMP in Eswatini, hosting of PMU on behalf of the Implementing Partner (MNRE)
Eswatini Electricity Company (EEC)	The vertically integrated national power utility has initiated the first minigrid installation for rural electrification in the country. The EEC will partner with the MNRE to implement the additional infrastructure requirement, to collect and monitor data, and to oversee and assess the changing business case when actively introducing PUE to the residential minigrid installation at Mvundla.	Participant in the National Dialogue (Output 1.2); Delivery of the pilot project addition of PUE at Mvundla (Output 2.1);
Ministry of Commerce, Industry and Trade (MCIT)	The Micro, Small and Medium-Sized Enterprises (MSME) Unit in the MCIT was created to advise government on policy issues and stimulate indigenous enterprises through creating an enabling environment for business. The MSME Unit has the	Possible support of the value chain analysis for the minigrid potential map (if adequate funding can be sourced for this output) (Output 1.1)

Partner name	Description and contributions	Relevant project outputs
	overall responsibility of coordinating the implementation of the SMME policy. The MNRE will partner with the MCIT MSME unit to support small business development, training, mentorships, value addition, seeking and establishing linkages to market and access to funding for both pilot projects. Access to funding for small businesses will also be linked into the funding and financing platform for communities to access. This partnership enables business development support to newly energized small businesses, intended to demonstrate the compounded benefits of clean energy to power economic development in rural areas. The MCIT Department of Cooperative Development is also instrumental in supporting the business development of these groups, who could be important productive users of electricity, and likely has a group/activity register that can aid in development of the mapping exercise.	Participant (ad hoc) in the National Dialogue (Output 1.2); Small business development, value addition and trade support at Mvundla pilot project (Output 2.1); Small business development, value addition, finance and trade support at the Energy Hub pilot (Output 2.2)
Microprojects Program (MPP) unit	The Microprojects unit is a semi-autonomous unit under the Ministry of Economic Planning and Development. The unit operates both as development agency and as an implementing agency for the government's small scale capital projects in collaboration with a number of ministries and development partners. The unit is responsible for processing, evaluating and recommending the best proposals among many, for supervision and monitoring of new projects, evaluation of completed projects and advising grassroots communities concerning their priorities and project ideas. It favors a participatory development approach, typically requiring co-funding from communities for their projects.	Funding and technical support for the economic activity (productive uses) infrastructure component of the Energy Hub pilot (Output 2.2)
Centre for Sustainable Energy Research, University of Eswatini	The CSER aims to strengthen skills and capacity in the energy sector, to contribute actively towards the replication and scaling up of successful sustainable energy technologies, policies and management practices, and increasing access to energy services for socio-economic development. The newly established Centre offers 6 short courses on sustainable energy systems and has been engaged to collaborate with the AMP for capacity building related to RE minigrid development and operation. Further opportunities for collaboration may include training to communities to benefit from minigrids, potential funders and O&M companies.	Capacity building (Output 2.3)
UNCDF / FinMark Trust	The United Nations Capital Development Fund (UNCDF) is the capital investment agency of the United Nations for the Least Developed Countries (LDCs). UNCDF programmes help to empower women, and are designed to catalyze larger capital flows from the private sector, national governments and development partners, for maximum impact towards the internationally agreed development goals. Through Making Access Possible (MAP), a multi-country initiative, UNCDF supports Ministries of Finance and Central Banks, to drive financial inclusion through a process of evidence-based analysis feeding into a financial inclusion roadmap.	Delivery of the minigrid potential mapping (Output 1.1)

Partner name	Description and contributions	Relevant project outputs
	In Eswatini, UNCDF works in partnership with FinMark Trust. Under the MAP, they have produced a diagnostic framework on access to clean energy for the country, as well as country diagnostic of the SME sector. The data sets underpinning these reports will be mined to enrich the spatial mapping of minigrid potential in the country. Coupled with established interfaces and access to supplemental data across various economic sectors, the UNCDF is well placed to lead the mapping of minigrid potential.	
Deputy Prime Minister's Office (DPMO)	The DPMO has responsibility for the Gender and Family Affairs portfolio and maintains the Gender Coordination Unit. Mainstreaming gender into all aspects of development is part of its mandate.	Participant in the National Dialogue (Output 1.2)
Ministry of Finance (MoF)	The Ministry of Finance's role is to promote macroeconomic stability in Eswatini by formulating and implementing fiscal and financial policies that optimize economic growth and improve the welfare of its citizens. The Ministry is responsible for the funding allocations to the REP as well as the other incentive packages and development programmes.	Participant in the National Dialogue (Output 1.2)
Ministry of Tinkhundla Administration and Development (MTAD)	The MTAD's mandate is to create an enabling environment for effective service delivery at Regional and Tinkhundla level and to enforce good governance practices, inclusive development and balanced regional development. Included among the objectives of the Ministry are: (i) to facilitate and implement the decentralization of all basic services from the Central Government to the grassroots level, and (ii) to build and strengthen community capacities and skills to participate in the country's socio-economic development for the attainment of sustainable development and poverty alleviation.	Participant in the National Dialogue (Output 1.2)
Renewable Energy Association of Eswatini (REAESWA)	REAESWA is recently established as a non-profit organisation representing the renewable energy and energy efficiency industry and service providers in Eswatini. It is expected to play an important role in facilitating knowledge sharing and capacity building as part of the AMP. The country could also benefit from engaging private sector roleplayers in renewable energy as the context for minigrids in the country is defined.	Facilitating knowledge network (Output 3.3)
Ministry of Tourism and Environmental Affairs	The Ministry has an overall mission to shape the safe and sustainable growth and development of tourism, gaming and wildlife, environmental affairs, meteorology, forestry, flora and fauna and climate change action to support economic growth and social progress. This includes provision of meteorological services to support life and infrastructure development, building a climate resilient nation and accelerating a low carbon pathway. The Ministry is also the custodian of the National Climate Change Strategy and Action Plan National Climate Change Policy.	Participant in the National Dialogue (Output 1.2), Environmental Authority for pilot projects (Outputs 2.1 and 2.2)
Ministry of Agriculture	The Ministry of Agriculture is to ensure household food security and increased sustainable agricultural productivity through diversification and enhancement of commercial agricultural activities. The Ministry is also responsible for the development and promotion of appropriate technologies and efficient extension services while ensuring stakeholder participation and sustainable development and management of natural resources in the country. Energising of agricultural value chains offer significant opportunities for synergy with clean energy minigrids.	Participant in the National Dialogue (Output 1.2) and potential partner in pilot development

A few donor funded initiatives were identified at concept design stage as having possible alignment with the AMP, offering opportunities for synergies to be explored. Closer consultation identified only one active initiative and two that are under development, expected to be in place within the next year.

A number of other initiatives currently under development or active in the country have relevance to the scope of the AMP and may serve as useful resources or opportunities for collaboration (Table 8). The AMP will seek opportunities for possible linkages with these, as appropriate.

Table 8: Related initiatives by development partners, donors or other role-players

Partner name	Related project scope
World Bank	The World Bank funded Network Reinforcement and Access Project (NRAP) was approved on 27 June 2019 and will run until 31 October 2024. The development objective of NRAP is to "Improve the reliability of electricity supply and increase access to electricity services in targeted areas of Eswatini". Within this larger scope, the NRAP includes support for off-grid electrification and PUE covering the whole country, as required. The primary focus for Shiselweni is on strengthening the transmission network in the region and also increasing access through grid extension (approximately 8,000 households), in line with the government rural electrification program in this area. The analytical support and capacity building component of NRAP has a national focus and will include enhancing electricity planning towards achieving universal access to energy.
EU GET.Invest/ ElectriFI agriculture supply chain initiative	This project aims to boost the sustainable and inclusive development of Eswatini's key agriculture value chains via RE and EE investments. The main value chains considered as key under this action include: sugarcane, horticulture and livestock. Expected outputs are: (i) Business environment is improved and duty bearers are supported to exert their roles to boost RE and EE investments. (ii) Increased investments in RE or EE projects in support of key agriculture value chains. Targeted investment projects include: Autonomous production projects based on renewable power generation (small and medium scale, on and off-grid); EE projects; and Independent power producer projects. The project is at an early stage and has not defined the approach and activities within this indicated framework. Market assessment studies will inform the implementation approach. Preliminary discussions noted likely synergies, but the details of collaboration will only be possible once implementation details are finalized.
Swazi Fair Trade Organisation (SWIFT)	SWIFT is a members-based organisation that provides economic empowerment with a primary focus on rural women in the handmade sector, including crafts and processing of agricultural produce. Their scope of activities include support for small businesses establishment, formalization and growth through hands-on training, mentoring and coaching, social programs, value chain development, marketing support, developing linkages to market and opening trade opportunities to regional and global networks. This initiative is unique to Eswatini and has been phenomenally successful since establishment in 2007.
IMBITA Self-Help Groups (SHGs)	IMBITA Swaziland Women's Finance Trust is a nonprofit organization registered under Section 21 in 1991. It was founded by a group of Swazi women to ameliorate constraints that were perceived to be responsible for trapping Swazis, particularly women, in the poverty cycle, thus resulting in slow economic advancement or no advancement at all. The major constraint addressed included the majority of entrepreneurs who start up income generating activities, but lack technical and financial support to ensure availability of resources for business growth and proper training to ensure forward planning. IMBITA provides a range of services, including entrepreneurial training, and establishment and coordination of self-help groups. SHGs are informal associations of low-income earners in a community with a common objective of working together for their economic, social, and political development. Typically made up of women from the same community with a similar socio-economic background, the groups aim to build financial resilience through savings, enable investment in small businesses and strengthen the position of women in society in order to improve their quality of life.
Southern African Centre for Renewable Energy and Energy Efficiency (SACREEE)	As part of SACREEE's overall scope to support clean energy development in the region, it aims to establish a coordinator to support Distributed Renewable Energy (DRE) for Productive Use for member states that includes Eswatini. It is expected to have this function in place during the first half of 2021 for a period of at least two years.

Partner name	Related project scope
Vukani Bomake Project	The project is spearheaded by Business Women Eswatini, aimed at capacitating women in rural areas to initiate and operate businesses. The project seeks to devolve the economy to Tinkhundla centres, supporting the growth and development of cottage industries in communities throughout the country.

A number of the abovementioned partners have provided letters of co-financing for this project, as attached in Annex 14 to this project document. As further described in Table 9 below, most of these co-financed activities correspond to funds not flowing through UNDP accounts and whose results are not included in the project results framework. In this case, UNDP is accountable to monitor the risk to realization of co-financing amounts and realization amounts annually in the GEF PIR, at mid-term and at terminal evaluation. Specifically, potential risks associated with co-financing that may affect the Project, including safeguards related risks that fall within the project context or area of influence, will be considered in safeguards due diligence and the project risk register and monitored accordingly. Risk management measures identified will be only those within the control of the UNDP project (e.g. managing reputational risk). See the ESMF (Annex 10) for more details on the management of risks related to the different types of co-financed activities in this project.

Table 9: List of co-financed activities not included as project results

Co-financing source	Co-financing type	Co-financing amount (USD)	Included in project results?	If yes, list the relevant outputs
Ministry of Natural Resources and Energy (MNRE)	In kind	8,234.16	No	N/A
Ministry of Natural Resources and Energy (MNRE)	Public Investment	Portion of 13,605,442.18 (to be confirmed at implementation stage)	Partially	Output 2.2
World Bank	Loan	154,053	No	N/A
UNDP	In kind	4,000,000	No	N/A
Eswatini Energy Regulatory Authority (ESERA)	In kind	381,411	No	N/A
Eswatini Energy Regulatory Authority (ESERA)	Public investment	59,088	NoYes	N/A
TOTAL		**To be confirmed**		

Key Risks

As described in the TOC, the AMP aims to help de-risk[50] the context for minigrid developments, thereby reducing the costs of system development, improving profitability, attracting private sector investment and commercial financing at scale, and in turn lowering the cost at which electricity can be supplied to consumers. For the AMP scope, a selection of interventions has been identified for creating an environment conducive to minigrid developments in Eswatini. The key risks that can threaten the achievement of these results through the chosen strategy are highlighted here (Table 10) with the complete risk register attached in Annex 7.

[50] Risks that potentially contribute to the cost of minigrid developments, span across energy market conditions, social acceptance, hardware, digital, labour, developers, end-user credit, financing, currency and sovereign risk.

Table 10: Risks

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
Strategic Risk		
Within the specific country context, minigrids may not provide a cost-effective solution for the 'last mile' electrification or may only do so for a small selection of sites. This will be particularly true if minigrids systems cannot be adequately scaled and have to compete with the average connection cost for grid extension[52]. If minigrids cannot reasonably contribute a least-cost electrification solution, it will compete for Government funding with other, more appropriate options. In this case, its contribution in the country may be small and may not attract private sector investment at scale.	Moderate (I = 2, L = 4)	The National Dialogue will be well-placed to assess the realistic contribution from minigrids, informed by the various knowledge resources[53] developed by the AMP project, as well as the country's own experience with pilots and the minigrid framework. With the formulation of the proposed Vision and Roadmap (Output 1.2), the appropriate application of minigrids in Eswatini can be articulated, drawing on the insights gained from AMP implementation. This roadmap will also enable discussions with the Ministry of Finance for appropriate funding allocations. A significant focus of the AMP interventions in Eswatini is to reduce the costs of future developments by creating an environment more conducive to minigrid development. With this emphasis, the AMP contribution should benefit future minigrid development irrespective of the details of the Vision and Roadmap.
The size of the market for minigrids in Eswatini may be too small to attract active private sector participation, substantive private sector investment and commercial financing at scale. Scalability is critical to achieve adequate cost reductions and commercial viability of minigrid operations.	Substantial (I = 4, L = 4)	Early assessment of the minigrid potential with mapping will allow an evaluation of the likely contribution of minigrids and the private sector role in the country. Experience gained with pilot projects will be relevant to any future minigrid developments, irrespective of market size or delivery model.
Limited experience with minigrids by all role players in Eswatini may limit the view on and perceived value of lessons and best practices from other countries, leading to a repeat of similar failures and lessons.	Substantial (I = 4, L = 4)	The National Dialogue and strong linkage with regional platform will facilitate proactive engagement with the established regional knowledge base. Capacity building interventions, drawing on experience and best practices from across the region, have been included for both public officials and minigrid developers. Component 3 has been structured to actively link between the regional and national projects and to capture and disseminate lessons learned, case studies, communication and training material at national level. Information sharing will also be facilitated by the establishment of a knowledge network or Community of Practice among potential industry participants.

[51] I = Impact; L = Likelihood

[52] e.g. for Sigcineni (Mvundla) to electrify 21 households using a minigrid, it cost around 3.2 million Emalangeni yet for grid extension 300 households on average are electrified at a cost of E7 million.

[53] Mapping data to identify suitable sites, minigrid framework, pilot project information, comparative costing and cost trends, regional project data and benchmarks.

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
Limited or no interest from the private sector to participate in minigrid projects in the format / roles / functions / capacities foreseen, may confine the rollout of minigrids in the country.	Substantial (I = 4, L = 3)	Engage private sector players in developing pilot project structures that are adequately attractive to attract interest in participation. Proof of concept business models to be used to demonstrate opportunities and recommend further amendments to encourage private sector participation. Community of practice created for private sector players to share knowledge and experience, to learn from each other as well as from national and regional experience. If needed, this experience coupled with the DREI may be used to inform a review of the policy direction and framework to further lower risks and barriers for implementation.
Political		
Failure to institute a coordinated policy position and response across country priorities and key government and energy role-players will (i) result in a suboptimal contribution to the developmental priorities for the country and (ii) complicate the environment for private sector role-players, discouraging participation in the sector and/or contribute to development costs.	Substantial (I = 5, L = 3)	The National Dialogue will facilitate an integrated response from government role-players across energy, environmental, economic and socio-economic development objectives.
Operational		
With commissioning planned during the first semester of 2021, it is assumed that consumption data for the Mvundla pilot project will be available to serve as a baseline for the pilot initiatives. This will be a key input parameter to accurately assess the impact of different interventions. This will also be important data to inform the type (e.g. equipment size and operating hours) of interventions suitable for the community. Baseline data is key to a meaningful pilot 'proof of concept' contribution.	Moderate (I = 3, L = 2)	It is suggested that an agreement be put in place between the Ministry and EEC during project inception phase to ensure data is collected and available for the AMP pilot.
The site in Ekubekezeleni, Bulimeni area, selected for the Energy Hub may not be suitable to a minigrid system anchored in PUEs as intended for the Energy Hub model. The priority focus of the AMP in Eswatini is on demonstrating alternative business models more likely to attract private sector investment. Accordingly, if this site cannot accommodate an Energy Hub with a strong PUE anchor, an alternate site will have to be identified. This will impact delivery timelines for the project and potentially also stakeholder relationships at the target site. This risk is highly likely considering the remote location, accessibility challenges and scattered distribution of a small number of households.	High (I = 5, L = 5)	The selected site is indicative of the typical minigrid electrification application in Eswatini and therefore of interest for the pilot. A number of PUE options have been identified that may be suited to the remote location and accessibility challenges. These potential PUEs include activities that do not rely on perishable produce and/or frequent transportation with strong linkages to markets, notably: Peanut butter production, Microwork Services and/or Egg Incubation. A (pre-)feasibility assessment will be critical and has been included in the workplan as an early implementation activity. If the site is not feasible, an alternative will have to be selected.
The community around the potential Energy Hub site in Ekubekezeleni, Bulimeni area, consists of 92 households, of which 30 are likely to be connected by the national grid. The remaining households may be served by a combination of off-grid solar	High (I = 5, L = 5)	Active stakeholder engagement will be critical to address perceptions regarding different service types and to address concerns regarding different tariffs (if any). Where possible, harmonized tariffs for households will likely be required.

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
and the minigrid, informed by the pre-feasibility study and geography. This will result in differentiated treatment of community members that may cause discontent.		
The COVID-19 pandemic is, at the time of writing, at a point of inflection. Variants and second/third waves of infections are emerging worldwide with concomitant reactions from authorities, ranging from mild restrictions on movement and curfews, to strict lockdowns and strict domestic travel restrictions. The most robust forms of restrictions could negatively impact activities requiring the physical presence of team members and stakeholders. At the pilot level, risks could relate to: - Supply chain delays or disruptions. Delays with importing or local availability of material and equipment due to reduced manufacturing capacity impacting planned delivery timelines. - Availability of construction teams. Increased absenteeism of resources due to sickness, the need to care for others, or restrictions on travel may impact project efficiency or progress. - Time and cost impact of COVID compliance. Project timelines may be delayed when scheduling around social distancing requirements and/or costs may increase to ensure compliance with COVID-19 guidance.	Moderate (I = 4, L = 2)	Scheduling of activities such as site development and on-site training that may require physical presence in certain localities has been front-loaded, allowing for a buffer in case the sanitary situation deteriorates to the point of preventing the swift realization of these activities. Online communication and teleconferencing options will be investigated and given preference to facilitate social distancing, where needed. Development at pilot sites will benefit from: - Performing a schedule assessment or time-impact analysis, including examining the status of material procurement on projects. Identifying most critical materials, equipment, products for procurement and engaging suppliers to prioritize and expose key vulnerabilities. - Identifying key resources and skills and possible alternatives in case of absences. - Prioritizing and facilitating vaccinations of workers if possible. - Assessing cost impacts of enhanced cleaning, reduced workforce, and other modifications. Assessing what services can be continued offsite to limit schedule delays.
Regulatory risk		
It is assumed that the minigrid framework will be in place when the AMP starts. This is an important milestone to create an enabling regulatory environment for private sector participation in minigrids. If not progressed as planned, regulatory uncertainty will present a hurdle for private sector involvement in the market.	Moderate (I = 3, L = 3)	ESERA has invited proposals for the development of the minigrid regulatory framework with a targeted completion date in the first half of 2021. Should this not be finalised as foreseen, the AMP should reassess its focus in consultation with the Project Board in the changed context. If deemed necessary, project resources can be reallocated (adaptive management). This may include providing technical assistance or other support to ESERA, if needed. Pilots and other activities that rely on the framework being in place, can be regulated by contract as a mitigation measure.
An iterative process has proven critical to shape the minigrid regulatory framework. Failure to adequately address key enabling issues (e.g. tariffs, subsidies, grid integration) and/or incorporate experiences from pilot projects, any other developments in the country, as well as industry feedback might limit the contribution from	Substantial (I = 4, L = 3)	The National Dialogue has been established to facilitate collaboration, knowledge sharing and allow a feedback loop from pilot initiatives to key role-players. Information and discussion at this forum will provide valuable opportunity to assess whether outcomes are being achieved and/or to identify opportunities for enhancement.

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
minigrids towards the targeted outcomes for the country.		The development of a shared vision and roadmap for minigrid development in the country will provide further guidance and clarity.
Organizational Risk		
Limited experience with GEF-funded projects in the energy sector in Eswatini may require additional implementation capacity to understand and meet all prescribed reporting and administrative requirements.	Substantial (I = 4, L = 3)	Implementing Partner capacity assessments have been conducted. MNRE and ESERA have committed resources, including recurrent expenditures, through co-financing and PMU. Both MNRE and ESERA will benefit from being part of a broader program and learning from other countries' experiences. The regional project will also provide training to project teams and Implementing Partners on monitoring and reporting requirements.
Cash budget available to fund dedicated PMU resources (Project Manager and Admin/Finance Assistant) is limited, relying heavily on co-financing from the Implementing Partner and/or responsible parties to fund or make available project staff. Without these staff, delivery of the project scope within the given timeframe will not be possible.	High (I = 5, L = 4)	The MNRE identified ESERA as responsible party to implement and manage the project delivery under the Ministry's oversight. As such, ESERA will supplement the available project management resources with the necessary resources to fulfill implementation requirements.
Financial		
If co-financing is not realized as anticipated, it will limit the contribution of the AMP and negatively impact GEF consideration of future projects.	Substantial (I = 5, L = 3)	Co-financing commitments from ESERA, EEC and MNRE have been confirmed and will be tracked on an annual basis. Co-financing confirmation from the World Bank and UNCDF for mapping is in place. Tracking and reporting of co-financing commitments will be done throughout project implementation. Additional co-financing and collaboration opportunities will be sought and leveraged during the implementation phase.
Social and Environmental (including climate)		
As an 'add on' to the EEC Mvundla pilot project, there is a risk that inadequate measures have been put in place to safeguard social and environmental impacts of the project or that safeguards are inconsistent with the requirements of the AMP and GEF.	Substantial (I = 5, L = 3)	It will be critical to ensure compliance of the overall project with the necessary social and environmental safeguards. Discussions with the EEC Environmental Officer and the Eswatini Environmental Authority (EEA) has provided preliminary assurance that the project has been subject to rigorous environmental assessment, consideration and planning and will be managed in accordance with commitments made under the authorization by the EEA. It is required that all documentation for this project be made available to the AMP, reviewed and elaborated, if necessary, to ensure safeguards meet UNDP and GEF requirements. If safeguards cannot meet the requirements of the UNDP and GEF, the pilot project should be abandoned, and resources allocated to the Energy Hub pilot project.
Irresponsible handling of battery waste at pilot projects and future developments may present a	Substantial (I = 5, L = 3)	The EEC pilot project was required to include a waste management plan for both battery and solar PV panel waste to obtain environmental

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
risk to the social and environmental sustainability of minigrids.		authorization. It is therefore an existing consideration of the EEA and focus of environmental impact assessment and authorization.
Minigrid system, structures and operation would be vulnerable to the climate hazards and risks associated with extreme and changing weather conditions.	Moderate (I = 4, L = 2)	Climate risk has been considered and mitigated into the planning, design, structure and operations of the pilot sites. Detail of the specific mitigation measures are included in Annex 17 of this document.
External environmental factors, for example the effects of climate change (such as the volume and quality of rainfall, rising temperatures, floods, droughts, violent winds, earthquakes, landslides, severe winds, or storm surges) could lead to delay or abandonment of the project.	Low (I = 4, L = 1) [54]	This is an external risk to the project that will be mitigated in the context of a variety of other third-party activities from the Government. Furthermore, external environmental factors likely to be a risk will be considered within this project as part of the feasibility/assessment studies established in the ESMF for each site, which will use conservative assumptions to successfully operate.
Potential negative environmental impacts resulting from the project, either routine or non-routine based, could lead to adverse local, regional, and/or transboundary impacts causing a delay or abandonment of it.	Moderate (I = 3, L = 3)	During project preparation, similar project activities have been visited and/or consulted by the team of experts to evaluate the risks. Principal environmental risks have been framed at this stage (Project Preparation Grant, PPG) and they will continue to be assessed along the entire project cycle for each chosen site. Based on that, a pertinent due diligence project development process, monitoring of operations, and active intervention are foreseen according to such environmental safeguards established in this project through the ESMF to ensure operation within the established parameters and in compliance with the applicable regulations.
External social factors, like for example political unrest, COVID persistence and other issues, could lead to delay, abandonment of the project or decrease the ability of people to pay for the services.	Moderate (I = 3, L = 3)	This is an external risk to the project that will be mitigated with a variety of other, third-party activities from the Government as per their national social agenda independent to the AMP. Furthermore, external social factors likely to be a risk will be considered within this project as part of the feasibility/assessment studies established in the ESMF for each site, which will use conservative assumptions to successfully operate.
Potential negative social impacts resulting from the project, either routine or non-routine based, could lead to adverse local, regional, and/or transboundary impacts causing a delay or abandonment of the project.	Moderate (I = 3, L = 3)	During project preparation, similar project activities have been visited and/or consulted by the team of experts to evaluate the risks. Principal social risks have been framed at this stage (Project Preparation Grant, PPG) and they will continue to be assessed along the entire project cycle for each chosen sites. Based on that, a pertinent due diligence project development process, monitoring of operations, and active intervention are foreseen according to such social

[54] Based on a World Bank assessment (https://climateknowledgeportal.worldbank.org/country/swaziland/vulnerability Eswatini is highly vulnerable to climate risks.

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
		safeguards established in this project through the ESMF to ensure operation within the established parameters and in compliance with the applicable regulations.
Potential negative impacts on the existing diesel generation supply chain and employment within the sector with the adoption of solar PV minigrids – both at national level and pilot sites.	Low (I = 2, L=2)	Current data (refer Annex 21) suggests that diesel use in the country is extremely limited, therefore confining the impact and risk of solar PV minigrids disrupting established industries and livelihoods. A baseline survey at the Mvundla pilot site confirmed that none of the community members were previously using diesel generators. The status quo and excess available RE capacity suggest there is no risk of the pilot beneficiaries reverting to diesel generation, the project being sabotaged by diesel generators or of current employment opportunities being impacted. A similar baseline assessment will be done for the greenfield pilot once a site selection has been finalized. A suitable response will be developed with any impacted parties identified. This will likely include a supported transition if relevant, capacity building within the target communities to optimally employ the available electricity for PUE and foster local economic development. Training will also cover the environmental benefits of utilising solar power, and the negative impacts of using environmentally harmful energy generation technologies such as diesel power. More generally, the project will work with the government of Eswatini and industry representative such as REAESWA to promote solar minigrids also as a viable and profitable means of income generation and business opportunity. The focus of such engagement will be on promoting job creation and highlighting the job opportunities in the renewable energy sector available to everyone, including those currently working with diesel generators.
Gender Equality and Inclusion		
Failure to identify, consult with, and tailor support services for women-led businesses in the PUE add-on or Energy Hub pilot will skew benefit incidence towards men. Design of financing solutions and platforms that do not compensate for female-specific challenges (e.g., related to property ownership) may inadvertently restrict women's participation in MG development.	Moderate (I=2, L=4)	Component 2 will account for male/female differences and gender norms, including tracking intermediate/instrumental participation indicators so as to promote gender balance in final outcomes through adaptive project management practices.

Description of risk (grouped by category)	Level of risk (I, L)[51]	Mitigation
Electricity provision may alter gender relations in households and communities, which though expected to contribute to female empowerment could also lead to widening gender disparities, male backlash, even in extreme cases gender-based violence.	Moderate (I=5, L=1)	Techniques of 'outcome harvesting[55],' whereby open-ended conversations are periodically held with beneficiaries will be used to probe for possible negative changes in gender relations. If discovered, the instance will be recorded in a grievance log and locally appropriate and ethical conflict resolution techniques will be initiated.

Stakeholder engagement and south-south cooperation: Stakeholder engagement activities are detailed in the attached plan (Annex 9). Stakeholder engagement will focus on (i) active engagement among key stakeholders and decision makers to develop the country's strategic direction as it relates to minigrids, (ii) awareness, knowledge sharing and capacity building among potential industry players and technical professionals, (iii) consultation, transparency and active engagement with communities where pilot projects will be implemented. Among all these stakeholders, the focus will be on inclusivity across gender, youth and vulnerable groups. All engagements will also strongly link with the AMP regional project, ensuring communication flow and information sharing among all AMP participating countries across the continent. The knowledge resources and/or products aggregated and developed at the regional project will be accessible to national project teams for cross country comparisons and to foster South-South learning. The AMP regional project in turn is already establishing interfaces with relevant platforms, associations and stakeholder communities across the continent and more broadly, including the Africa Minigrid Developers Association (AMDA), among many others.

In addition, to bring the voice of Eswatini to global and regional fora, the project will explore opportunities for meaningful participation in specific events where UNDP could support engagement with the global development discourse on minigrids. The project will furthermore provide opportunities for regional cooperation with countries that are implementing initiatives on minigrids in geopolitical, social and environmental contexts relevant to the proposed project in Eswatini.

Gender equality and Women's Empowerment: The Gender Analysis and Gender Action Plan is included in Annex 11. The gender analysis noted Eswatini as a patriarchal society with a dual (civil and customary) legal system, which has created a number of loopholes through which the duty to uphold equal rights can be abrogated. Landholding and house ownership remains highly skewed between men and women and only in 2019 was the practice of marital power, which effectively relegated married women to the legal status of minors, struck down. The minigrid project will be clear-eyed and realistic about the gender norms and inequities that exist, particularly with regard to family and domestic affairs, while striving to ensure inclusive participation in, and equitable benefit incidence from, the project.

The project will in particular build off the existing high degree of female activity in the rural micro- and small enterprise sector in order to support electricity-enabled commercial production and propel minigrid load growth, and ultimately financial viability. Existing microfinance, self-help, fair trade, and producer cooperative structures with predominantly female membership are active and will form the backbone of a local service delivery package specifically tailored to women that includes business, technical, empowerment training to support PUE connections and equipment uptake. The goal is for female-led endeavours to move closer to parity with male-led ones according to objective measures such as turnover, employment creation, and profitability as well as subjective ones such as confidence, agency, and autonomous decision-making.

In addition to directly supporting individual women and women's groups in the selected pilot areas, the project will also elevate the global visibility of women's electricity needs and potential through the inclusion of special GIS layers

[55] Outcome harvesting is an open-ended Monitoring and Evaluation (M&E) process that doesn't presuppose the interviewer has knowledge of what should be monitored or of the relative importance of various outcomes to participants. It can be used in combination with other forms of project (M&E) as well.

and variables in the country minigrid mapping exercise. Value chains and value addition steps where women are over-represented will be tagged as such, and the presence of complementary institutions, such as MFIs or co-ops, that could contribute to women's PUE development will be geo-referenced, permitting developers to select sites with high – but perhaps obscured – load potential and with a greater than average chance of achieving balanced gender impacts at the community level.

Finally, at every gathering of stakeholders, whether for community outreach and consultation or project steering, gender diversity and inclusion will be sought, compensating in particular for women's scheduling demands, mobility constraints, different levels of education, and any social discrimination linked to marital status, especially recent widowhood.

Aspects of gender have been embedded throughout the project, with the Gender Action Plan providing for specific actions to support all three components of the AMP in Eswatini.

Innovativeness, Sustainability and Potential for Scaling Up: The AMP in Eswatini has been designed very deliberately to build a knowledge platform (minigrid potential map, Output 1.1, Vision and Roadmap, Output 1.2, Training courses, Output 2.3) to support and benefit all future minigrid developments, including those that may service non-residential sectors. A significant focus of the AMP interventions in Eswatini is to reduce the costs of future developments by creating an environment more conducive to minigrid development. Output 1 has been structured to be embedded into the policy and planning for the country, contributing to the long-term context for minigrids.

The two pilot projects, introducing innovative business models, are intended as demonstration facilities to inform future system design and development. Feedback loops to the National Dialogue (Output 1.2), Capacity Building (Output 1.3 and 2.3) and the Community of Practice (Output 3.4) are intended to actively disseminate the learnings from the pilots to inform both the policy and regulatory environment as well technical capacity building.

The entire scope of Component 3 is focused on converting data, findings, lessons and case studies into useful resources for the benefit of future developments, both nationally and in the region.

The combined impact of better planning data, a clear line of sight on the intended contribution and role of minigrids in the country and rich knowledge resources that includes regional and country specific experience, is intended to create a springboard for minigrid developments in the country.

Embedding the PMU and project website with complete knowledge resources within ESERA and the training modules with CSER, with a view towards incorporating these as permanent offerings in the short course platform, it is intended to encourage institutionalization and sustainability also of these contributions beyond the four-year implementation period.

V. PROJECT RESULTS FRAMEWORK

This project will contribute to the following Sustainable Development Goal(s): *SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all and SDG 13. Take urgent action to combat climate change and its impacts. It will indirectly also contribute to SDG 3. Ensure healthy lives and promote well-being for all at all ages. SDG 5. Achieve gender equality and empower all women and girls. SDG 8. Promote sustained, inclusive and sustainable economic growth, full productive employment and decent work for all*				
This project will contribute to the following country outcome (UNSDCF): *Outcome 1: Promoting Sustainable and Inclusive Economic Growth. By 2025, women, men and youth, including marginalized persons, contribute to and benefit from economic progress, through greater access to decent employment, equitable social economic opportunities, sustainable enterprise opportunities as well as resilient, financially sustainable social protection systems. Outcome 4: Strengthening Natural Resource Management, Climate Resilience and Environmental Sustainability. By 2025, Eswatini is on an inclusive low-carbon development pathway that is resilient to climate change and in which natural resources are managed sustainably, and community adaptation to climate change is enhanced, for improved livelihoods, health and food security, especially for vulnerable and marginalized communities.*				
	Objective and Outcome Indicators **(no more than a total of 20 indicators)**	**Baseline**	**Mid-term Target**	**End of Project Target**
Project Objective: Supporting access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in RE minigrids in Eswatini with a focus on cost-reduction levers and innovative business models.	***Mandatory*** *GEF Core Indicators*: *Indicator 1:* **Greenhouse gas emissions mitigated (metric tons of carbon dioxide equivalent)** *(Units of measure: metric tons of CO_2e)*	Zero, since the project has not yet started	N/A	2,444 (direct) 18,000 (indirect)
	Mandatory *GEF Core Indicators:* *Indicator 2:* **Number of direct beneficiaries benefitting from energy access via minigrids, disaggregated by gender and by customer segment (residential, social, commercial/productive use), as co-benefit of GEF investment** *Units of measure: number of people; number of connections disaggregated by customer segment*	Zero, since the project has not yet started.	132 additional persons of whom at least 67 women	459 additional persons of whom 234 women --- 400 people (residential) 8 people (social) 51 people (commercial/PUE) 459 people (total) --- 80 connections (residential) 2 connections (social) 17 connections (commercial/PUE) 99 connections (total)
	Indicator 3: Increase in installed solar PV capacity (MW) and battery storage (MWh) *(Units of measure: Megawatt (MW) and Megawatt hour (MWh))*	Zero, since the project has not yet started	None.	0. 02 MW new capacity (dependent on available budget and community needs) Battery storage: 0.165 MWh
Project component 1	**Policy and Regulation**			
Project Outcome 1 Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are	*Indicator 4:* Suitable locations for minigrid development identified and published for the country *(Units of measure: binary (1/0))*	Sites suitable to minigrid development have not been identified. World Bank process for least cost electrification planning process initiated	First iteration of minigrid map overlays developed to help identify suitable minigrid sites.	Updated map of suitable minigrid sites published for the country.

adopted to facilitate investment in RE minigrids.		that will develop the base map.		
	Indicator 5: Number of policy derisking instruments for minigrid investments identified and endorsed by the national government *(Units of measure: Absolute number of policy derisking instruments)*	0 policy derisking instruments for RE minigrids investment (tariffs, customs, standards, financial incentives, etc.) identified and endorsed by the national government. Minigrid Regulatory Framework under development by ESERA (to be confirmed as baseline at inception).	1 new policy derisking instrument for RE minigrids investment (tariffs, customs, standards, financial incentives, etc.) identified and endorsed by the national government	2 new policy derisking instruments for RE minigrids investment (tariffs, customs, standards, financial incentives, etc.) identified and endorsed by the national govern
	Indicator 6: A minigrid delivery model and roadmap to enable minigrid development is endorsed/adopted through a consultative process involving key stakeholders (e.g. relevant ministries, local authorities, rural populations, private sector, media, etc.) *(Units of measure: binary (1/0))*	Technical Steering Committee being created as part of PPG phase	National Dialogue platform established and active. First DREI analysis concluded.	At least one preferred minigrid delivery model is identified and endorsed through the work of the multi-stakeholder platform and dialogue. Minigrid Roadmap adopted, informed by National Dialogue and DREI analysis
Outputs to achieve Outcome 1	Output 1.1: Geospatial, techno-economic modelling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems) Output 1.2: An inclusive national dialogue to identify minigrid delivery models, a vision and roadmap is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification. Output 1.3: Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models. Output 1.4: Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments and contribute to AMP Flagship Report on Cost Reduction			
Project component 2	**Business Model Innovation with Private Sector Engagement**			
Outcome 2 Innovative business models based on cost reduction operationalized, with strengthened private sector	*Indicator 7:* Number of minigrid pilots implemented that demonstrate a delivery model, cost-reduction measure(s) and/or productive use of electricity *(Units of measure: Absolute number of minigrid sites where pilots are implemented with project support)*	First 35 kWp minigrid system developed by public utility primarily for electrification of rural households.	One pilot demonstrating improved feasibility with PUE overlay	Two operational minigrids demonstrating a delivery model, cost-reduction measure(s) and/or productive use of electricity

participation in RE minigrid development.	*Indicator 8:* Capacity of minigrid developers and/or operators is enhanced to implement innovative business models and incorporate cost-reduction levers in minigrid projects *(Units of measure: binary (1/0))*	Four potential developers identified, and preliminary assessment done of minigrid experience. No capacity building done.	Information disseminated and awareness raised (2 out of a possible scale of 5)	Institutional/human capacity strengthened for potential developers (4 out of a possible scale of 5)
Outputs to achieve Outcome 2	Output 2.1: Expansion of public utility minigrid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of minigrid systems for rural households. Output 2.2: Greenfields pilot developed demonstrating productive uses use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids. Output 2.3: Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects.			
Project component 3	**Digital, Knowledge Management and Monitoring and Evaluation**			
Outcome 3 Digitalization and data mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefitting from linkages to international good practice	*Indicator 9*. A project digital strategy for the project is prepared and implemented by the PMU to contribute to project implementation and local minigrid market development *(Units of measure: binary (1/0))*	Data strategy not currently in place.	The project digital strategy is developed and being implemented. (1)Baseline data from EEC minigrid pilot project available.	The project digital strategy is implemented. (1) Recommendations for rolling out digital solutions for minigrids at national level have been shared with key national stakeholders. (1) Complete dataset for all outputs and measured data from pilot projects
	Indicator 10. Number of minigrid pilots sharing data on minigrid performance with the regional project and other stakeholders following best practices and guidance provided by the AMP Regional Project. *(Units of measure: binary (1/0))*	No pilot data currently available.	The project's 'digital & data management platform' is procured and operational, ready for data collection from the project's mini-grid pilot(s), and for data sharing with the AMP regional project's digital platform. (1) Pilot 1 sharing data	100% of the planned minigrid pilots, as identified in the project's Minigrid Pilot Plan, are collecting and sharing data with the AMP Regional Project using the project's 'digital & data management platform'. (1)
	Indicator 11. Comprehensive minigrid knowledge resources including complete dataset from pilot projects established *(Units of measure: binary (1/0))*	No formal minigrid knowledge resource in place.	All data available at this time captured and processed into knowledge resources.	Comprehensive country-specific knowledge resource with case studies, communications and training material.
	Indicator 12. Measurement, Reporting and Verification (MRV) framework linked to and compliant with regional project requirements.	No MRV framework in place.	MRV framework designed to meet at least regional project requirements. Indicators	MRV framework complete, up to date and submitted to regional project.

	(Units of measure: binary (1/0))		monitored and captured to specification.	
Outputs to achieve Outcome 3	Output 3.1: A Quality Assurance and Monitoring Framework for measuring, reporting and verification of the sustainable development impacts of all minigrids pilots supported, including GHG emission reductions, is adopted and operationalized based on standardized guidance from the regional project. Output 3.2: A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project. Output 3.3: Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction. Output 3.4: Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt. Output 3.5: Knowledge network established to promote minigrid development / rural energy access. Output 3.6: M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation			

VI. MONITORING AND EVALUATION (M&E) PLAN

The project results, corresponding indicators and mid-term and end-of-project targets in the project results framework will be monitored annually and evaluated periodically during project implementation. If baseline data for some of the results indicators is not yet available, it will be collected during the first year of project implementation. The Monitoring Plan included in Annex details the roles, responsibilities, and frequency of monitoring project results.

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the UNDP POPP and UNDP Evaluation Policy. The UNDP Country Office is responsible for ensuring full compliance with all UNDP project monitoring, quality assurance, risk management, and evaluation requirements.

Additional mandatory GEF-specific M&E requirements will be undertaken in accordance with the GEF Monitoring Policy and the GEF Evaluation Policy and other relevant GEF policies[56]. The costed M&E plan included below, and the Monitoring plan in Annex, will guide the GEF-specific M&E activities to be undertaken by this project.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report.

Finally, the project will have a number of M&E linkages to the AMP regional project. This is set out in Box 10, at the end of this section.

Additional GEF monitoring and reporting requirements:

Inception Workshop and Report: A project inception workshop will be held within 60 days of project CEO endorsement, with the aim to:

a. Familiarize key stakeholders with the detailed project strategy and discuss any changes that may have taken place in the overall context since the project idea was initially conceptualized that may influence its strategy and implementation.
b. Discuss the roles and responsibilities of the project team, including reporting lines, stakeholder engagement strategies and conflict resolution mechanisms.
c. Review the results framework and monitoring plan.
d. Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP and other stakeholders in project-level M&E.
e. Update and review responsibilities for monitoring project strategies, including the risk log; SESP report, Social and Environmental Management Framework and other safeguard requirements; project grievance mechanisms; gender strategy; knowledge management strategy, and other relevant management strategies.
f. Review financial reporting procedures and budget monitoring and other mandatory requirements and agree on the arrangements for the annual audit.
g. Plan and schedule Project Board meetings and finalize the first-year annual work plan. Finalize the TOR of the Project Board.
h. Formally launch the Project.

GEF Project Implementation Report (PIR):

[56] See https://www.thegef.org/gef/policies_guidelines

The annual GEF PIR covering the reporting period July (previous year) to June (current year) will be completed for each year of project implementation. Any environmental and social risks and related management plans will be monitored regularly, and progress will be reported in the PIR. The PIR submitted to the GEF will be shared with the Project Board. The quality rating of the previous year's PIR will be used to inform the preparation of the subsequent PIR.

GEF Core Indicators:
The GEF Core indicators included as Annex will be used to monitor global environmental benefits and will be updated for reporting to the GEF prior to the TE. Note that the project team is responsible for updating the indicator status. The updated monitoring data should be shared with TE consultants prior to required evaluation missions, so these can be used for subsequent groundtruthing. The methodologies to be used in data collection have been defined by the GEF and are available on the GEF website.

Terminal Evaluation (TE):
An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terms of reference, the evaluation process and the final TE report will follow the standard templates and guidance for GEF-financed projects available on the UNDP Evaluation Resource Center.

The evaluation will be 'independent, impartial and rigorous'. The evaluators that will be hired to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the evaluators should not be in a position where there may be the possibility of future contracts regarding the project being evaluated.

The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the BPPS/GEF Directorate.

The final TE report and TE TOR will be publicly available in English and posted on the UNDP ERC by 1 June 2025. A management response to the TE recommendations will be posted to the ERC within six weeks of the TE report's completion.

Final Report:
The project's terminal GEF PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the Project Board during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information:
To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy[57] and the GEF policy on public involvement[58].

[57] See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/
[58] See https://www.thegef.org/gef/policies_guidelines

Monitoring and Evaluation Plan and Budget: This M&E plan and budget provides a breakdown of costs for M&E activities to be led by the Project Management Unit during project implementation. These costs are included in Component 3 of the Results Framework and TBWP. For ease of reporting M&E costs, please include all costs reported in the M&E plan under the one technical component. The oversight and participation of the UNDP Country Office/Regional technical advisors/HQ Units are not included as these are covered by the GEF Fee.		
GEF M&E requirements	**Indicative costs (US$)**[59]	**Time frame**
Inception Workshop (assumed blended format, respecting social distancing guidelines)	3,000	Within 60 days of CEO endorsement of this project.
Inception Report	None[60]	Within 90 days of CEO endorsement of this project.
M&E of GEF core indicators and project results framework	12,000 (3,000 per year)[61]	Annually and at mid-point and closure.
GEF Project Implementation Report (PIR)	None[62]	Annually typically between June-August, starting after first year of implementation.
Monitoring of environmental and social risks, and corresponding management plans as relevant	None[63]	On-going.
Addressing environmental and social grievances	None[64]	
Monitoring of Gender Action Plan	None[65]	On-going.
Supervision missions	None	Annually.
Independent Mid-term Review (MTR)	N.A.	N.A.
Independent Terminal Evaluation (TE)	28,000	1 June 2025
TOTAL indicative COST	**43,000**[66]	Included under component 3, outputs 3.1 and 3.6 as relevant.

Interaction between the project and the AMP Regional Project**:** M&E is a key area of interface between the national project and the AMP regional Project. The latter can support the PMU Project to undertake planning, coordination, management, monitoring, evaluation and reporting. As such, details on these linkages are provided in **Error! Reference source not found.** below.

[59] Not including project team staff time
[60] To be prepared by PMU, with no additional costs
[61] Because the aim of the regional program is knowledge sharing between the participant countries, a critical focus is on data collection, monitoring and reporting. The development of a data strategy, data collection, analysis, monitoring and reporting are integral to the overall monitoring framework and therefore already covered under the budget for Output 3.4. Within the overall QAMF, this budget allocation is specific to monitoring of GEF core indicators (emissions and beneficiaries) and results framework indicators.
[62] Activities and costs included in the PMU, Country Office and Regional Technical Advisor functions.
[63] The ESMF has not identified specific indicators at this time, however socio-economic and environmental indicators have been incorporated under the data collection and overall monitoring framework and integrated under Output 3.4. A separate budget has therefore not been allocated.
[64] The SEP makes provision for a grievance mechanism
[65] Gender specific indicators have been incorporated into the indicators, data collection and overall monitoring framework and are therefore already covered under the budget for Output 3.4. Therefore, no additional budget allocation has been made.
[66] Within the 5% allowance for M&E when GEF project grant for project is up to USD 5 million

Box 10: Linkages to the AMP Regional Project - M&E

The project will share M&E information with the AMP Regional Project as follows:

- The project will provide on an annual basis (and to the extent feasible if requested on an ad-hoc basis) the following M&E information to the AMP regional project staff: (a) Standard reporting on all indicators in the results framework for aggregation and reporting to GEF (by the regional project) on the impacts of all participating national projects for the program as a whole; and (b) Reporting on any and all additional Key Performance Indicators (KPIs) adopted by the project under the common M&E framework.

The project will receive support and guidance from the AMP Regional Project for conducting M&E activities as follows:

- **Inception workshop**. The AMP Regional Project PMU will:
    a. Provide support to the project PMU to develop content and materials to facilitate project planning activities to be completed during and after the Inception Workshop. This includes but is not limited to support for the PMU to prepare and/or update 'key project planning instruments' such as the Total Budget and Work Plan, multi-year work plan, Annual Work Plan (AWP), Monitoring Plan, Risks Matrix, and Procurement Plan, among others.
    b. Participate either remotely or in-person in the Inception Workshop.
    c. Review and provide inputs to the Inception Report prior to submitting to UNDP.
- **Ongoing project monitoring**. The AMP Regional Project PMU will:
    a. Develop a 'common monitoring and evaluation (M&E) framework' against which GHG emission reductions and broader SDG impacts and program objectives can be measured, and work closely with national child projects to ensure operationalization and harmonization.
    b. Provide support to the project PMU for updating 'key project planning instruments' at least on an annual basis as required to comply with UNDP project monitoring, quality assurance, and risk management requirements, and ensure adequate project planning and adaptive management. This may entail developing common templates for 'key project planning instruments'.
    c. Review and provide feedback on reports submitted by the project PMU seeking to continuously improve the quality and ease of reporting by national projects.
    d. Aggregate M&E data from all national projects, including Results Framework and all additional Key Performance Indicators (KPIs) adopted by the project under the common M&E framework, and report back to GEF at the program level.
- **Evaluations (MTR and TE)**. The AMP Regional Project PMU will:
    a. Make available to national projects standardized terms of reference for MTR and TE as well as a roster of vetted evaluation consultants.
    b. Review and provide feedback on terms of reference and draft evaluation reports shared by the project PMU to ensure project-level evaluation will be undertaken in compliance with UNDP requirements.
    c. Make themselves available for interviews and consultation in the context of national project mid-term and terminal evaluations.

VII. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

Roles and responsibilities of the project's governance mechanism:

Implementing Partner: The Implementing Partner for this project is the **Ministry of Natural Resources and Energy** (MNRE) within the Government of the Kingdom of Eswatini.

The Implementing Partner is the entity to which the UNDP Administrator has entrusted the implementation of UNDP assistance specified in this signed project document along with the assumption of full responsibility and accountability for the effective use of UNDP resources and the delivery of outputs, as set forth in this document.

The Implementing Partner is responsible for executing this project. Specific tasks include:

- Project planning, coordination, management, monitoring, evaluation and reporting. This includes providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes and is aligned with national systems so that the data used and generated by the project supports national systems.
- Risk management as outlined in this Project Document;
- Procurement of goods and services, including human resources;
- Financial management, including overseeing financial expenditures against project budgets;
- Approving and signing the multiyear workplan;
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorization and certificate of expenditures.

A Project Management Unit (PMU) will be established within ESERA to lead the implementation of the AMP on behalf of the Implementing Partner. The PMU will coordinate delivery across all component of the project. The PMU should consist of a Project Manager and a Project Assistant, as appropriate. The scope of duties for these roles are available in Annex 8 to the Project Document.

Responsible Parties: The Implementing Partner may enter into a written agreement with other organizations, known as responsible parties, to provide goods and/or services to the project, carry out project activities and/or produce outputs using the project budget. Responsible parties are directly accountable to the Implementing Partner in accordance with the terms of their agreement or contract with the Implementing Partner. Any organization that is legally constituted and duly registered may become a responsible party including government agencies, NGOs, private firms, and academia.

Responsible parties have been identified to support the delivery of aspects of the project on behalf of the MNRE. Contracts will be placed with the responsible parties for the delivery of:

- Energy Regulatory Authority of Eswatini (ESERA) – Overall delivery and hosting of the PMU on behalf of the MNRE.
- United Nations Capital Development Fund (UNCDF) – Component 1, Intervention 1: Minigrid potential map.
- Eswatini Electricity Company (with support from the MCIT MSME Unit) – Component 2, Intervention 1: Sigcineni (Mvundla) productive use pilot project.

The legal instruments (contracts/agreements) to engage responsible parties are included in Annex 14 to this Project Document. Responsible parties should not serve on the Project Board to avoid conflict of interest.

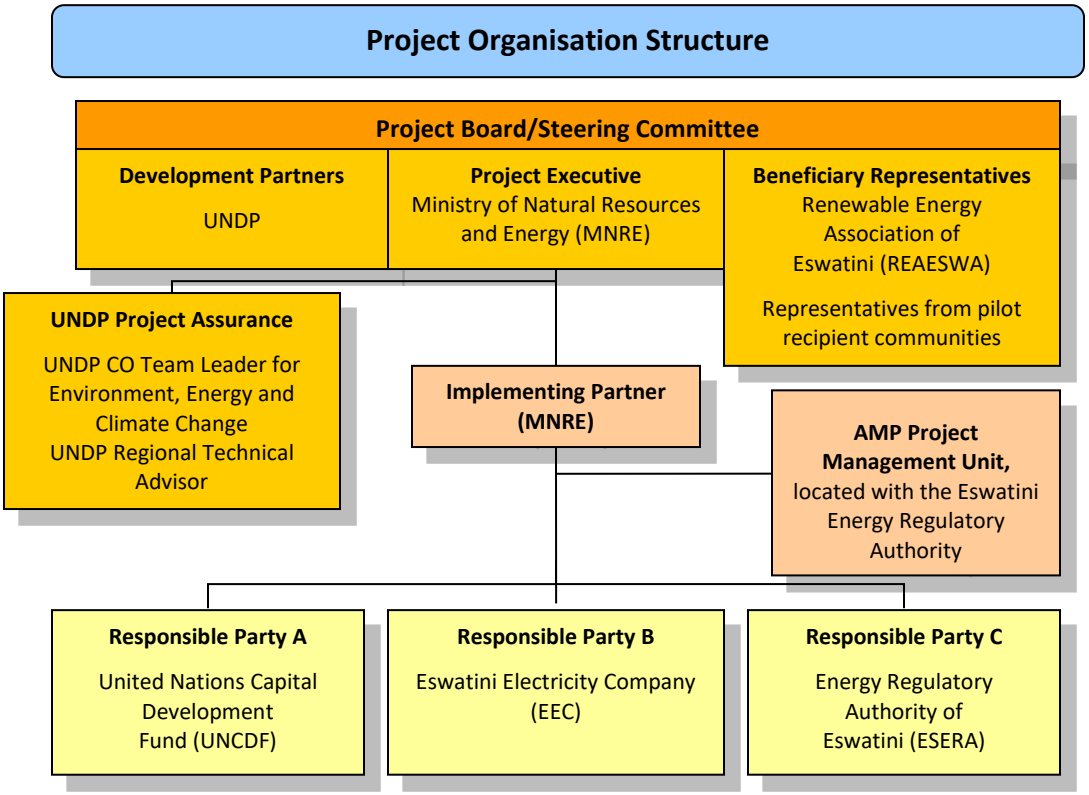
Project stakeholders and target groups:

All the people of Eswatini stand to benefit from accelerated investments in clean energy. All taxpayers and electricity users stand to benefit from more cost-effective ways to deliver clean energy to end users. More specifically, rural communities currently without access to electricity will benefit from solutions that will enable affordable, clean energy to be delivered to their communities. Very directly, the specific communities who will be the recipients of the pilot projects will benefit from access to clean energy and the multiple associated socio-economic benefits including opportunities for income generation. Both communities will be engaged in the design of the pilot initiatives and the selection of productive uses. Community representatives will be elected by the communities for participation on the Project Board. It is anticipated that active engagement of direct beneficiaries at pilot level will inform future developments in other communities.

The potential RE minigrid industry will also benefit from the investment in capacity building and the piloting of innovative business models that can guide future development and operation. With no active minigrid industry, REASWA, the Renewable Energy Association of Eswatini in the country will be engaged as industry representative and Project Board member.

UNDP: UNDP is accountable to the GEF for the implementation of this project. This includes oversight of project execution to ensure that the project is being carried out in accordance with agreed standards and provisions. UNDP is responsible for delivering GEF project cycle management services comprising project approval and start-up, project supervision and oversight, and project completion and evaluation. UNDP is also responsible for the Project Assurance role of the Project Board/Steering Committee.

Project organisation structure:



The Project Board (also called Project Steering Committee) is responsible for taking corrective action as needed to ensure the project achieves the desired results. In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.

In case consensus cannot be reached within the Board, the UNDP Resident Representative (or their designate) will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed.

Specific responsibilities of the Project Board include:

- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;

- Address project issues as raised by the project manager;
- Provide guidance on new project risks, and agree on possible mitigation and management actions to address specific risks;
- Agree on project manager's tolerances as required, within the parameters set by UNDP-GEF, and provide direction and advice for exceptional situations when the project manager's tolerances are exceeded;
- Advise on major and minor amendments to the project within the parameters set by UNDP-GEF;
- Ensure coordination between various donor and government-funded projects and programmes;
- Ensure coordination with various government agencies and their participation in project activities;
- Track and monitor co-financing for this project;
- Review the project progress, assess performance, and appraise the Annual Work Plan for the following year;
- Appraise the annual project implementation report, including the quality assessment rating report;
- Ensure commitment of human resources to support project implementation, arbitrating any issues within the project;
- Review combined delivery reports prior to certification by the Implementing Partner;
- Provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans;
- Address project-level grievances;
- Approve the project Inception Report, Mid-term Review and Terminal Evaluation reports and corresponding management responses;
- Review the final project report package during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.
- Ensure highest levels of transparency and take all measures to avoid any real or perceived conflicts of interest.
- Designate the 'beneficiary representative' of the project on the AMP Regional Project's Steering Committee/Project Board

The composition of the Project Board must include the following roles:

a. Project Executive: Is an individual who represents ownership of the project and chairs the Project Board. The Executive is normally the national counterpart for nationally implemented projects. The Project Executive is: Ministry of Natural Resources and Energy, Principal Secretary.

b. Beneficiary Representative(s): Individuals or groups representing the interests of those who will ultimately benefit from the project. Their primary function within the board is to ensure the realization of project results from the perspective of project beneficiaries. Often civil society representative(s) can fulfil this role. The Beneficiary representative (s) are: Nominated representative from the Renewable Energy Association of Eswatini (REAESWA) and elected representatives from the two pilot project recipient communities.

c. Development Partner(s): Individuals or groups representing the interests of the parties concerned that provide funding and/or technical expertise to the project. The Development Partner is: UNDP Resident Representative,.

d. Project Assurance: UNDP performs the quality assurance and supports the Project Board and Project Management Unit by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed, and conflict of interest issues are monitored and addressed. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. UNDP provides a three – tier oversight services involving the UNDP Country Offices and UNDP at regional and headquarters levels. Project assurance is totally independent of project execution.

Representation on the AMP Regional Project's board: The AMP national projects will be among the primary beneficiaries of regional project activities. As such and in line with established practice in similar global/regional

projects, a representative of the project will sit on the project board/steering committee of the AMP Regional Project in a role as 'beneficiary representative.' It is expected that all AMP Regional Project board meetings will be held virtually (i.e. not in-person) and that beneficiary representatives will participate in project board meetings via video-conference. The representative of the project on the AMP Regional Project board will be **from the Implementing Partner or ESERA as host of the AMP Project Management Unit**[67]. It is expected that the AMP regional project board will meet a maximum of twice per year.

Project extensions: The UNDP Resident Representative and the UNDP-GEF Executive Coordinator must approve all project extension requests. Note that all extensions incur costs and the GEF project budget cannot be increased. A single extension may be granted on an exceptional basis and only if the following conditions are met: one extension only for a project for a maximum of six months; the project management costs during the extension period must remain within the originally approved amount, and any increase in PMC costs will be covered by non-GEF resources; the UNDP Country Office oversight costs in excess of the CO's Agency fee specified in the DOA during the extension period must be covered by non-GEF resources.

VIII. FINANCIAL PLANNING AND MANAGEMENT

The total cost of the project is USD 20,287,470. This is financed through a GEF grant of USD 863,242 administered by UNDP, USD 50,000 in cash co-financing to be administered by UNDP, and additional support of USD 19,374,228. UNDP, as the GEF Implementing Agency, is responsible for the oversight of the GEF resources and the cash co-financing transferred to UNDP bank account only.

Confirmed Co-financing: The actual realization of project co-financing will be monitored during the terminal evaluation process and will be reported to the GEF. Note that all project activities included in the project results framework that will be delivered by co-financing partners (even if the funds do not pass through UNDP accounts) must comply with UNDP's social and environmental standards. Co-financing will be used for the following project activities/outputs:

Co-financing source	Co-financing type	Co-financing amount	Planned Co-financing Activities/Outputs	Risks	Risk Mitigation Measures
MNRE	In-kind	8,234	Staff time and use of vehicles in support of AMP implementation activities.	Limited staff availability	This commitment letter
MNRE	Public investment	13,605,442	Ministry's Rural Electrification Program that aims to provide electricity for households and businesses in rural areas.	Funding from this resource not available to the specific pilot project sites	Participation during development phase and Ministry (loan recipient) commitment to participating communities
World Bank[68]	Loan	154,053	Mapping of the potential areas for minigrid deployment in Eswatini	None foreseen	Funding already committed and approved by World Bank and allocation confirmed by MNRE

[67] This role will be additional to any role in their respective national project steering committee. It is recommended this role will be played by either the representative of the IP on the Eswatini project board or the project manager/project coordinator of the Eswatini project.

[68] World Bank loan is reflected in the co-finance letter from the MNRE

Co-financing source	Co-financing type	Co-financing amount	Planned Co-financing Activities/Outputs	Risks	Risk Mitigation Measures
ESERA	In-kind	381,411	Hosting and staffing of the Project Management Unit	Capacity challenges (e.g. unexpected resignations)	Commitment letter and the importance of off-grid and minigrids to the regulatory environment as an important staffing area.
ESERA	Public investment	59,088	Development of the Minigrid and Off-grid Regulatory Framework	None foreseen	Funding already committed and procurement process initiated.
EEC	Public investment	256,000	Development of the Mvundla Minigrid Pilot project i.e. basis for AMP PUE overlay pilot.	None foreseen	Infrastructure investment already committed for the development of the Mvundla minigrid.
UNDP	Cash	50,000	Funding of a portion of Output 1.4, DREI Analysis	None foreseen	N.A.
UNDP	In-kind	4,000,000	Primarily in support of Component 3	None foreseen	N.A.
UNCDF	In-kind	910,000	Data resource to inform mapping of potential areas for minigrid deployment in Eswatini	None foreseen	N.A.

Budget Revision and Tolerance: As per UNDP requirements outlined in the UNDP POPP, the project board will agree on a budget tolerance level for each plan under the overall annual work plan allowing the project manager to expend up to the tolerance level beyond the approved project budget amount for the year without requiring a revision from the Project Board.

Should the following deviations occur, the Project Manager/CTA and UNDP Country Office will seek the approval of the BPPS/GEF team to ensure accurate reporting to the GEF:
a) Budget re-allocations among components in the project budget with amounts involving 10% of the total project grant or more;
b) Introduction of new budget items that exceed 5% of original GEF allocation.

Any over expenditure incurred beyond the available GEF grant amount will be absorbed by non-GEF resources (e.g. UNDP TRAC or cash co-financing).

Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies. Audit cycle and process must be discussed during the Inception workshop. If the Implementing Partner is an UN Agency, the project will be audited according to that Agencies applicable audit policies.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP. All costs incurred to close the project must be included in the project closure budget and reported as final project commitments presented to the Project Board during the final project review. The only costs a project may incur following the final project review are those included in the project closure budget.

Operational completion: The project will be operationally completed when the last UNDP-financed inputs have been provided and the related activities have been completed. This includes the final clearance of the Terminal Evaluation Report (that will be available in English) and the corresponding management response, and the end-of-project review Project Board meeting. **Operational closure must happen with 3 months after posting the TE report to the**

UNDP ERC. The Implementing Partner through a Project Board decision will notify the UNDP Country Office when operational closure has been completed. At this time, the relevant parties will have already agreed and confirmed in writing on the arrangements for the disposal of any equipment that is still the property of UNDP.

Transfer or disposal of assets: In consultation with the Implementing Partner and other parties of the project, UNDP is responsible for deciding on the transfer or other disposal of assets. Transfer or disposal of assets is recommended to be reviewed and endorsed by the project board following UNDP rules and regulations. Assets may be transferred to the government for project activities managed by a national institution at any time during the life of a project. In all cases of transfer, a transfer document must be prepared and kept on file[69]. The transfer should be done before Project Management Unit complete their assignments.

Financial completion (closure): The project will be financially closed when the following conditions have been met: a) the project is operationally completed or has been cancelled; b) the Implementing Partner has reported all financial transactions to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).

The project will be financially completed **within 6 months of operational closure or after the date of cancellation**. Between operational and financial closure, the Implementing Partner will identify and settle all financial obligations and prepare a final expenditure report. The UNDP Country Office will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to the BPPS/GEF Unit for confirmation before the project will be financially closed in Atlas by the UNDP Country Office.

Refund to GEF: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the BPPS/GEF Directorate in New York. No action is required by the UNDP Country Office on the actual refund from UNDP project to the GEF Trustee.

[69] See https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Project%20Management_Closing.docx&action=default.

IX. TOTAL BUDGET AND WORK PLAN

Total Budget and Work Plan			
Atlas Award ID:	00134785	Atlas Output Project ID:	00126286
Atlas Proposal or Award Title:	Africa Minigrids Program		
Atlas Business Unit	SWZ10		
Atlas Primary Output Project Title	Africa Minigrids Program		
UNDP-GEF PIMS No.	6432		
Implementing Partner	Ministry of Natural Resources and Energy (MNRE)		

Atlas Activity (GEF Component)	**Atlas Implementing Agent (Responsible Party, IP or UNDP)**	**Atlas Fund ID**	**Donor Name**	**Atlas Budgetary Account Code**	**ATLAS Budget Account Description**	**Amount Year 2022 (USD)**	**Amount Year 2023 (USD)**	**Amount Year 2024 (USD)**	**Amount Year 2025 (USD)**	**Amount Year 2026 (USD)**	**Total (USD)**	***See Budget Note:***
COMPONENT 1: **Policy and Regulation** *(as per Table B of CEO endorsement request)*	**ESERA, UNCDF**	**62000**	**GEF**	71200	International Consultants	0	7,000	6,053	4,000	7,000	24,053	*1*
				71300	Local Consultants	0	0	0	0	25,000	25,000	*2*
				72100	Contractual Services-Companies	0	75,000	78,000	8,000	5,000	166,000	*3*
				71600	Travel	0	7,500	0	0	0	7,500	*4*
				75700	Training, Workshops and Confer	0	3,500	6,500	3,500	5,500	19,000	*5*
					sub-total GEF	**0**	**93,000**	**90,553**	**15,500**	**42,500**	**241,553**	
		4000	**UNDP**	71200	International Consultants		40,000	0	0	0	40,000	*6*
				71300	Local Consultants	0	10,000	0	0	0	10,000	*7*
					sub-total UNDP	**0**	**50,000**	**0**	**0**	**0**	**50,000**	
					Total Outcome 1	**0**	**143,000**	**90,553**	**15,500**	**42,500**	**291,553**	
COMPONENT 2:		**62000**	**GEF**	71200	International Consultants	0	5,000	15,000	2,000	1,405	23,405	*8*
				71300	Local Consultants	0	14000	7000	4000	4000	29,000	*9*

Business Model Innovation with Private Sector Engagement *(as per Table B of CEO endorsement request)*	**ESERA, EEC**			72100	Contractual Services-Companies	0	52,500	32,611	16,000	13,000	114,111	*10*
				72200	Equipment and Furniture	0	100,000	60,000	0	0	160,000	*11*
				71400	Contractual Services - Individ	0	10,000	5,000	0	0	15,000	*12*
				75700	Training, Workshops and Confer	0	5,000	5,000	5,000	5,000	20,000	*13*
					sub-total GEF	**0**	**186,500**	**124,611**	**27,000**	**23,405**	**361,516**	
					Total Outcome 2	**0**	**186,500**	**124,611**	**27,000**	**23,405**	**361,516**	
COMPONENT 3: **Digital, KM and M&E** *(as per Table B of CEO endorsement request)*	**ESERA**	**62000**	**GEF**	71200	International Consultants	0	3,000	3,000	3,000	31,000	40,000	*14*
				75700	Training, Workshops and Confer	3,000	0	0	0	0	3,000	*15*
					Total M&E Subcomponent	**3,000**	**3,000**	**3,000**	**3,000**	**31,000**	**43,000**	
				71200	International Consultants	0	3,000	0	0	0	3,000	*16*
				71300	Local Consultants	0	2,000	5,000	3,000	3,000	13,000	*17*
				72100	Contractual Services-Companies	4,000	41,200	9,600	9,600	9,797	74,197	*18*
				74200	Audio Visual&Print Prod Costs	0	1,500	2,000	2,000	2,000	7,500	*19*
				71600	Travel	0	4,000	4,000	4,000	8,000	20,000	*20*
				75700	Training, Workshops and Confer	0	9,000	4,000	4,000	4,000	21,000	*21*
					Total Digital and KM Subcomponent	**4,000**	**60,700**	**24,600**	**22,600**	**26,797**	**138,697**	
					Total Outcome 3	**7,000**	**63,700**	**27,600**	**25,600**	**57,797**	**181,697**	
Project Management Costs	**ESERA**	**62000**	**GEF**	71300	Local Consultants	2,476	18,000	18,000	18,000	14,000	70,476	*22*
				74100	Professional Services	0	2000	2000	2000	2000	8,000	*23*
					sub-total GEF	**2476**	**20000**	**20000**	**20000**	**16000**	**78,476**	
					Total Project Management	**2476**	**20000**	**20000**	**20000**	**16000**	**78,476**	
					SUB-TOTAL GEF	**9476**	**363,200**	**262,764**	**88,100**	**139,702**	**863,242**	

SUB-TOTAL UNDP	**0**	**50000**	**0**	**0**	**0**	**50,000**	
PROJECT TOTAL	**9476**	**413,200**	**262,764**	**88,100**	**139,702**	**913,242**	

Summary of funds (US Dollars)

	Amount Year 1[70]	Amount Year 2	Amount Year 3	Amount Year 4	Amount Year 5	Total
GEF grant administered by UNDP	9,477	363,200	262,764	88,100	139,701	863,242
UNDP	250,000	1,050,000	1,000,000	1,000,000	750,000	4,050,000
MNRE	850,340	3,403,419	3,403,419	3,403,419	2,552,566	13,613,676
World Bank	-	154,053	-	-	-	154,053
ESERA	59,088	95,353	95,353	95,353	95,352	440,499
EEC	256,000	-	-	-	-	256,000
UNCDF	-	910,000	-	-	-	910,000
TOTAL	1,424,905	5,976,025	4,761,536	4,586,872	3,537,619	20,287,470

Budget note number	**Comments**
1	International Consultants to be procured for the following services related to Component 1: - A gender specialist under Output 1.1 to support a gender-sensitive analysis of mapping data, assessment of potential opportunities for minigrid locations and assist in establishing a balanced portfolio of eventual sites. A budget allocation of USD 5,053 is made for gender related inputs during the initial mapping phase (year 1 and 2). [Total 5,053] - Under Output 1.2, National Dialogue, a provision of USD 2,000 per year has been made for Technical Assistance services. This is to secure access to expertise from the regional project on issues of policy, regulation, minigrid planning and identification of a delivery model, to be available to the National Dialogue. An additional USD 5,000 has been allowed in year 4 for input from the panel of experts into the formulation of various aspects of the Eswatini Minigrid Vision and Roadmap that is scheduled for development in this year. [Total 13,000] - Subject matter expertise (SME) for capacity building of specific interest to public officials and members of the National Dialogue under Output 1.3, with the aim to provide input into the tailoring of generic training/learning/knowledge material, sourced from the regional project, for Eswatini context. A provision of USD2,000 was made for years 2, 3 and 4 to access SMEs from the regional project panel of experts. [Total 6,000]

[70] Assuming start in the last quarter of 2021, Year 1 will correspond with the last three months of 2021 and Year 5 will correspond with the first nine months of the 2025 calendar year.

Budget note number	Comments
2	Provision of USD 25,000 is made for the procurement of local consulting services to develop the Eswatini Minigrid Vision and Roadmap with support from the regional project. Access to regional project support and/or technical assistance for this activity was costed separately under International Consultants (refer budget note 1).
3	Contractual services under Component 1 are foreseen to include: - Contracting with the UNCDF for the delivery of Output 1.1, including sourcing of data and developing of GIS-based mapping information to supplement grid expansion planning and facilitate the identification of areas suited to minigrids in Eswatini. The budget allocation for data sourcing, analysis for gender sensitive information and development of the GIS-based mapping information is costed at USD 149,000 over the first two years of implementation. In addition to gender sensitive analysis work included in this budget (USD 10,000), an additional provision is made for input from a gender specialist to support data analysis and interpretation (refer international consultants, Budget note 1). [Total 149,000] - Under Output 1.3, contracting of services (anticipated to be a technical consultancy, academic institution or learning academy with access to a suitable technical expert) to tailor universal or generic knowledge / training / learning material sourced from the regional project for relevance to the Eswatini context. Provision is made for an annual development cost of USD5,000 per year for the first 3 years and USD2,000 for the 4th year of implementation. An allowance is also made under International Consultants for service providers to access subject matter expertise from the regional project or alternatively to be sourced independently. [Total 17,000]
4	Provision for travel and logistics by the DREI consultants during study, data collection and dissemination events (budgeted atUSD7,500 consisting of two return flights at USD1,800, accommodation (8 nights at USD250 per night) and local car rental with driver at USD1,900 for 10 days) [Total USD7,500]
5	Training, Workshops and Conferences: - Provision for the organization, logistics and catering of one physical meeting of the National Dialogue per year over the 4-year project period (USD 1,500 per year). It is anticipated that other (quarterly) meetings will be held online. National Dialogue meetings can also be scheduled to precede or follow the annual, physical Project Board/Steering Committee meeting to share costs. [USD 6,000] - Provision of an additional USD 2,000 in the last year for workshop(s) to develop delivery models, vision and roadmap. - USD 2,000 allowed per year to host webinars and training events for capacity building (Output 1.3) [Total USD 8,000] - Dissemination event(s) for DREI findings USD 3,000
6	Procurement of services from a pre-qualified panel of service providers to develop the first full DREI techno-economic study for Eswatini including data analysis, drafting of report and dissemination of findings. [Total 40,000]
7	Procurement of services of a national service provider / consultant to support the DREI techno-economic study with data gathering and dissemination under guidance of the international consultant (refer budget note 6). [Total 10,000]
8	Under Component 2, International Consulting services are foreseen for: - The regional panel of experts to provide inputs on PUE overlay design, structure and business model of pilot 1. A provision of USD 3,000 has been allocated for each of the first two years to cover 7 to 8 days of expert review and design input into design aspects related to growing the PUE component, tariff design, innovations in the operating and business model. [Total 6,000] - Similarly, the regional panel of experts are expected to provide inputs on the Energy Hub design, structure and business model (pilot 2). USD 10,000 has been allocated to year 3 to cover 10 to 12 days of expert review and design input to the design and development of the Energy Hub, tariff structures and innovations in the operating and business model, as required. [Total 10,000]

Budget note number	Comments
	- Under technical assistance, Output 2.3, an allowance of USD 7,405 has been made for the procurement of services from international consultants (subject matter expertise) to provide input to the tailoring of generic training material, sourced from the regional project, for the Eswatini context. [Total 7,405]
9	National consultants have been planned to support the two pilot projects under Component 2 in terms of the socio-economic safeguards and ESMF assessment, data collection, monitoring and management requirements. For Pilot 1 (PUE overlay) the budget for national consultants is USD 10,000 over 4 years. For pilot 2, the estimated costs are USD 19,000 for 4 years. [Total USD 29,000]
10	Contractual services are planned under Component 2, to support the pilot projects. For pilot 1, the productive use overlay, these include: - Facilitation of stakeholder engagement, market research and data collection (through consultation, focus groups, surveys, etc.) to identify PUEs, electrical equipment and business development priorities and track socio-economic impacts with specific focus on inclusion of gender and youth. The cost for these services and continued provision over the AMP implementation period is budgeted at USD 20,000. [Total 20,000] - Design, development and operation of the PUE overlay pilot project. This is estimated separately at USD12,500, but is likely to be part of a single contract for the overall delivery of the PUE overlay development that will include equipment costs (refer Budget note 4). [Total 12,500] - Business development support in the form of training, mentoring, business registration and administration, provided to small businesses and cottage industries. This will be supplemental to the MTIC MSME unit training and mentoring commitment and is costed at USD 1,000 per year in year 3 and 4 of implementation. [Total 2,000] For pilot 2, the Energy Hub, these include: - Facilitation of stakeholder engagement, market research and data collection (using consultation, focus groups, surveys, etc.) to identify PUEs, electrical equipment and business development priorities and track socio-economic impacts with specific focus on inclusion of gender and youth. USD 15,611 is budgeted for these costs during the AMP implementation. [Total 15,611] - For the Energy Hub, the costs of design, development and operation of the Energy Hub pilot project is estimated at USD 30,000. As for pilot 1, this is likely to be part of a single contract for the overall delivery of the Energy Hub development. [Total 30,000] - Business development support to small businesses / cottage industries is also budgeted to supplement and support the training and mentoring commitment by the MTIC MSME unit. USD 1,000 is earmarked per year in years 3 and 4 of implementation. [Total 2,000] Capacity building under Output 2.3 focus on the development and offering of an accredited short course programme related to clean energy minigrids. Contractual services (anticipated to be a technical consultancy, academic institution or learning academy with access to a suitable technical expert) are expected to develop accredited training material (drawing on the regional project knowledge resources) for the Eswatini context. Provision is made for an annual development cost of USD 8,000 per year for the 4 years of implementation. An allowance is also made under International Consultants (refer Budget note 6) for service providers to access subject matter expertise from the regional project or alternatively source such inputs independently. [Total 32,000]
11	Procurement of equipment, electrical equipment/appliances for small businesses and households, additional metering infrastructure and extension of electrical connections and all ancillary works, as relevant. Equipment costs for Pilot 1 is budgeted at USD 25,000, with USD135,000 of the budget allocated for Pilot 2. The capital cost budget for Pilot 2 is based on a 20kWp solar PV battery minigrid system and the development of an energy hub of productive uses. [Total 160,000]
12	Procurement of contractual services – Individual, to support the implementation of the gender action plan for Component 2, including participation by women in design, consultation on priority PUEs, ownership and operating model, business development and training tailored to women. Budgeted at USD 15,000 to be spent during years the first two full years of implementation.
13	A provision of USD 5,000 per year has been made for a sponsorship of the inaugural training courses that will be offering the newly developed and introduced course material, to allow for subsidised (reduced fee or cost free) attendance by participants during the first 4 years with specific focus on inclusion of women and youth among the trainees. [Total USD 20,000]

Budget note number	Comments
14	***M&E sub-component***. Procurement of international consultants/service providers under Component 3 to deliver on: - Development and implementation of the monitoring framework with particular focus on M&E of indicators specific to the GEF core indicators and results framework. An annual provision of USD 3,000 over 4 years of implementation has been made for a service provider approved by the regional project. [Total 12,000] - Conducting an independent terminal evaluation of the project, budgeted at USD 28,000. This is below the recommended allocation, but dictated by the available cash budget for the project and the M&E cost cap. [Total 28,000]
15	**M&E sub-component**. Training, Workshops and Conferences: - Provision for the organization, logistics and catering for the inception workshop. A once off budget allocation of USD 3,000.
16	Procurement of international consultants/service providers under Component 3 to deliver on: - Technical Advisory support from the Regional Project to set up the monitoring, reporting and verification across all indicators to ensure data quality, integrity and compliance when integrated at program level. A once off provision of USD 3,000 is made for this purpose. [Total 3,000]
17	Procurement of a technical writer to develop lessons learnt under the guidance of the PMU and with inputs from the regional project. The budget estimate is based on the development of 2 to 4 case studies per year, with the actual number dependent on the extent of research and data analysis required to produce content. An additional allowance is made in the second year of implementation to develop a country insight brief in collaboration with the regional project [Total 13,000]
18	Contractual services under Component 3 are foreseen for: - Procurement of service provider to develop a project website (or webpage on MERA website) for ongoing publication of knowledge resources with counter of unique visits and registration system to track downloads. An initial development fee of USD 4,000 with annual maintenance support at USD 500. [Total 6,000] - Support for the development of a technical strategy in consultation with the regional project. [Total USD 10,000] - Establishment and tailoring of a digital platform for data collection (USD 10,000), tendering (USD 13,000), and annual licensing fees (USD 600 per year for 4 years). [Total USD 25,400] - Procurement of service provider (potentially academic institution) to conduct data and trend analysis, including consideration to gender and youth specific indicators, and develop case studies, knowledge resources and research publications for the pilot projects (estimated at USD 15,000 over 3 years). [Total USD 15,000] - Procurement of service provider to set up and maintain the Quality Assurance and Monitoring Framework in compliance with guidance provided from the regional project. Once off provision of USD 7,100, thereafter USD 500 per annum for 2 years and USD 696 in the final year allowing for any revisions required to house the data long term). [Total USD 8,796] - Service provider for data collection related to socio-economic, gender and youth impacts from pilot projects, estimated at USD 9,000 over 3 years. This should be read with the USD 12,000 allowed for International consultants to support the MRV. [Total USD 9,000]
19	Design and layout (packaging) of knowledge material for: - Case Study and/or lessons learnt developed into one or two page publications for online distribution and/or print. Budget allocation of USD 500 in the first year and USD 1,000 per year for 3 years. [USD 3,500] - Knowledge Network knowledge events for online distribution and/or print with a budget of USD1,000 per year for 4 years of implementation. [USD 4,000]
20	Travel and logistics include:

Budget note number	Comments
	- Costs for travel and logistics of nominated representative(s) to attend Community of Practice events hosted by the regional project. Costing is based on travel from Manzini, Eswatini to Istanbul, Turkey (flights ranging between USD840 and USD1300), accommodation for 4 days per year (quotes ranging between USD224 and USD1,350) and a daily allowance of USD100 per day. [USD 16,000] - Travel and logistic costs for independent, international consultants to conduct the terminal evaluation, estimated at USD4,000. [Total travel USD20,000]
21	Training, Workshops and Conferences: - Further provision for the organization of annual project board meetings over the 4-year project period. An annual allocation of USD 1,000 per year to host one physical meeting and/or to facilitate attendance by pilot project community representatives at online meetings, as necessary. Noting the cost savings potential if hosted alongside the annual physical meeting of the National Dialogue. [USD 4,000] - Procurement of services for organization of training and knowledge sharing events to facilitate the dissemination of knowledge and peer-to-peer knowledge sharing and networking among members of local community of practice. Provision is made for 3 events per year with a budget of USD 1,000 per event. Events may be conducted online or in person and may take different formats such as a workshop, training session or lecture, presentation of case study, clinic, site visit or webinar. [USD 12,000] - Capacity building for use of digital platform, USD 5,000. [Total USD21,000]
23	Contractual services – Individual, to serve as project and financial assistant to support the PMU. USD 18,000 per year with a pro rata allocation in Year 1 (last quarter of 2021 only) and a pro rata allocation in year 5 (first three quarters of 2025).
24	Annual audit costs allocated as UD 2,000 per year.

X. LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the Standard Basic Assistance Agreement between the Government of (country) and UNDP, signed in 1977. All references in the SBAA to "Implementing Partner" shall be deemed to refer to "Implementing Partner."

This project will be implemented by the Ministry of Natural Resources and Energy ("Implementing Partner") in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations or UNDP concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

XI. RISK MANAGEMENT

1. Consistent with the Article III of the SBAA, the responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. To this end, the Implementing Partner shall:
   a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
   b) assume all risks and liabilities related to the Implementing Partner's security, and the full implementation of the security plan.

2. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the Implementing Partner's obligations under this Project Document.

3. The Implementing Partner agrees to undertake all reasonable efforts to ensure that no UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml.

4. The Implementing Partner acknowledges and agrees that UNDP will not tolerate sexual harassment and sexual exploitation and abuse of anyone by the Implementing Partner, and each of its responsible parties, their respective sub-recipients and other entities involved in Project implementation, either as contractors or subcontractors and their personnel, and any individuals performing services for them under the Project Document.

   (a) In the implementation of the activities under this Project Document, the Implementing Partner, and each of its sub-parties referred to above, shall comply with the standards of conduct set forth in the Secretary General's Bulletin ST/SGB/2003/13 of 9 October 2003, concerning "Special measures for protection from sexual exploitation and sexual abuse" ("SEA").

(b) Moreover, and without limitation to the application of other regulations, rules, policies and procedures bearing upon the performance of the activities under this Project Document, in the implementation of activities, the Implementing Partner, and each of its sub-parties referred to above, shall not engage in any form of sexual harassment ("SH"). SH is defined as any unwelcome conduct of a sexual nature that might reasonably be expected or be perceived to cause offense or humiliation, when such conduct interferes with work, is made a condition of employment or creates an intimidating, hostile or offensive work environment.

5. a) In the performance of the activities under this Project Document, the Implementing Partner shall (with respect to its own activities), and shall require from its sub-parties referred to in paragraph 4 (with respect to their activities) that they, have minimum standards and procedures in place, or a plan to develop and/or improve such standards and procedures in order to be able to take effective preventive and investigative action. These should include: policies on sexual harassment and sexual exploitation and abuse; policies on whistleblowing/protection against retaliation; and complaints, disciplinary and investigative mechanisms. In line with this, the Implementing Partner will and will require that such sub-parties will take all appropriate measures to:

    i. Prevent its employees, agents or any other persons engaged to perform any services under this Project Document, from engaging in SH or SEA;

    ii. Offer employees and associated personnel training on prevention and response to SH and SEA, where the Implementing Partner and its sub-parties referred to in paragraph 4 have not put in place its own training regarding the prevention of SH and SEA, the Implementing Partner and its sub-parties may use the training material available at UNDP;

    iii. Report and monitor allegations of SH and SEA of which the Implementing Partner and its sub-parties referred to in paragraph 4 have been informed or have otherwise become aware, and status thereof;

    iv. Refer victims/survivors of SH and SEA to safe and confidential victim assistance; and

    v. Promptly and confidentially record and investigate any allegations credible enough to warrant an investigation of SH or SEA. The Implementing Partner shall advise UNDP of any such allegations received and investigations being conducted by itself or any of its sub-parties referred to in paragraph 4 with respect to their activities under the Project Document, and shall keep UNDP informed during the investigation by it or any of such sub-parties, to the extent that such notification (i) does not jeopardize the conduct of the investigation, including but not limited to the safety or security of persons, and/or (ii) is not in contravention of any laws applicable to it. Following the investigation, the Implementing Partner shall advise UNDP of any actions taken by it or any of the other entities further to the investigation.

    b) The Implementing Partner shall establish that it has complied with the foregoing, to the satisfaction of UNDP, when requested by UNDP or any party acting on its behalf to provide such confirmation. Failure of the Implementing Partner, and each of its sub-parties referred to in paragraph 4, to comply of the foregoing, as determined by UNDP, shall be considered grounds for suspension or termination of the Project.

6. Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (http://www.undp.org/ses) and related Accountability Mechanism (http://www.undp.org/secu-srm).

7. The Implementing Partner shall: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project

or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.

8. All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

9. The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors and sub-recipients in implementing the project or using UNDP funds. The Implementing Partner will ensure that its financial management, anti-corruption and anti-fraud policies are in place and enforced for all funding received from or through UNDP.

10. The requirements of the following documents, then in force at the time of signature of the Project Document, apply to the Implementing Partner: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. The Implementing Partner agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.

11. In the event that an investigation is required, UNDP has the obligation to conduct investigations relating to any aspect of UNDP projects and programmes in accordance with UNDP's regulations, rules, policies and procedures. The Implementing Partner shall provide its full cooperation, including making available personnel, relevant documentation, and granting access to the Implementing Partner's (and its consultants', responsible parties', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with the Implementing Partner to find a solution.

12. The signatories to this Project Document will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

    Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

13. UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the Implementing Partner under this or any other agreement. Recovery of such amount by UNDP shall not diminish or curtail the Implementing Partner's obligations under this Project Document.

    Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

    Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

14. Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

15. Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

16. The Implementing Partner shall ensure that all of its obligations set forth under this section entitled "Risk Management" are passed on to each responsible party, subcontractor and sub-recipient and that all the clauses under this section entitled "Risk Management Standard Clauses" are included, *mutatis mutandis*, in all sub-contracts or sub-agreements entered into further to this Project Document.

XII. MANDATORY ANNEXES

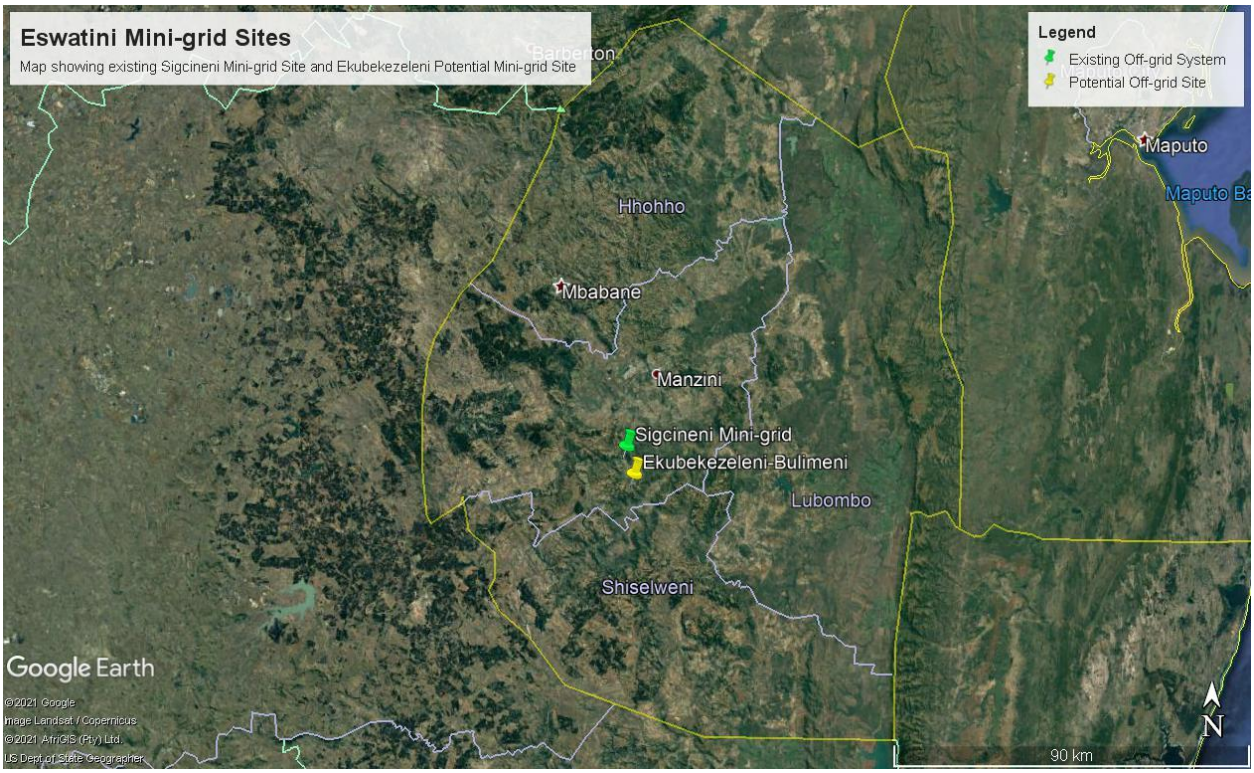
Annex 1: GEF Budget Template

Annex 2: GEF execution support letter

Not Applicable.

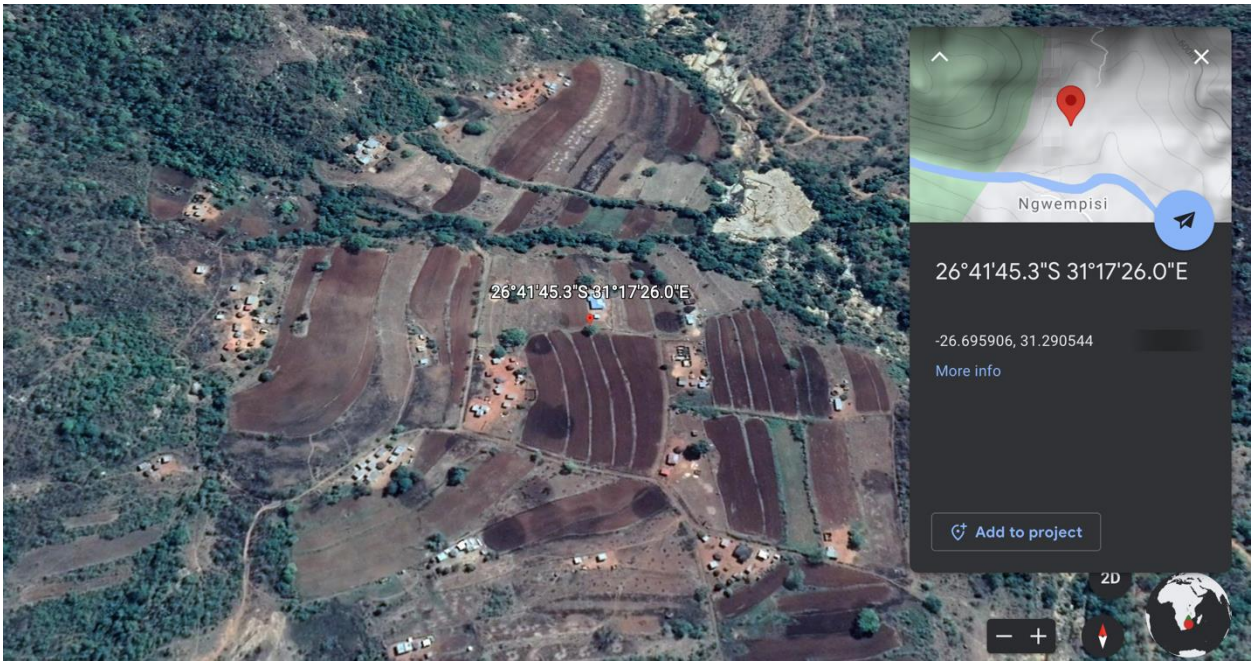
Annex 3: Project map and Geospatial Coordinates of project sites

Two project sites are identified for the pilot projects under Component 2, Output 2.1 and 2.2 and their geographic location relative to each other and the country borders in the map below.



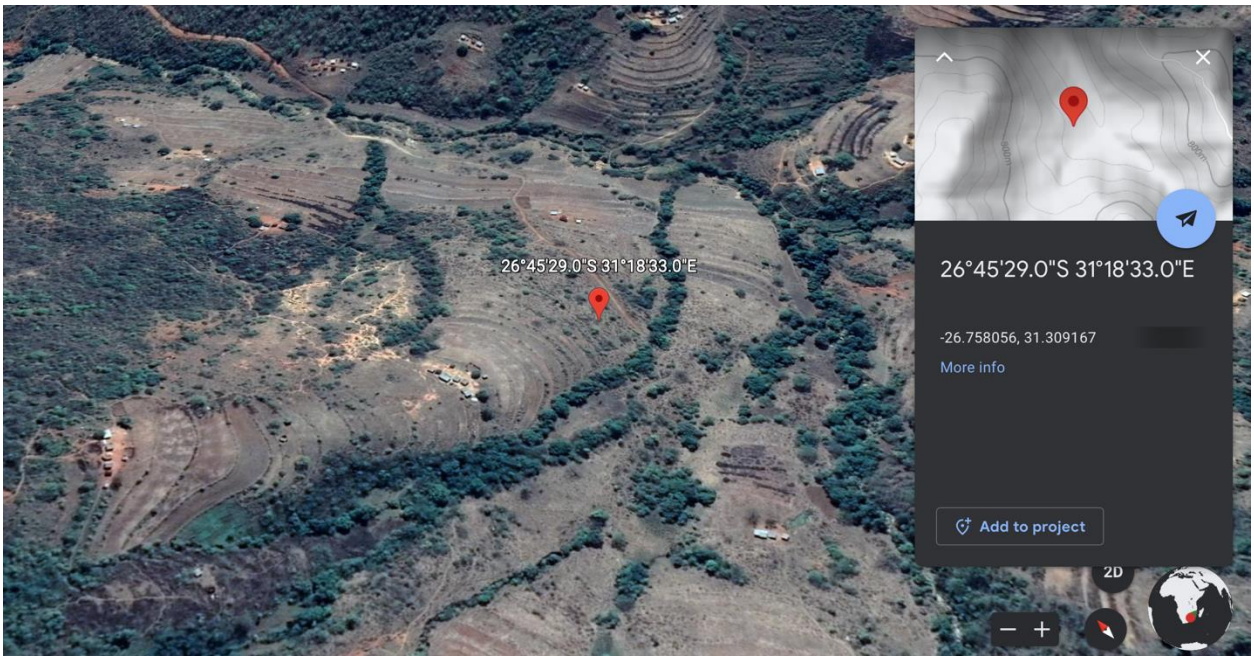
Pilot site 1: Sigcineni (Mvundla)

The village is isolated by the Ngwempisi river and accessible only by footbridge (no road access) with GPS coordinates: 26°41’45.26” S, 31°17’25.96” E, elevation 461m.



Pilot site 2: Energy Hub, Ekubekezeleni, Bulimeni area

The proposed pilot site is located at the following GPS coordinates: 26°45’29” S; 31°18’33” E, elevation 939m.



Annex 4: Multi Year Work Plan

Years 1 and 2 Workplan

Table 11: Workplan (years 1 and 2)

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1	Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate investment in RE minigrids.	1.1 Minigrid potential for the country mapped incorporating a value chain analysis, productive uses, MSME activity and mobile network coverage.	Agreement with Responsible Party in place (UN Agency to Agency). Identify additional co-financing opportunities for value chain analysis. Establish data/mapping workgroup with key government stakeholders, WB and any other development partners. Workplan and delivery timelines agreed to meet final output by latest Q4 of year 2.	Kick of meeting for mapping working group. Set workgroup meeting schedule for oversight and steering of activities. Establish data integration approach and protocols for data collection, handling, maintenance, and updates, ensuring integration across existing (including WB least cost electrification mapping project) and future datasets. Available data assessed for gender specific information.	Working group meeting (as per schedule). Productive uses, MSME and any available gender data translated to GIS. Availability of mobile network data confirmed (or funding reallocated to value chain analysis)	Working group meeting (as per schedule). Review and expand data protocol / manual for data collection, maintenance, updates, as needed. Commission value chain analysis in collaboration with MTIC and Ministry of Agriculture (funding dependent).	Working group meeting (as per schedule).	Working group meeting (as per schedule). Overlays produced and analysed to indicate / rank potential locations.	Working group meeting (as per schedule).	Working group meeting (as per schedule). Minigrid potential for the country mapped. Accompanying paper / publication highlighting sites with significant potential to energize productive uses and value addition.
		1.2 An active National Dialogue established	Draft mandate, charter and scope of	Key stakeholders	Workplan defined to meet	Meeting / knowledge event.	Confirm year workplan and meeting schedule	Knowledge event / Community of Practice	Knowledge event / Community of Practice	Assess findings of of Mvundla (near Sigcineni)pilot

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		among minigrid policy role-players in Eswatini with strong link to AMP regional project knowledge platform to formulate a national minigrid vision and roadmap.	National Dialogue forum	identified and invited. Representatives for participating organizations nominated / appointed. Inaugural meeting held. Charter, mandate and scope refined and adopted. Meeting calendar (frequency and dates) agreed.	required outputs. Nomination and appointment of participants in the regional Community of Practice. First knowledge event hosted: Overview of minigrid status global, regional, national (including overview of EEC pilot and minigrid regulatory framework)	Workstreams established to meet targeted outputs. Inform capacity building needs for Output 1.3	(including workstreams as relevant)	knowledge sharing update Activities as per workplan Meetings as per meeting schedule	knowledge sharing update Activities as per workplan Meetings as per meeting schedule	project, minigrid potential mapping data, as available. Activities as per workplan Meetings as per meeting schedule Workstream specific updates or position papers produced, as relevant Inform capacity building needs for Output 1.3
		1.3 Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.	-	Initial training schedule planned in consultation with regional program. Training material tailored for Eswatini needs (with support from regional project).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Plan training schedule for year 2, with guidance from the National Dialogue direction (as available). Training summary for the year for M&E and TE purposes.	Additional training material tailored for Eswatini needs (with support from regional project).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Training summary for the year for M&E and TE purposes. Plan training schedule for year 3, with guidance from the National Dialogue direction (as available).
		1.4 Minigrid DREI techno-economic	-	Procure international and national	Initiate DREI interviews, data gathering and	Completion of full quantitative DREI analysis	Continuation of dissemination events e.g.	-	-	-

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		analyses carried out to propose most cost-effective basket of policy and financial derisking instruments.		consultants for the DREI quantitative assessment. Complete TORs and other support available from the regional project. International consultant to be selected from a pool of pre-qualified DREI practitioners. National Consultant recruited directly at national level.	analysis with support from the DREI Core team at regional level.	and delivery of complete set of standard outputs (as described for Output 1.4) with recommended derisking measures necessary to advance the market Presentation of findings DREI results to the National Dialogue (output 1.2) and other identified stakeholders in a series of 3 – 4 dissemination events e.g. workshops or round tables.	workshops or round tables, as required.			
Component 2	Innovative business models based on cost reduction operationalized, with strengthened private sector participation in RE minigrid	2.1 Expansion of public utility minigrid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development	Agreement with Responsible Party in place. Confirm data availability and sharing for baseline and monitoring. Review and analyse baseline data for existing pilot. Review Social and	If needed, appoint service provider to support stakeholder engagement process. Stakeholder engagement and needs assessment to identify most appropriate / relevant PUEs.	Develop TOR and issue request for proposals (RFP) for PUE add on pilot. Appoint service provider(s) for: 1. Construction / development (e.g. small business premises / facilities, equipment,	Construction and development.	Construction and development. Training and business development support.	Commissioning. Training and business development support.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Continued business development support.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis. Review of grid utilization to identify any additional development

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	developmen t.	, to demonstrate opportunitie s for improved feasibility of minigrid systems for rural households.	Environmental Safeguards status against plan and identify any additional requirements. Establish project team with EEC, MNRE, ESERA, MTIC MSME Unit, etc, Project Steering committee (SteerCo) to define joint approach to PUE support and development.	Ensure inclusion & prioritization of women in stakeholder process, prioritization and ownership of PUEs. Investigate additional funding, if any becomes relevant to the detail design (e.g. UNICEF, Microprojects, other). Project meetings as required.	appliances, electricity connections, metering infrastructure, etc.), and 2. Operation (revenue collection, O&M, etc.) MSME Unit to assess business development & training needs for identified businesses / productive uses / business owners.					and support required. Identify any additional opportunities to improve grid utilization and revenue. Develop case study with recommendatio ns. Stakeholder engagement plan and impact monitoring. Feedback to National Dialogue.
		2.2 Greenfields pilot developed demonstrati ng productive uses use/innovati ve appliances and modular hardware/sy stem design, leading to cost-reduction in minigrids.	Develop a top-level action plan for advancing the pilot(s). The plan will be focused on the baseline, resources (human, financial), partners, activities and key questions to be answered. Note this plan is not intended to answer all the question.	Develop project concept note with input from technical assistance available at regional project. Establish project team with EEC, MoE, ESERA, MTIC MSME Unit, MPP Unit, and any other key stakeholders as relevant. Preliminary feasibility	Submit project details to Eswatini Environment Authority for consideration and classification. Initiate procurement process using digital platform (refer Output 2.2). - The PMU will work with the selected vendor to set-up and	Establish project steering committee (SteerCo) to guide integrated pilot development with representation from the local community. If required, appoint service provider to support stakeholder engagement process.	Initiate social and environmental safeguards process in accordance with EEA and UNDP guidelines. (continued from previous quarter) Follow minigrid Regulatory framework process for all licensing, design, tariff	Construction and development.	Construction and development. MSME Unit to assess business development & training needs for identified businesses / productive uses / business owners.	Commissioning. Training and business development support.

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
			Incorporate findings from baseline data from Mvundla (near Sigcineni) in project design.	assessment of the selected site for suitability to an Energy Hub solution. Design of tender process for pilots using a digital platform, including capacity building of IP, PMU and developers. Determine approach/specifications/ selection criteria for tender for the pilots, including, but not limited to, approach for proposed delivery model, site selection, tariffs, methodology for determining level of GEF support/subsidy, system specifications and service offer, environmental and social safeguards, gender requirements,	customize the digital platform based on the specific needs of the tender. Execution of tender process. - Tender will be launched and run according to the design. - Submissions will be competitively assessed against evaluation criteria (technical, financial).	Conduct Stakeholder Engagement and Needs Assessment to identify most appropriate / relevant PUEs, electrical equipment. Ensure inclusion & prioritization of women in stakeholder process, prioritization and ownership of PUEs. Identify participating households for electrification. Follow minigrid Regulatory Framework process for all licensing, design, tariff design, etc. requirements.	design, etc. requirements. Incorporate findings from Mvundla near Sigcineni PUE add on project to further refine project design. Appoint service provider(s) for project components.			

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
				disposal of e-waste, co-financing requirements, etc. Investigate additional funding, if relevant to detail design (e.g. UNICEF, Microprojects, other).						
		2.3 Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects.	-	-	Assess suitability of using the Centre for Sustainable Energy Research (CSER)'s short course platform to house training. Establish agreement with CSER (or other suitable training institution) (i) to cap costs and accreditation fees in exchange for course material, (ii) for a continued MG curriculum post AMP. Identify initial training priorities and modules, with	Develop a training schedule. Develop training material and modules in partnership with the CSER and/or other identified stakeholders.	Training of first modules. Continued development of further modules. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups.	Training of first modules (continued). Continued development of further modules. Track attendance including representation of gender, youth, other vulnerable groups.	Add additional modules to training schedule. Continued development of further modules. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups.	Training as per schedule. Use findings from first pilot and stakeholder feedback to enhance or supplement existing modules. Identify further training needs, develop training schedule for next year. Track attendance including representation of gender, youth, other vulnerable groups. Training summary for

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
					input from industry stakeholders and regional project.					the year for M&E and TE purposes.
Component 3	Digitalization and data mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefitting from linkages to international good practice	3.1 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 based on standardized guidance from the regional project	With guidance from the regional project, develop a data strategy incorporating all Quality Assurance and Monitoring, Reporting and Verification requirements.	Implement data strategy and maintain data repository.	Implement data strategy and maintain data repository.	Implement data strategy and maintain data repository. Upload data resource to regional project.	Implement data strategy and maintain data repository.	Implement data strategy and maintain data repository.	Implement data strategy and maintain data repository.	Implement data strategy and maintain data repository. Upload data resource to regional project.

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		3.2 A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project.	With guidance from the regional project, define / scope a digital strategy for the project. Identify a Government champion and host for the central database. Establish memorandum of understanding / charter for hosting, maintenance and sharing of data once aggregated/ anonymized. Define access protocols for categories of stakeholders.	-	-	-	-	-	-	-
		3.3 Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and	Procure digital platform to meet generic specifications	Implement digital platform in support of the digital strategy. Conduct necessary capacity building and user training of key stakeholders,	Establish data collection interface with 1st pilot. Collect data from pilot site(s); Support procurement for pilots;	Collect data from pilot site(s); Support procurement for pilots;	Collect data from pilot site(s); Support procurement for pilots;	Collect data from pilot site(s); Support procurement for pilots;	Collect data from pilot site(s); Support procurement for pilots;	Extend data collection interface to 2nd pilot. Collect data from pilot site(s); Support procurement for pilots;

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		cost-reduction		including the public focal point.						
		3.4: Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt at national and regional level.	(i) Link with Regional Communities of Practice. -	Project Steering Committee / National Dialogue to to nominate representative(s) from key institution(s) to participate in CoP. Identify meeting dates (at least twice a year) for feedback and updates on progress from CoP. Identify preferred format for larger knowledge sharing events e.g. workshops, clinics, lectures or webinars to coincide with sharing of findings or outputs from the COP and/or technical cohorts.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s).	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s)	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s).

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
			(ii) Lessons learned. Establish interface with regional project. Establish Project website to host all knowledge resources[71] Ensure the following are included on the website: 1. Registration system to identify users, track number of downloads and enable survey of users to obtain feedback, gauge value of material published and identify further topics of interest. 2. Details of project contacts and grievance mechanism as per SEP (Annex 9).	-	With consideration of data, regional project guidance, gender and stakeholder inputs, identify priority topics of interest to Minigrid development and operations in Eswatini. Define a development schedule for the year. Develop case study using baseline data of EEC Mvundla neat Sigcineni pilot project to describe baseline conditions and impact of electricity infrastructure without PUE. Include gender and youth specific analysis. Share with National	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other channels as relevant.	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other channels as relevant. Data from first pilot project analyzed and shared and learnings packaged into case studies, communication and training material made available online to support future developments	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other channels as relevant.	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other channels as relevant.	Assess approach and value of developed material. Identify next tier of topics with input from stakeholders. Define a development schedule for the next year. Analyze data from digital platform for daily, seasonal and growth trends, impacts on customer types and end-uses, inflection points, comparative assessments, etc. Draw information from the analysis to develop a case study post PUE overlay or addition to assess / describe impact of PUE on baseline conditions and

[71] Published knowledge resources to include lessons, all publications and material emanating from studies, data analysis, details and proceedings from training, workshops, events.

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
					Dialogue and other stakeholders including regional project.					identify further opportunities. Include for youth, gender in data collection and analysis. Share with National Dialogue, industry and other stakeholders including regional project.

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		3.5 Knowledge Network established to promote MG development / rural energy access	-	-	-	Establish Knowledge Network among active and interested industry role-players. Identify preferred communication or information sharing channels. Identify a framework of topics of interest from within the community. Develop a corresponding schedule of knowledge events and training workshops/webinars[72] (align where possible with planned regional events).	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Review / assess implementation year. Refine approach, structure, format as relevant. Invite stakeholder input to inform planning. Develop schedule for next year. Based on participation, develop and implement strategy for broader inclusion and networking. Report attendance numbers for the year for M&E and TE purposes.

[72] Events may be conducted online or in person and may take different formats such as a workshop, training session or lecture, presentation of case study, clinic, site visit or webinar.

Comp.	Outcomes	Outputs	Year 1				Year 2			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		3.6: M&E and Reporting including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, and (iii) Terminal Evaluation	Inception Workshop conducted, and Inception Report submitted to UNDP Overall Project Board / Steering Committee established. Define calendar / schedule of meetings.	-	Project Board / Steering Committee meeting (anticipated, but dependent on schedule)	Annual PIR for the year completed at end June of current year. (Note. Quarters dependent on alignment with months, but expected to be Q4 of year 1)	Project Board / Steering Committee meeting, review of PIR. Assess any project changes (if needed) and implement adaptive management if required.	-	Project Board / Steering Committee meeting (proposed) Develop TOR and procure independent consultant for Mid Term Review (MTR).	Annual PIR for the year completed at end June of current year. (Note. Quarters dependent on alignment with months, but expected to be Q4 of year 2)

Years 3 and 4 Workplan

Table 12: Workplan continued (years 3 and 4)

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1	Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate investment in RE minigrids.	1.1 Minigrid potential for the country mapped incorporating a value chain analysis, productive uses, MSME activity and mobile network coverage.	Updates of mapping data as relevant / if applicable.	-	-	-	Updates of mapping data as relevant / if applicable.	-	-	-
		1.2 An active National Dialogue	Review findings from Mvundla near Sigcineni	Knowledge event / Community of	Knowledge event / Community of	Assess outputs of DREI Analysis	Confirm year workplan and meeting	Roadmap and vision for minigrids in	Roadmap and vision for minigrids in	Conclude forum or identify an appropriate

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		established among minigrid policy role-players in Eswatini with strong link to AMP regional project knowledge platform to formulate a national minigrid vision and roadmap.	pilot project, minigrid potential mapping data, as available. Confirm year workplan and meeting schedule (including workstreams as relevant)	Practice knowledge sharing update Activities as per workplan Meetings as per meeting schedule	Practice knowledge sharing update. Activities as per workplan Meetings as per meeting schedule. Workstream specific updates or position papers produced, as relevant	and both pilot projects. identify a preferred business model(s) for minigrids in Eswatini. Commission development of minigrid roadmap and vision. Knowledge event / Community of Practice knowledge sharing update Inform capacity building needs for Output 1.3	schedule (including workstreams as relevant)	Eswatini developed. Knowledge event / Community of Practice knowledge sharing update Activities as per workplan Meetings as per meeting schedule	Eswatini adopted. Knowledge event / Community of Practice knowledge sharing update Activities as per workplan Meetings as per meeting schedule	format for a continued National Dialogue on minigrids
		1.3 Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.	Additional training material tailored for Eswatini needs as needed (with support from regional project).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Training summary for the year for M&E and TE purposes. Plan training schedule for year 4, with guidance from the National Dialogue direction (as available).	Any additional training material tailored for Eswatini needs (with support from regional project).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Ensure gender representation. Collate feedback and attendance records including gender).	Training events as per plan. Training summary for the year for M&E and TE purposes.

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		1.4 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments.	-	-	-	-	-	Initiate and facilitate the process for the national follow up, "light" quantitative DREI analyses. Procurement is expected to be centralized, and administered and performed by the regional project. Liaise with the regional project regarding the appointment of international consultant with technical support from the DREI Core Team. Ensure consultant(s) have access to all materials from first full quantitative DREI.	Conclude DREI update analysis and deliver update note specifically focusing on changes in (i) the risk environment, (ii) financing costs, hard and soft costs, and LCOE. Share update with the National Dialogue (Output 1.2), relevant national stakeholders, regional project and as input into Terminal Evaluation. Facilitate any other dissemination activities.	-
Component 2	Innovative business models based on cost reduction operationalized, with strengthene	2.1 Expansion of public utility minigrid pilot to incorporate Productive Use of Energy	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis.	Assess progress and identify additional interventions to support PUE and enhance electricity usage as needed.	Implement any additional actions, as relevant. Operations. Monitoring and Reporting.	Implement any additional actions, as relevant. Operations. Monitoring and Reporting.	Implement any additional actions, as relevant. Operations. Monitoring and Reporting.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis.	Close out report, updated case study(ies). Feedback to National Dialogue. Ensure measures in

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	d private sector participation in RE minigrid development.	(PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of minigrid systems for rural households.			Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis. Feedback to National Dialogue.	Stakeholder engagement plan and impact monitoring. Data analysis.	Stakeholder engagement plan and impact monitoring. Data analysis.	Stakeholder engagement plan and impact monitoring. Data analysis.		place for sustainability of operations and established interventions.
		2.2 Greenfields pilot developed demonstrating productive uses use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Continued business development support.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Continued business development support.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Continued business development support.	Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis. Review of grid utilization to identify any additional development and support required. Identify any additional opportunities to improve grid utilization and revenue.	Implement additional interventions as appropriate. Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis. Feedback to National Dialogue.	Review of grid utilization to identify any additional development and support required. Identify any further opportunities to improve grid utilization and revenue (continued refinement). Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring.	Implement additional interventions as appropriate. Operations. Monitoring and Reporting. Stakeholder engagement plan and impact monitoring. Data analysis. Feedback to National Dialogue.	Close out report, updated case study(ies). Feedback to National Dialogue. Ensure measures in place for sustainability of operations and established interventions.

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
						Develop case study with recommendations (see Output 3.2) Feedback to National Dialogue.		Data analysis.		
		2.3 Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant.	Training as per schedule. Prepare and submit training summary for the year for M&E and TE purposes. Review of training impact for the year. Identify further training needs in consultation with stakeholders. Use findings from second pilot and stakeholder feedback to enhance or supplement existing modules. Develop training schedule for next year.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant.	Training as per schedule. Review training feedback for refinements. Track attendance including representation of gender, youth, other vulnerable groups. Continued development of further modules, as relevant. Identify suitable training platform (if not CSER short course platform) and formalize agreements for long term hosting of training courses.	Training as per schedule. Prepare and submit training summary for the year for M&E and TE purposes. Review of training impact for the year. Ensure sustainability / continuation of training platform beyond project timeframe.

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 3	Digitalization and data mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefitting from linkages to international good practice	3.1: 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 based on standardized guidance from the regional project.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository. Upload data resource to regional project.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository.	Implement data framework, source necessary data and maintain data repository. Upload data resource to regional project.
		3.2 A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the								

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		regional project.								
		3.3 Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction	Continue data collection to (i) track the performance of the minigrid systems in real-time; (ii) validate the underlying pilot assumptions and business case; (iii) track performance enhancement in minigrid capacity utilization; and (iv) generate insights and lessons learned to share with the AMP Regional Project. Automated M&E analytics for all project/program indicators (connections deployed, amounts paid, gender/environmental impact metrics, etc.	Data collection continue	Data collection continue	Data collection continue	Data collection continue	Data collection continue	Data collection continue	Data collection continue

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
			Develop knowledge products.							
		3.4: Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt at national and regional level.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s).	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s)	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s).	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule.	Representatives to provide CoP feedback / updates to Project Steering Committee / National Dialogue as per schedule. With support from AMP, host and present any CoP outputs in one of preferred formats (as relevant) to relevant audience(s).
			Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other	Assess approach and value of developed material. Identify next tier of topics with input from stakeholders. Define a development schedule for the next year. Ensure readily available online and other	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other	Develop series of lessons learned according to schedule, with input from regional project, regional role players and local experience. Share with National Dialogue. Ensure readily available online and other	Conclude series of publications according to schedule. Ensure readily available online and other channels as relevant. Assess value, impact and reach of the material shared. Update both pilot project case studies with further	Ensure sustainable platform for hosting of knowledge resource beyond implementation timeframe.

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
			channels as relevant.	channels as relevant.	channels as relevant. Analyse data for daily, seasonal and growth trends, impacts on customer types and end-uses, inflection points, comparative assessments, etc. Draw information from the analysis to update case study on Sigcineni (Mvundla) pilot projects with further developments, findings and recommendations. Include for youth, gender in data collection and analysis. Share with National Dialogue, industry and other stakeholders including regional project.	channels as relevant. Analyse data for daily, seasonal and growth trends, impacts on customer types and end-uses, inflection points, comparative assessments, etc. Draw information from the analysis to develop a case study for the Energy Hub pilot with findings and recommendations. Include for youth, gender in data collection and analysis. Share with National Dialogue, industry and other stakeholders including regional project.	channels as relevant.	channels as relevant.	developments, findings and recommendations. Include for youth, gender in data collection and analysis. Share with National Dialogue, industry and other stakeholders including regional project.	

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		3.5 Knowledge network established to promote MG development / rural energy access	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Review /assess implementation year. Refine approach, structure, format as relevant. Report attendance numbers for the year for M&E and TE purposes. Invite stakeholder input to inform planning. Develop schedule for next year. Based on participation, develop and implement strategy for broader inclusion and networking.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Host / facilitate events according to planned schedule. Actively share information and publish knowledge resources on project website. Track participation (also for inclusivity) and participant feedback.	Review / assess implementation year. Report attendance numbers for the year for M&E and TE purposes.

Comp	Outcomes	Outputs	Year 3				Year 4			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		3.6: M&E and Reporting including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, and (iii) Terminal Evaluation 3.6: Project Monitoring 3.7: Project Evaluations	Project Board / Steering Committee meeting, review of PIR. Assess any project changes (if needed) and implement adaptive management if required.	-	Project Board / Steering Committee meeting (proposed)	Annual PIR for the year completed at end June of current year. (Note. Quarters dependent on alignment with months, but expected to be Q4 of year 2)	Project Board / Steering Committee meeting, review of PIR. Assess any project changes (if needed) and implement adaptive management if required.	-	Project Board / Steering Committee meeting (proposed) Develop TOR and procure independent consultant for Terminal Evaluation.	Final PIR and TE for discussion at final Project Board / Steering Committee meeting. Conduct TE and publish (refer Section VI)

Annex 5: Monitoring Plan

This Monitoring Plan and the M&E Plan and Budget in Section VI of this project document will both guide monitoring and evaluation at the project level for the duration of project implementation.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
Project objective from the results framework. Supporting access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in RE minigrids in Eswatini with a focus on cost-reduction levers and innovative business models.	***Indicator 1:*** Greenhouse gas emissions mitigated (metric tons of carbon dioxide equivalent) *(Units of measure: metric tons of CO_2e)*	<u>*Midterm*</u> N/A <u>*End of project:*</u> 2,444 (direct) 54,000 (indirect)[74]	Targets were calculated based on the direct, additional emission reductions and clean energy use from PUE addition and greenfield minigrid pilot projects. At the AMP regional project, 10% of the indirect GHG impacts calculated at the Eswatini project level are allocated to the regional child project, in line with the apportioning of the overall program budget. This reflects the benefits of national projects accessing the regional project's support. To avoid double counting, this 10% is removed from the	Baseline: taken as zero relative to the AMP project. Additional, clean energy consumption for both pilot projects to be monitored and emissions reductions calculated using the AMP Model (refer Annex 13)	Annually from commissioning of PUE overlay to the Mvundla near Sigcineni pilot. Adding Pilot 2 contribution once commissioned).	System operator, PMU, Country Office.	Records of units of electricity sold or consumed generated from RE minigrid systems. Modelling output.	Development of the pilot projects delayed or not implemented as planned.

[73] Data collection methods should outline specific tools used to collect data and additional information as necessary to support monitoring. The PIR cannot be used as a source of verification.

[74] 10% of the indirect GHG ER of this an all AMP national child projects have been removed from each project and allocated to the AMP regional child project, in line with the apportioning of the overall program budget and reflected in the PFD allocation of GHG emissions reductions across the different child projects. This reflects the benefits of national child projects accessing the regional child project's support which is expected to contribute and enhance the enabling conditions required for minigrids development across AMP countries.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
			indirect totals for the Eswatini project.					
	Indicator 2. *Number of direct beneficiaries benefitting from energy access via minigrids, disaggregated by gender and by customer segment (residential, social, commercial/productive use), as co-benefit of GEF investment* [75]	*Midterm* 132 additional persons from the first pilot, of whom at least 67 women[76] *End of project:* 459 additional persons, of whom at least 234 (51%) women ---- 400 people (residential) 8 people (social) 51 people (commercial/PUE) ***459 people (total)***	The number of Beneficiaries across multiple categories as defined in Annex 13.	Baseline is taken as zero since the project has not yet started. The target is stated as additional beneficiaries who are directly impacted across the customer categories defined in Annex 13.	Annually Reported in DO tab of the GEF PIR	PMU	Annual reports	Reach of minigrids not as wide as foreseen, limiting the number of direct beneficiaries. Tracking and monitoring of data not implemented diligently.

[75] This indicator captures the number of individual people who receive targeted support from a given GEF project and/or who use the specific resources that the project maintains or enhances. Support is defined as direct assistance from the project. Direct beneficiaries are all individuals receiving targeted support from a given project. Targeted support is the intentional and direct assistance of a project to individuals or groups of individuals who are aware that they are receiving that support and/or who use the specific resources. The stated target includes residential, commercial and social consumers to be provided with electricity access, recipients of small businesses support and/or subsidized electrical appliances, recipients of training, participants in Community of Practice, participants in National Dialogue. It includes the total number of all direct project beneficiaries expected to benefit from all project activities until project closure.

[76] By mid-term expected to already include to include recipients of PUE, small business development support and subsidized electrical appliances at Mfundla pilot, National Dialogue participants and some recipients of training through various channels.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
	Indicator 3. Increase in installed solar PV capacity (MW) and battery storage (MWh)	*Midterm* No additional capacity expected *End of project:* 0.02 MW new capacity	Newly installed capacity of the greenfields Solar PV minigrid (Energy Hub) pilot	Baseline for the country is 0.035 MW of solar PV minigrid capacity installed (not yet commissioned) Actual installed capacity.	On design and commissioning of system (year 3 and 4 of AMP implementation)	PMU	Physical installation	Development of the pilot project delayed or not implemented as planned. Selected pilot site cannot support a system of this scale.
Project Outcome 1. Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate investment in RE minigrids.	***Indicator 4.*** Suitable locations for minigrid development identified and published for the country.	*Midterm* First iteration of minigrid map overlays to identify suitable sites, developed. *End of project:* Updated map of suitable sites published for the country.	Develop additional GIS-based mapping information key to viable minigrid sites. (Note: gender-sensitive data to be collected and shown).	Baseline. Sites suitable to minigrid development have not been identified. World Bank process for least cost electrification planning process initiated that will develop the base map. Data sourcing and map development progress tracked during first two years. Additional data developed and mapped, available as overlays to the base map and published and/or available in the public domain.	Annually.	PMU and Implementing Partner as owner of base map	Data mapped, available as overlays to the base map and published and/or available in the public domain.	Base map not developed as planned. UNCDF MSME and productive use data not available for mapping as anticipated. Integration of overlays to base map not implemented. Mapping data not shared publicly to support planning by the private sector.
	Indicator 5: Number of policy derisking instruments for minigrid	*Midterm* 1 new policy derisking instrument for RE minigrids	Confirms that new policy derisking instruments (e.g. tariffs, customs, standards, financial	Baseline. 0 policy derisking instruments for RE minigrids investment (tariffs,	Annually	MNRE / PMU, National Dialogue	Record of decisions; DREI report; initiated policy development process.	Consensus and endorsement not achieved among stakeholders.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
	investments identified and endorsed by the national government *(Units of measure: Absolute number of policy derisking instruments)*	investment identified and endorsed by the national government <u>*End of project:*</u> 2 new policy derisking instruments for RE minigrids investment identified and endorsed by the national government	incentives, etc.) for RE minigrids investment were identified and endorsed for development / adoption by government from the process of risk assessment and dialogue.	customs, standards, financial incentives, etc.) identified and endorsed by the national government. Minigrid Regulatory Framework under development by ESERA (to be confirmed as baseline at inception).				Endorsement does not translate into implementation.
	Indicator 6. A minigrid delivery model and roadmap to enable minigrid development is endorsed/adopted through a consultative process involving key stakeholders (e.g. relevant ministries, local authorities, rural populations, private sector, media, etc.) *(Units of measure: binary (1/0))*	<u>*Midterm*</u> National Dialogue platform established and active. Full DREI quantitative analysis completed. <u>*End of project*</u> At least one preferred minigrid delivery model is identified and endorsed through the work of the multi-stakeholder platform and dialogue. Minigrid Roadmap adopted,	<u>Baseline</u>: Technical Steering Committee (TSC) being created as part of PPG phase. TSC expected to form the basis of a National Dialogue on minigrids. Forum established and activities structured to collaborate, digest knowledge material (existing and developed by the project) and actively interface with regional project to formulate a vision and roadmap incorporating a selected business model(s) for the country.	Track knowledge material developed as outputs, National Dialogue meetings held, nominations for regional Community of Practice implemented and active interface established. Capacity building events hosted and attended. Roadmap and vision commissioned and developed. Chosen business model(s) identified. DREI analyses completed with complete set of	Annually Progress on key outputs tracked in PIR.	PMU and Implementing Partner as host / sponsor of the National Dialogue	Forum established, schedule planned and implemented, Outputs produced.	National Dialogue not engaged in the topic as anticipated and therefore unable to utilize the wealth of resources available through AMP to effectively shape the direction of MGs in Eswatini. Stakeholder participation not adequately representative to maximise the contribution of minigrids in the country. Outputs produced as tick boxes rather than as meaningful planning resources.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		informed by National Dialogue and DREI analysis DREI light analysis completed.		standard outputs delivered at mid-term and update note delivered by project end.				Vision and roadmap not adequately cognizant of the country context.
Project Outcome 2. Innovative business models based on cost reduction operationalized, with strengthened private sector participation in RE minigrid development.	***Indicator 7.*** Number of minigrid pilots implemented that demonstrate a delivery model, cost-reduction measure(s) and/or productive use of electricity (*Units of measure: Absolute number of minigrid sites where pilots are implemented with project support*)	*Midterm* One pilot demonstrating improved feasibility with PUE overlay *End of project* Two operational minigrids demonstrating a delivery model, cost-reduction measure(s) and/or productive use of electricity	The number of pilot projects implemented that demonstrate a delivery model, cost-reduction measure(s) and/or productive use of electricity.	Baseline: First $35kW_p$ minigrid system developed by public utility primarily for electrification of rural households.	Annually	PMU / MNRE	Physical installations	Spontaneous uptake of energy from the baseline Sigcineni (Mvundla) pilot project considerably higher than anticipated, making the PUE overlay redundant. EEC O&M resources already earmarked for the minigrid system, not available to support the further pilot. Development of second pilot delayed.
	Indicator 8. Capacity built among potential minigrid developers and operators. (*binary (1/0)*)	*Midterm* Information disseminated and awareness raised (2 out of a possible scale of 5)[77] *End of project*	Baseline: Four potential developers identified, and preliminary assessment done of minigrid experience. No capacity building regarding minigrids done in the country to date.	Baseline: Four potential developers identified, and preliminary assessment done of minigrid experience. No capacity building regarding minigrids done in the country to date.	Annually	PMU with support of any training partners	Participation records of all capacity building events, Record of event or training feedback forms.	Training and capacity building events not effective in strengthening institutional or human capacity.

[77] Scoring categories taken from GEF climate change mitigation tracking tool, i.e.: 1: no capacity built; 2: information disseminated/awareness raised; 3: training delivered; 4: institutional/human capacity strengthened; 5: institutional/human capacity utilized and sustained

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		Institutional/human capacity strengthened for potential developers (4 out of possible 5) [78]		Number of events, publications and training courses. Attendance and participation in the above. Certificates issued (including attendance and/or completion certificates) Feedback forms from all capacity building events. The capacity of targeted recipients is assessed by survey towards the end of year 2. On a scale of 1 to 5, an average score of at least 2 is achieved. - 1 represents a low level of capacity - 5 represents a strong capacity to understand relevant issues and apply knowledge and skills to find effective solutions. (1) The capacity of targeted recipients is assessed by			Participant survey as optional verification.	

[78] Scoring categories taken from GEF climate change mitigation tracking tool, i.e.: 1: no capacity built; 2: information disseminated/awareness raised; 3: training delivered; 4: institutional/human capacity strengthened; 5: institutional/human capacity utilized and sustained

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
				survey towards the end of the project. On a scale of 1 to 5, an average score of at least 4 is achieved. - 1 represents a low level of capacity - 5 represents a strong capacity to understand relevant issues and apply knowledge and skills to find effective solutions. (1)				
Project Outcome 3. Data and digitalization are mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefitting	***Indicator 9*.** A project digital strategy for the project is prepared and implemented by the relevant PMU to contribute to project implementation and local minigrid market development	*Midterm* Data/digital strategy developed and being implemented. Baseline data from EEC minigrid pilot project available. *End of project* Project digital strategy implemented Recommendations for rolling out digital solutions for minigrids at national level have been shared	Baseline: Data strategy not currently in place. Data/digital strategy prepared and implemented to ensure experience gained is effectively captured and utilized.	Smart metering data Surveys, focus groups, interviews, and any other data collection instruments used. CSO statistics and publications. ESERA minigrid application and licensing data. REASWA Memberships and COP attendance. CSER training attendance. UNCDF and FinMark Trust survey data.	Dependent on data strategy and regional project guidance. Different data sets will be collected monthly, quarterly and/or ad hoc as relevant, and collated and reported annually.	PMU	Data base or bank of collected data. Knowledge resources made available on the website. Submissions to regional project.	-

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
from linkages to international good practice.		with key national stakeholders. (1) Complete dataset for all outputs and measured data from pilot projects.						
	Indicator 10. Number of minigrid pilots sharing data on minigrid performance with the regional project and other stakeholders following best practices and guidance provided by the AMP Regional Project*	*Midterm* The project's 'digital & data management platform' is procured and operational, ready for data collection from the project's mini-grid pilot(s), and for data sharing with the AMP regional project's digital platform. (1) Pilot 1 sharing data. *End of project* 100% of the planned minigrid pilots, as identified in the project's Minigrid Pilot Plan, are collecting and sharing data with the AMP Regional Project using the project's 'digital &	Baseline: No pilot data currently available.	Remote metering data captured and analysed per end use, customer type, season, time of day, etc. Survey data, interviews, focus groups, economic data, satellite data, for pilot communities with specific focus on including representation of gender, youth and under vulnerable groups.	Monthly collection of metering data Annual collection of socio-economic impact data.	Pilot project operator or owner, PMU (with support of appointed service providers if required)	*Data strategy documented.* *Physical data sets.* *Corresponding CSO data where relevant.*	Metering systems not functioning as planned. Remote reading of data not actively implemented. Pilot 1 data not shared by EEC.

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		data management platform'. (1) Both pilot 1 and pilot 2 collecting and sharing data.						
	Indicator 11. Comprehensive minigrid knowledge resources including complete dataset from pilot projects established	*Midterm* All data available at this time captured and processed into knowledge resources. *End of project* Comprehensive country specific knowledge resource with case studies, communications and training material.	Baseline. No formal minigrid knowledge resource in place.	Centrally located, readily available facility (online and otherwise, as needed) containing all knowledge resources developed for the country including training modules, presentations, workshop material, publications, case studies, etc.	Updated as published, generated, made available, shared.	PMU and training partners including CSER and REASWA	Annual development plans / schedules for lessons, knowledge events, publications and other knowledge resources. Corresponding evidence of outputs. Website and any other place where material is shared and readily available from.	-
	Indicator 12. Measurement, Reporting and Verification (MRV) framework linked to and compliant with regional project requirements.	*Midterm* National Dialogue platform established and active. DREI analysis commissioned. *End of project* Minigrid Roadmap adopted informed by National	Baseline: No MRV framework in place.		Downloads and users of project website.			

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
		Dialogue and DREI analysis						
Add indicators included in gender action plan, stakeholder engagement plan or other monitoring plans as needed.								
Gender Additional tracking (non-outcome) indicators under Indicator 1	1.1 Women and men accessing MG electricity in their homes and working appliance inventory	No target	*Additional granularity of data collected for Indicator 1, ensuring specific identifiers are noted in engagements, consultations, surveys, attendance registers, etc.*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*
	1.2 Women and men accessing MG electricity (or electric services) for farming/livestock /aquaculture	No target	*Additional granularity of data collected for Indicator 1, ensuring specific identifiers are noted in engagements, consultations, surveys, attendance registers, etc.*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*
	1.3 Male-, female-led (and mixed) commercial endeavors newly employing MG electricity (non farming, but includes agro-transformation)	No target	*Additional granularity of data collected for Indicator 1, ensuring specific identifiers are noted in engagements, consultations, surveys, attendance registers, etc.*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*	*As for Indicator 1*
Environmental and Social risks	N/A at this stage	N/A at this stage	N/A at this stage	As per ESMF	Annually	Project Manager and UNDP CO	Project terminal report	To be determined individually for each pilot/activity

Monitoring	Indicators	Targets	Description of indicators and targets	Data source/Collection Methods[73]	Frequency	Responsible for data collection	Means of verification	Risks/Assumptions
related studies, as relevant[79].								

[79] See ProDoc, Annex 10 - ESMF, Section IX for further details.

Annex 6: UNDP Social and Environmental Screening Procedure (SESP)

Please refer separate document with SESP.

Annex 7: UNDP Risk Register

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
	Strategic Risk			
1	Within the specific country context, minigrids may not provide a cost-effective solution for the 'last mile' electrification or may only do so for a small selection of sites. This will be particularly true if minigrids systems cannot be adequately scaled and have to compete with the average connection cost for grid extension[81].	If minigrids cannot reasonably contribute a least-cost electrification solution, it will compete for Government funding with other, more appropriate options. In this case, its contribution in the country may be small and may not attract private sector investment at scale. Moderate (I = 2, L = 4)	The National Dialogue will be well-placed to assess the realistic contribution from minigrids, informed by the various knowledge resources[82] developed by the AMP project, as well as the country's own experience with pilots and the minigrid framework. With the formulation of the proposed Vision and Roadmap (Output 1.2), the appropriate application of minigrids in Eswatini can be articulated, drawing on the insights gained from AMP implementation. This roadmap will also enable discussions with the Ministry of Finance for appropriate funding allocations. A significant focus of the AMP interventions in Eswatini is to reduce the costs of future developments by creating an environment more conducive to minigrid development. With this emphasis, the AMP contribution should benefit future minigrid development irrespective of the details of the Vision and Roadmap.	Implementation Partner and PMU
2	The size of the market for minigrids in Eswatini may be too small to attract active private sector participation, substantive private sector investment and commercial financing at scale.	Scalability is critical to achieve adequate cost reductions and commercial viability of minigrid operations. Substantial (I = 4, L = 4)	Early assessment of the minigrid potential with mapping will allow an evaluation of the likely contribution of minigrids and the private sector role in the country. Experience gained with pilot projects will be relevant to any future minigrid developments, irrespective of market size or delivery model.	Implementation Partner and PMU
3	Limited experience with minigrids by all role players in Eswatini.	Limited experience may limit the view on and perceived value of lessons and best practices from other countries, leading to a repeat of similar failures and lessons.	The National Dialogue and strong linkage with regional platform will facilitate proactive engagement with the established regional knowledge base. Capacity building interventions, drawing on experience and best practices from across the region, have been included for both public officials and minigrid developers.	Implementation Partner, PMU and National Dialogue

[80] I = Impact; L = Likelihood

[81] e.g. for Mvundla to electrify 21 households using a minigrid, it cost around 3.2 million Emalangeni yet for grid extension 300 households on average are electrified at a cost of E7 million.

[82] Mapping data to identify suitable sites, minigrid framework, pilot project information, comparative costing and cost trends, regional project data and benchmarks.

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		Substantial (I = 4, L = 4)	Component 3 has been structured to actively link between the regional and national projects and to capture and disseminate lessons learned, case studies, communication and training material at national level. Information sharing will also be facilitated by the establishment of a knowledge network or Community of Practice among potential industry participants.	
4	Limited or no interest from the private sector to participate in minigrid projects in the format / roles / functions / capacities foreseen.	Low private sector interest will likely confine the rollout of minigrids in the country. Substantial (I = 4, L = 3)	Engage private sector players in developing pilot project structures that are adequately attractive to attract interest in participation. Using the proof-of-concept business models to demonstrate opportunities and recommend further amendments to encourage private sector participation. Community of practice created for private sector players to share knowledge and experience, to learn from each other as well as from national and regional experience. If needed, this experience coupled with the DREI may be used to inform a review of the policy direction and framework to further lower risks and barriers for implementation.	Implementation Partner, PMU and National Dialogue
	Political			
5	Failure to institute a coordinated policy position and response across country priorities and key government and energy role-players.	This will (i) result in a suboptimal contribution to the developmental priorities for the country and (ii) complicate the environment for private sector role-players, discouraging participation in the sector and/or contribute to development costs. Substantial (I = 5, L = 3)	The National Dialogue will facilitate an integrated response from government role-players across energy, environmental, economic and socio-economic development objectives.	Implementation Partner, PMU / ESERA, National Dialogue
	Operational			
6	Baseline data from Sigcineni (Mvundla) pilot project and/or subsequent operation and metering data not available to inform 'proof of concept' pilot.	With commissioning planned for the first semester of 2021, it is assumed that consumption data for the Sigcineni (Mvundla) pilot project will be available to serve as a	It is suggested that an agreement be put in place between the Ministry and EEC during project inception phase to ensure data is collected and available for the AMP pilot.	Implementation Partner, PMU and EEC

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		baseline for the pilot initiatives. This will be a key input parameter to accurately assess the impact of different interventions. This will also be important data to inform the type (e.g. equipment size and operating hours) of interventions suitable for the community. Baseline data is key to a meaningful pilot 'proof of concept' contribution. Moderate (I = 3, L = 2)		
7	The site in Ekubekezeleni, Bulimeni area, selected for the Energy Hub may not be suitable to a minigrid system anchored in PUEs as intended for the Energy Hub model.	The priority focus of the AMP in Eswatini is on demonstrating alternative business models more likely to attract private sector investment. Accordingly, if this site cannot accommodate an energy hub with a strong PUE anchor, an alternate site will have to be identified. This will impact delivery timelines for the project and potentially also stakeholder relationships at the target site. This risk is highly likely considering the remote location, accessibility challenges and scattered distribution of a small number of households. High (I = 5, L = 5)	A number of PUE options have been identified that may be suited to the remote location and accessibility challenges. These potential PUEs include activities that do not rely on perishable produce and/or frequent transportation with strong linkages to markets, notably: Peanut butter production, Microwork Services and/or Egg Incubation. A (pre-)feasibility assessment will be critical and has been included in the workplan as an early implementation activity. If the site is not feasible, an alternative will have to be selected.	Implementation Partner, PMU
8	Differentiated treatment of community around the Energy Hub pilot.	The community around the potential Energy Hub site in Ekubekezeleni, Bulimeni area, consists of 92 households, of which 30 are likely to be connected by the national grid. The	Active stakeholder engagement will be critical to address perceptions regarding different service types and to address concerns regarding different tariffs (if any). Where possible, harmonized tariffs for households will likely be required.	Implementation Partner, PMU

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		remaining households may be served by a combination of off-grid solar and the minigrid, informed by the pre-feasibility study and geography. This will result in differentiated treatment of community members that may cause discontent. High (I = 5, L = 5)		
9	Project delays or disruptions due to COVID-19	The COVID-19 pandemic is, at the time of writing, at a point of inflection. Variants and second/third waves of infections are emerging worldwide with concomitant reactions from authorities, ranging from mild restrictions on movement and curfews, to strict lockdowns and strict domestic travel restrictions. The most robust forms of restrictions could negatively impact activities requiring the physical presence of team members and stakeholders. At the pilot level, risks could relate to: - **Supply chain delays or disruptions**. Delays with importing or local availability of material and equipment due to reduced manufacturing capacity impacting planned delivery timelines. - **Availability of implementation teams**. Increased absenteeism of	Scheduling of activities such as site development and on-site training that may require physical presence in certain localities has been front-loaded, allowing for a buffer in case the sanitary situation deteriorates to the point of preventing the swift realization of these activities. Online communication and teleconferencing options will be investigated and given preference to facilitate social distancing, where needed. Development at pilot sites will benefit from: - Performing a schedule assessment or time-impact analysis, including examining the status of material procurement on projects. - Identifying most critical materials, equipment, products for procurement and engaging suppliers to prioritize delivery and/or expose key vulnerabilities. - Identifying key resources and skills and possible alternatives in case of absences. - Prioritizing and facilitating vaccinations of workers if possible. - Assessing cost impacts of enhanced cleaning, reduced workforce, and other modifications. - Assessing what services can be continued offsite to limit schedule delays.	Implementation Partner, PMU, Contracted service providers

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		resources due to sickness, the need to care for others, or restrictions on travel may impact project efficiency or progress. - **Time and cost impact of COVID compliance**. Project timelines may be delayed when scheduling around social distancing requirements and/or costs may increase to ensure compliance with COVID-19 guidance. Moderate (I = 4, L = 2)		
	Regulatory risk			
10	Minigrid Regulatory Framework not implemented as planned.	It is assumed that the minigrid framework will be in place when the AMP starts. This is an important milestone to create an enabling regulatory environment for private sector participation in minigrids. If not progressed as planned, regulatory uncertainty will present a hurdle for private sector involvement in the market. Moderate (I = 3, L = 3)	ESERA has invited proposals for the development of the minigrid regulatory framework with a targeted completion date in the first half of 2021 (by September 2021 development had been initated, but not yet completed). Should this not be finalised as foreseen, the AMP should reassess its focus in consultation with the Project Board in the changed context. If deemed necessary, project resources can be reallocated (adaptive management). This may include providing technical assistance or other support to ESERA, if needed. Pilots and other activities that rely on the framework being in place, can be regulated by contract as a mitigation measure.	ESERA / PMU, Project Board / Steering Committee
11	Failure to implement continual refinement of the policy and regulatory environment to effectively achieve national objectives.	An iterative process has proven critical to shape the minigrid regulatory framework. Failure to adequately address key enabling issues (e.g. tariffs, subsidies, grid integration) and/or incorporate experiences from pilot projects, any other developments in the country, as well as	The National Dialogue has been established to facilitate collaboration, knowledge sharing and allow a feedback loop from pilot initiatives to key role-players. Information and discussion at this forum will provide valuable opportunity to assess whether outcomes are being achieved and/or to identify opportunities for enhancement. The development of a shared vision and roadmap for minigrid development in the	National Dialogue, ESERA, PMU

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		industry feedback might limit the contribution from minigrids towards the targeted outcomes for the country. Substantial (I = 4, L = 3)	country will provide further guidance and clarity.	
	Organizational Risk			
12	Limited experience with GEF funded projects in the energy sector in Eswatini.	The PMU may require additional implementation capacity to understand and meet all prescribed reporting and administrative requirements. Substantial (I = 4, L = 3)	Implementing Partner capacity assessments have been conducted. MNRE and ESERA have committed resources, including recurrent expenditures, through co-financing and PMU. Both MNRE and ESERA will benefit from being part of a broader program and learning from other countries' experiences. The regional project will also provide training to project teams and Implementing Partner on monitoring and reporting requirements.	PMU, UNDP Country Office
13	Cash budget available to fund dedicated PMU resources (Project Manager and Admin/Finance Assistant) is limited.	The limited allocation allowed under the GEF budget towards PMC, means project management and coordination will rely heavily on co-financing from the Implementing Partner and/or responsible parties to fund or make available project staff. Without these staff, delivery of the project scope within the given timeframe will not be possible. High (I = 5, L = 4)	The MNRE identified ESERA as responsible party to implement and manage the project delivery under the Ministry's oversight. As such, ESERA will supplement the available project management resources with the necessary resources to fulfill implementation requirements.	Implementation Partner, ESERA with execution support from UNDP Country Office
	Financial			
14	If co-financing is not realized as anticipated, it will limit the contribution of the AMP and negatively impact GEF consideration of future projects.	Substantial (I = 5, L = 3)	Co-financing commitments from ESERA, UNDP, EEC, UNCDF and MNRE have been confirmed and will be tracked on an annual basis. Several opportunities identified for shared costs, leveraging of existing and planned or available resources: - Agreed partnerships, support and other contributions from ESERA, EEC, MNRE, MCIT and Microprojects to be confirmed at	Implementation partner, Project Board / Steering Committee, PMU

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
			start of implementation and actively accessed throughout. - Active collaboration to be established with the World Bank to leverage and build on baseline map. Additional co-financing and collaboration opportunities to be sought and leveraged during the implementation phase.	
	Social and Environmental			
15	Inadequate social and environmental safeguard established on the pilot site where PUE overlay will be implemented.	As an 'add on' to the EEC Sigcineni (Mvundla) pilot project, there is a risk that inadequate measures have been put in place to safeguard social and environmental impacts of the project or that safeguards are inconsistent with the requirements of the AMP and GEF. Substantial (I = 5, L = 3)	It will be critical to ensure compliance of the overall project with the necessary social and environmental safeguards. Discussions with the EEC Environmental Officer and the Eswatini Environmental Authority (EEA) has provided preliminary assurance that the project has been subject to rigorous environmental assessment, consideration and planning and will be managed in accordance with commitments made under the authorization by the EEA. It is required that all documentation for this project be made available to the AMP, reviewed and elaborated, if necessary, to ensure safeguards meet UNDP and GEF requirements. If safeguards cannot meet the requirements of the UNDP and GEF, the pilot project should be abandoned, and resources allocated to the Energy Hub pilot project.	Implementation Partner, Project Board / Steering Committee, PMU, EEC
16	Irresponsible handling of battery waste.	Irresponsible handling of battery waste at pilot projects and future developments may present a risk to the social and environmental sustainability of minigrids. Substantial (I = 5, L = 3)	The EEC pilot project was required to include a waste management plan for both battery and solar PV panel waste to obtain environmental authorization. It is therefore an existing consideration of the EEA and focus of environmental impact assessment and authorization.	PMU, Relevant Government Authorities
17	External environmental factors, like for example the effects of climate change (such as the volume and quality of rainfall, rising temperatures, floods, droughts, violent winds, earthquakes,	Low (I = 4, L = 1)	This is an external risk to the project that will be mitigated in the context of a variety of other third-party activities from the Government. Furthermore, external environmental factors likely to be a risk will be considered within this project as part of the feasibility/assessment studies established in the ESMF for each site, which will use	UNDP CO, PMU

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
	landslides, severe winds, or storm surges) could lead to delay or abandonment of the project.		conservative assumptions to successfully operate.	
18	Potential negative environmental impacts resulting from the project, either routine or non-routine based, could lead to adverse local, regional, and/or transboundary impacts causing a delay or abandonment of it.	Moderate (I = 3, L = 3)	During project preparation, similar project activities have been visited and/or consulted by the team of experts to evaluate the risks. Principal environmental risks have been framed at this stage (Project Preparation Grant, PPG) and they will continue to be assessed along the entire project cycle for each chosen site. Based on that, a pertinent due diligence project development process, monitoring of operations, and active intervention are foreseen according to such environmental safeguards established in this project through the ESMF to ensure operation within the established parameters and in compliance with the applicable regulations.	UNDP CO, PMU
19	External social factors, like for example poverty, health or other service delivery, slow recovery from COVID and other issues, could lead to delay, abandonment of the project or decrease the ability of people to pay for the services.	Moderate (I = 3, L = 3)	This is an external risk to the project that will be mitigated with a variety of other, third-party activities from the Government as per their national social agenda independent to the AMP. Furthermore, external social factors likely to be a risk will be considered within this project as part of the feasibility/assessment studies established in the ESMF for each site, which will use conservative assumptions to successfully operate.	UNDP CO, PMU
20	Potential negative social impacts resulting from the project, either routine or non-routine based, could lead to adverse local, regional, and/or transboundary impacts causing a delay or abandonment of the project.	Moderate (I = 3, L = 3)	During Project preparation similar Project activities have been visited and/or consulted by the team of experts to evaluate the risks. Principal social risks have been framed at this stage (Project Preparation Grant, PPG) and they will continue to be assessed along the entire project cycle for each chosen sites. Based on that, a pertinent due diligence project development process, monitoring of operations, and active intervention are foreseen according to such social safeguards established in this project through the ESMF to ensure operation within the established parameters and in compliance with the applicable regulations.	UNDP CO, PMU
21	Potential negative impacts on the existing	Low (I = 2, L=2)	Current data (refer Annex 21) suggests that diesel use in the country is extremely	UNDP CO, PMU, EEC

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
	diesel generation supply chain and employment within the sector with the adoption of solar PV minigrids – both at national level and pilot sites.		limited, therefore confining the impact and risk of solar PV minigrids disrupting established industries and livelihoods. A baseline survey at the Sigcineni (Mvundla) pilot site confirmed that none of the community members were previously using diesel generators. The status quo and excess available RE capacity suggest there is no risk of the pilot beneficiaries reverting to diesel generation, the project being sabotaged by diesel generators or of current employment opportunities being impacted. A simi;ar baseline assessment will be done for the greenfield pilot once a site has been selected. A suitable response will be developed with any impacted parties identified. This will include capacity building within the target communities to optimally employ the available electricity for PUE and foster local economic development. Training will also cover the environmental benefits of utilising solar power, and the negative impacts of using environmentally harmful energy generation technologies such as diesel power. More generally, the project will work with the government of Eswatini and industry representative such as REAESWA to promote solar minigrids also as a viable and profitable means of income generation and business opportunity. The focus of such engagement will be on promoting job creation and highlighting the job opportunities in the renewable energy sector available to everyone, including those currently working with diesel generators.	
	Gender Equality and Inclusion			
22	Failure to identify, consult with, and tailor support services for women-led businesses in the PUE add-on or Energy Hub pilot will skew benefit incidence towards men.	Design of financing solutions and platforms that do not compensate for female-specific challenges (e.g., related to property ownership) may inadvertently restrict women's participation in MG development. Moderate	Component 2 will account for male/female differences and gender norms, including tracking intermediate/instrumental participation indicators so as to promote gender balance in final outcomes through adaptive project management practices.	PMU

#	Description of risk (grouped by category)	Impact & Probability (I, L)[80]	Risk Treatment / Management Measures	Risk Owner
		(I=2, L=4)		
23	Electricity provision may alter gender relations in households and communities.	Altered gender relations, which though expected to contribute to female empowerment could also lead to widening gender disparities, male backlash, even in extreme cases gender-based violence. Moderate (I=5, L=1)	Techniques of 'outcome harvesting[83],' whereby open-ended conversations are periodically held with beneficiaries will be used to probe for possible negative changes in gender relations. If discovered, the instance will be recorded in a grievance log and locally appropriate and ethical conflict resolution techniques will be initiated.	PMU, Pilot system Operators

[83] Outcome harvesting is an open-ended Monitoring and Evaluation (M&E) process that doesn't presuppose the interviewer has knowledge of what should be monitored or of the relative importance of various outcomes to participants. It can be used in combination with other forms of project (M&E) as well.

Annex 8: Overview of Project Staff and Technical Consultancies

Consultant	Time Input	Tasks, Inputs and Outputs
For Project Management		
Local / National contracting		
Project Manager/ Coordinator *ESERA Secondment* *(Indicative rate: $50,000/year)*	*Full time over 4 years*	*The Project Manager (PM) will be responsible for the overall management of the project, including the mobilization of all project inputs, supervision over project staff, consultants and sub-contractors.* *Duties and Responsibilities* • *Manage the day-to-day implementation of the project.* • *Plan the activities of the project and monitor progress against the approved workplan.* • *Execute activities by managing personnel, goods and services, training and low-value grants, including drafting terms of reference and work specifications, and overseeing all contractors' work.* • *Monitor events as determined in the project monitoring plan, and update the plan as required.* • *Provide support for completion of assessments required by UNDP, spot checks and audits.* • *Manage requests for the provision of UNDP financial resources through funding advances, direct payments or reimbursement using the FACE form.* • *Monitor financial resources and accounting to ensure the accuracy and reliability of financial reports.* • *Monitor progress, watch for plan deviations and make course corrections when needed within project board-agreed tolerances to achieve results.* • *Ensure that changes are controlled and problems addressed.* • *Perform regular progress reporting to the project board as agreed with the board, including measures to address challenges and opportunities.* • *Prepare and submit financial reports to UNDP on a quarterly basis.* • *Manage and monitor the project risks – including social and environmental risks - initially identified and submit new risks to the Project Board for consideration and decision on possible actions if required; update the status of these risks by maintaining the project risks log.* • *Capture lessons learned during project implementation.* • *Prepare revisions to the multi-year workplan, as needed, as well as annual and quarterly plans if required.* • *Prepare the inception report no later than one month after the inception workshop.* • *Ensure that the indicators included in the project results framework are monitored annually in advance of the GEF PIR submission deadline so that progress can be reported in the GEF PIR.* • *Prepare the GEF PIR;*

Consultant	Time Input	Tasks, Inputs and Outputs
		• *Assess major and minor amendments to the project within the parameters set by UNDP-GEF;* • *Monitor implementation plans including the gender action plan, stakeholder engagement plan, and any environmental and social management plans;* • *Monitor and track progress against the GEF Core indicators.* • *Support the Terminal Evaluation process.* • *Add technical tasks as necessary* • *Liaise with the AMP Regional Project PMU Staff to request and receive operational and technical support as needed, to participate in activities led by the AMP Regional Project, and share data and information with the AMP regional Project as required.* The Terms of Reference (ToR) for this position should include a clear statement indicating that a minimum of 10% of the person's time will be allocated to AMP Regional Project activities. If the PM is also delegated as the 'beneficiary(ies) representative' on the AMP Regional Project board, this should also be included in their ToR.
Project and Finance Assistant *Rate: $18,000/year (total cost to project)*	*Full time over 4 years*	*<u>Duties and Responsibilities</u>* *Under the guidance and supervision of the Project Manager, the Project Assistant will carry out the following tasks:* • *Assist the Project Manager in day-to-day management and execution of project activities;* • *Assist the M&E officer in matters related to M&E and knowledge resources management;* • *Assist in the preparation of progress reports;* • *Ensure all project documentation (progress reports, consulting and other technical reports, minutes of meetings, etc.) are properly maintained in hard and electronic copies in an efficient and readily accessible filing system, for when required by PB, TAC, UNDP, project consultants and other PMU staff;* • *Provide PMU-related administrative and logistical assistance.* *<u>Duties and Responsibilities with support and oversight from UNDP Country Office and Project Manager</u>* • *Keep records of project funds and expenditures, and ensure all project-related financial documentation are well maintained and readily available when required by the Project Manager;* • *Review project expenditures and ensure that project funds are used in compliance with the Project Document and UNDP financial rules and procedures;* • *Validate and certify FACE forms before submission to UNDP;* • *Provide necessary financial information as and when required for project management decisions;* • *Provide necessary financial information during project audit(s);* • *Review annual budgets and project expenditure reports, and notify the Project Manager if there are any discrepancies or issues;*

Consultant	Time Input	Tasks, Inputs and Outputs
		• *Consolidate financial progress reports submitted by the responsible parties for implementation of project activities;* *Liaise and follow up with the responsible parties for implementation of project activities in matters related to project funds and financial progress reports.*
For Technical Assistance		
Outcome 1		
Local / National contracting		
Renewable Energy and/or Clean Energy strategy or policy consultant *Rate: $3,000/week*	*8.5 weeks in Year 4*[84]	*With due consideration of the knowledge resources developed and collated (including those from Output 1.1, 1.3, 2.1 and 2.2) as well as the direction provided by the National Dialogue regarding a preferred business model and implementation approach for the country, formulate a coherent vision and implementation roadmap for minigrids in Eswatini.* • *Review policy context and policy direction from the National Dialogue,* • *Analyse critical input resources including those from Output 1.1, 1.3, 2.1 and 2.2,* • *Articulate preferred business model for the country if not already defined by the policy direction,* • *Within this context, draft a coherent vision and implementation roadmap for minigrids in Eswatini,* • *Obtain input on the draft from the National Dialogue and key stakeholders,* • *Finalise a coherent vision and implementation roadmap for minigrids in Eswatini for approval and adoption.*

National Consultant to support the DREI analysis.
 	
Rate $10,000 total contract value
	15 days in Year 1	*A nationally based consultant to provide support and assistance to the international consultant in performaing a full DREI analysis, preparing a DREI report, and disseminating the findings for solar PV-battery minigrids in Eswatini. A complete TOR for this role has been drafted and is available at the regional project.*
		
		<u>Duties and Responsibilities</u>
		• *Provide support and assistance to the international consultant for the full DREI analysis for solar PV-battery minigrids in Eswatini, including:*
		  ○ *Risk environment. Assist with data collection and gathering of market information, facilitate the scheduling and arrangement of meetings and setting up interviews aimed at quantifying the contribution of risk to financing costs in the country. Participate in meetings and interviews.*
		  ○ *Public instrument selection. Assist in development of baseline view on public instruments and collecting data on costs and benchmarks to inform the costing of public instruments.*

[84] Implementation year, not calendar year.

Consultant	Time Input	Tasks, Inputs and Outputs
		○ *Levelised cost of electricity (LCOE) modelling and evaluation. Assist in gathering data and assumptions for the baseline technology and solar PV-battery minigrids.* ○ *Cross cutting activities. Support the development and maintenance of the Assumptions Book and feedback on the methodology for contimual improvement* • *Support the preparation of the DREI Report for solar PV-battery minigrids in Eswatini with review and comments or inputs as relevant.* • *Assist the international consultant in planning and holding 2-3 round table workshops for the dissemination of the DREI analysis for solar PV-battery minigrids in Eswatini. Assist with preparing the accompanying meeting notes.* • *Assist the international consultant in planning and holding 1-2 round table workshops for the dissemination of the DREI AMP regional knowledge product. Disseminate the findings of the DREI AMP Regional knowledge product at 1-2 round-table workshops with government stakeholders.*
International / Regional and global contracting		
Technical expert on GIS-based modelling for PUE, MSME and value-chain overlays *Rate: $ 800/day* *[Note. These services will likely be recruited by UNCDF, as responsible party for Output 1.1.* *Note 2. GIS Analyst / Technical expert may also be procured as contractual services for a turn-key delivery of all aspects including procurement of data.]*	*40 days in Year 2*	*The Technical Expert on GIS modelling will be responsible for the delivery of the data overlays and map analysis for minigrid potential for Eswatini that clearly demarcates areas best suited to minigrid developments in the country (Output 1.1).* • *Sourcing and analyzing spatial data through the use of mapping software.* • *Performing data munging and cleaning to convert data into its desired form.* • *Identifying patterns and trends through spatial mapping of data.* • *Producing map overlays showing the spatial distribution of various kinds of data, including MSMEs, PUEs, sattelite / value chain analysis data, mobile network data.* • *Contributing spatial modeling to build on World Bank least-cost electrification base map* • *Produce reports on geographic data utilizing data visualizations.* *Inputs: GEF financing resources + UNCDF data resources + World Bank / ESMAP Least cost electrification map* *Outputs: (1) Data overlays to least-cost electrification options and map indicating minigrid potential in Eswatini (2) Reports / data visualisation of minigrid potential*

Consultant	Time Input	Tasks, Inputs and Outputs

International DREI Expert
 	
Rate: $ 800/day
	50 days in Year 1	*A Technical Expert qualified to perform a full DREI analysis, preparing a DREI report, and disseminating the findings for solar PV-battery minigrids in Eswatini under the guidance of the regional project. A complete TOR for this role has been drafted and is available at the regional project.*
		
		<u>Duties and Responsibilities</u>
		• *Conduct a full DREI analysis for solar PV-battery minigrids in Eswatini, including:*
		  ○ *Risk environment. Data collection and market research to assess the risk environment and develop DREI financing cost waterfalls to describe the contribution of risk to financing costs.*
		  ○ *Public instrument selection. Overview of the public instruments in place and an assessment of the risk mitigation potential of instruments*
		  ○ *Levelised cost of electricity (LCOE) modelling.*
		  ○ *Evaluation and sensitivity analysis*
		  ○ *Cross cutting activities e.g. developing and maintaining an Assumptions Book and feedback on the methodology for contimual improvement*
		• *Preparation of a DREI Report for solar PV-battery minigrids in Eswatini that consists of an Executive Summary (~20 pages) report, a final report ([indicate format: Word/PowerPoint/other]) together with completed financial tools, and an Annex capturing the assumptions behind the analysis.*
		• *Dissemination of DREI analysis for solar PV-battery minigrids in Eswatini in a series of 2 – 3 round table workshops with accompanying meeting notes.*
		• *Dissemination of DREI AMP regional knowledge product. Disseminate the findings of the DREI AMP Regional knowledge product at 1-2 round-table workshops with government stakeholders.*
		
		Outputs: Completed (1) DREI financing cost tool, including interview data (quantitative and qualitative), (2) DREI LCOE tool, (3) DREI public instrument costing tool, and (4) assumptions book, summarizing rationale and sources for data and assumptions, as well as (5) a Power-point slide deck with summary findings, including take-aways from the DREI analysis.

Outcome 2		
Local / National contracting		
Project Environmental and Social Safeguards Officer / Specialist	*8 weeks over 4 years*	*The national expert will be nationally recruited by the UNDP and she/he will be responsible for undertaking social and environmental studies related to the activities of the project.* *<u>Duties and Responsibilities</u>*

Consultant	Time Input	Tasks, Inputs and Outputs
Rate: $ 2,000/week		• Monitor progress in development/implementation of the project ESMF ensuring that UNDPs SES policy is fully met and the reporting requirements are fulfilled; • Oversee/develop/coordinate implementation of all safeguard related plans; • Ensure social and environmental grievances are managed effectively and transparently; • Review the SESP annually, and update and revise corresponding risk log; mitigation/management plans as necessary; • Ensure full disclosure with concerned stakeholders; • Ensure environmental and social risks are identified, avoided, mitigated and managed throughout project implementation; • Work with the PMU to ensure reporting, monitoring and evaluation fully address the safeguard issues of the project; • Assist the finance and administration staff by providing technical inputs during the preparation and revision of the Management Plan, Annual Work Plans, periodic reports such as the Combined Project Implementation Review/Annual Project Report (PIR/APR), inception report, technical reports, quarterly reports for submission to UNDP, the GEF, other donors and Government Departments, as required; • Ensure quality control of interventions/outcomes/deliverables; • Document lessons learned from project implementation and make recommendations to the Steering Committee for more effective implementation and coordination of project activities; *Education and experience:* • University / Master's Degree in social and environmental sciences or other closely related areas; alternatively 10 years of experience in the same areas. • At least 5 years of progressively responsible experience at the local and/or national level in environmental and social impact studies (including necessary national qualifications to conduct ESIA analysis under the national legislation). • At least 3 years' experience with community engagement in the public sector; • Previous experience in development assistance or related work for a donor organization, governmental institutions, NGO or private sector / consulting firm is a very strong advantage; • Strong analytical, drafting and communication skills; • Experience in the usage of computers and office software packages (MS Word, Excel, PowerPoint, etc) and advance knowledge of spreadsheet and database packages, experience in handling of web-based management systems; • Strong research skills

Consultant	Time Input	Tasks, Inputs and Outputs
Stakeholder engagement specialist *Rate: $ 1,750/week*	*2.5 weeks over 4 years*	*Provide expert stakeholder engagement guidance and support to the PMU in developing pilot projects, needs assessments, community engagement, impact assessments and design of grievance mechanism with specific consideration of inclusivity of gender, youth and other vulnerable groups.* *Expert or Specialist input supported by contracted services for consultation activities such as surveys, focus groups, etc.*
Outcome 2		
Local / National contracting		
Stakeholder engagement specialist *Rate: $ 1,750/week*	*2.5 weeks over 4 years*	*Provide expert stakeholder engagement guidance and support to the PMU in developing pilot projects, needs assessments, community engagement (consultation and information sharing), impact assessments and design of grievance mechanism with specific consideration of inclusivity of gender, youth and other vulnerable groups.* *Expert or Specialist input supported by contracted services for consultation activities such as surveys, focus groups, etc.*
Outcome 1, 2 and 3		
Local / National contracting		
Gender Analyst / Specialist *Rate: $ 2,000/week*	*15 weeks over 4 years*	*The Gender Analyst(s) will be responsible to provide high quality technical support in ensuring the quality of the gender-responsiveness and mainstreaming of the project, as well as knowledge and capacity building activities, in accordance with the objective and outcomes of the project document and the Gender Action Plan. Expert or Specialist input supported by contracted services for activities identified in the Gender Action Plan.* *<u>Duties and Responsibilities</u>* • *Provide guidance to the various aspects of project design and implementation to enhance mainstreaming gender equality and women's empowerment in all aspects of the project,* • *Guidance for improved gender representation in all project related activities,* • *Ensure inclusivity and gender sensitive communication and consultation,* • *Recommendations for tailored approaches to prioritize women's needs and identified gender equality priorities in the pilot project development,* • *Ensure gender sensitivity in data strategy, data collection frameworks, monitoring, analysis and reporting,* • *Support knowledge sharing, documentation and dissemination of good practices on gender equality, women's empowerment and rights within the project.*
International / Regional and global contracting		

Consultant	Time Input	Tasks, Inputs and Outputs
AMP Regional Project Panel of Technical Experts *Rate: $ 800/day*	*26.25 days over 4 years*	*Drawing from the pool of technical experts available at the regional project, obtain technical advisory support as required for:* • *National Dialogue questions and concerns (Output 1.2).* • *Identification of a business model (if not already established by the regulatory framework) and development of the Minigrid Vision and Implementation Roadmap for Eswatini (Output 1.2).* • *Capacity building including tailoring of training material (Output 1.3).* • *Design and structuring of pilot project business models (Oupts 2.1 and 2.2)* • *Tailoring of training material and knowledge products for industry capacity building (Output 2.3)* • *Design of the data strategy and MRV framework (Outputs 3.1 and 3.4)*

Annex 9: Stakeholder Engagement Plan[85]

1. Introduction

The purpose of developing a Stakeholder Engagement Plan (SEP) for the Africa Minigrid Programme (AMP) national project in Eswatini (hereinafter referred to as the 'AMP in Eswatini' or 'the project') is to support the identification of key stakeholders and undertake the consultations required throughout the project cycle, i.e. project design during the Project Preparation Grant (PPG) stage, and project implementation during its 4 years' duration. The development and implementation of the SEP is also part of the UNDP Social and Environmental Safeguards (SES) requirements. Hence, the presented SEP will be reviewed and updated during the course of the social and environmental assessment processes required for the development of the project's Environmental and Social Management Framework (ESMF).

1.1 Project description

For Eswatini, the AMP focus is on establishing a springboard for RE minigrid development, building data and knowledge resources and 'proof of concept' business models that can inform planning, de-risk investments and encourage private sector participation in the country. This aligns with the country targets for renewable energy (RE) and the expectation that minigrids will contribute to the goal of achieving universal energy access, as set out by the National Energy Policy (2018) and the Kingdom of Eswatini Energy Masterplan, 2034.

This contribution will be achieved through three outcomes: (i) appropriate policies and regulations addressing policy, institutional, regulatory and technical barriers to investment in RE minigrids; (ii) innovative business models, based on cost reduction, operationalized; and (iii) increased awareness and network opportunities in the minigrid market and among stakeholders as well as lessons learned for scaling up rural electrification using RE minigrids.

In addition to supporting the development of data and knowledge resources across all these components, the project will support two pilot project installations under component 2, to demonstrate innovative business models more likely to contribute to cost-effective delivery of electricity to remote rural areas.

1.2 Project location

The fist pilot has a recently established minigrid system that is located in Mvundla, near Sigcineni, in a village isolated by the Ngwempisi river and accessible only by footbridge (no road access). It has GPS coordinates: 26°41'45.26" S, 31°17'25.96" E, elevation 461m. The pilot intervention will focus on growing the productive use of energy within the community, tracking the socio-economic impacts.

The second pilot entails a complete minigrid installation for Ekubekezeleni, Bulimeni area. The pilot site is located at the following GPS coordinates: 26°45'29" S; 31°18'33" E, elevation 939m. This pilot project will introduce electricity to the community for both commercial (small business / cottage industries) and residential consumption. Electricity infrastructure will be introduced in conjunction with other development measures to demonstrate the impact of an integrated approach for minigrid developments.

1.3 Potential social and environmental issues

The benefits of providing access to clean energy in rural areas are multiple. Access to electricity can improve socio-economic conditions through its influence on key components of poverty, namely health, education, income and environment. Electricity access provides avenues for participation in the economy, providing information access, increased connectivity and communication, access to banking and credit systems and local opportunities for skilled and educated workers. Rural electrification is generally associated with improved gender equity and women's empowerment, creating opportunities for girls to access education and, for women more generally, improved safety

[85] Outline relies on content provided in IFC, Guidance Note 1: Assessment and Management of Environmental and Social Risks and Impacts (2012), Annex B.

and income diversification along with the opportunity to engage in microenterprise creation and other income-generating activities.

Clean energy solutions ensure these benefits are achieved with limited impact on the environment and by active displacement of more harmful fuel sources.

While rural electrification programs are crucial to improve living conditions and promote development, they may also have unintended adverse impacts. These may include changing cultural or social practices, localized impact on the environment where construction occurs, increased light pollution, increased usage of water for economic activities, among other.

The SESP has identified the following potential areas of risk arising from the implementation of the project:

Overarching Principle 1: Leave No One Behind
Programming Principle 2: Human Rights
Programming Principle 3: Gender Equality and Women's Empowerment
Programming Principle 4: Sustainability and Resilience[2]
Programming Principle 5: Accountability
Project- level Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management
Project- level Standard 2: Climate Change and Disaster Risk
Project- level Standard 3: Community Health, Safety and Security
Project- level Standard 4: Cultural Heritage
Project- level Standard 5: Displacement and Resettlement
Project- level Standard 6: Indigenous Peoples[86]
Project- level Standard 7: Labour and Working Conditions
Project- level Standard 8: Pollution Prevention and Resource Efficiency

The number of direct project beneficiaries is expected to be around 459 persons, of whom approximately 234 women. The lifetime global environmental benefits that will accrue from the adoption of clean energy minigrid technologies is estimated at 2,444 tCO_2e. Indirect emission reductions amounting to 54,000 tCO2e are expected due to investments in minigrids completed during the 10-year influence period following project completion, predominantly through the replication of the sustainable technology value chain. The project yields a GEF abatement cost of 1,086 USD/tCO_2e. This abatement cost takes into consideration overall upfront and replacement CAPEX of both pilots, as well as CAPEX for PUE overlay.

The monitoring of identified impacts will form part of the project. Pilot projects are particularly important for understanding and quantifying impact including unexpected impacts. Stakeholders are key to this process. Active stakeholder engagement is therefore a priority and the focus of this plan.

2. Regulations and Requirements

At a national level, the Eswatini Environment Authority (EEA), a regulatory agency under the Ministry of Tourism and Environmental Affairs (MTEA), is responsible for facilitating sustainable development and ensuring all development

[86] Based on the initial assessment, this standard is unlikely to be triggered for Eswatini, but is retained for the sake of completeness and will be reassessed at local level when the pilot sites are being developed.

complies with the relevant environmental laws of the country. A comprehensive legal framework is in place[87], with the Environmental Management Act of 2002 the principal Act guiding environmental matters in the country. The Environmental Audit, Assessment and Review Regulations, 2000 provides the requirements and process for obtaining and retaining an Environmental Compliance Certificate for all new developments. Requirements for public participation is included in these Regulations.

In addition, the project will adhere to the relevant international obligations on public consultation and disclosure requirements related to the social and environmental assessment process established by the Guidance Note of the UNDP Social and Environmental Standards (SES) for Stakeholder Engagement. Through this SEP, UNDP meets the requirements of the GEF's Environmental and Social Safeguards Policy too regarding stakeholder engagement.

3. Stakeholder Identification

As part of the PPG development process, the project team identified several groups of stakeholders.

3.1 State and local government authorities, i.e. public sector entities

1) Public sector parties
    - Eswatini Energy Regulatory Authority (ESERA)
    - Eswatini Electricity Company (EEC)
    - Eswatini Environment Authority (EEA)
    - Microprojects Program (MPP) unit
    - Ministry of Natural Resources and Energy
    - Ministry of Tinkhudla Administration
    - Ministry of Finance
    - Ministry of Economic Planning and Development
    - Ministry of Commerce, Industry and Trade (SMME Unit)
    - Ministry of Agriculture
    - Deputy Prime Minister's Office
    - Ministry of Tourism and Environmental Affairs (Climate Change Unit) and GEF focal point
    - Eswatini Standards Authority (ESWASA)

3.2 Private sector associations and companies

1) Private sector parties
    - Associations
        - Renewable Energy Association of Eswatini (REASWA)
        - Africa Minigrid Developers Association (AMDA)
        - Sustainable Energy for All (SE4All)
        - International Renewable Energy Agency (IRENA)
        - South African Centre for Renewable Energy and Energy Efficiency (SACREE)
        - Minigrids Partnership (MGP)
    - Renewable Energy private companies and Organizations
        - Tifiso Energy
        - Ecollibri
        - Whatsupp Solar

[87] Available at: http://www.sea.org.sz

3.3 Development partners with minigrid and renewable energy projects in Eswatini

- World Bank (WB)
- African Development Bank (AfDB)
- European Union (EU) Eswatini
- United Nations Development Program (UNDP)
- United Nations Capital Development Fund (UNCDF) and Finmark Trust

3.4 Local communities

Local communities of relevance to the project can be categorized into two groups: communities in pilot locations (Mvundla, Manzini and Ekubekezeleni, Bulimeni) and communities in non-pilot locations. Representatives of each group will be identified at AMP implementation. Both groups will be further studied during the site assessment to be conducted during project implementation.

3.5 Additional groups (to be further defined during implementation)

- Direct beneficiaries
  - Pilot communities
  - Recipients of training
  - Industry participants
  - Centre for Sustainable Energy Research (CSER) from the University of Eswatini
- Indirect beneficiaries
  - Industry groups (agriculture, fisheries, manufacturing)
  - Non-governmental Organizations (NGOs) working on relevant projects and initiatives
    - Eswatini National Youth Council
    - Swaziland Action Group Against Abuse
    - African network for Prevention and Protection Against Child Abuse and Neglect (ANPPCAN)
    - SOS Children's Villages International
    - Save the Children
    - African Child Policy Forum (ACPF)
    - African Centre for Women (ACW)
    - Women in Africa
    - Business Women Forum Eswatini
    - Swazi Fair Trade Organisation (SWIFT)
    - Imbita Swaziland Women's Finance Trust
    - Coordinating Assembly of Non-Governmental Organisations (CANGO)
    - African Regional Organisation of the International Trade Union Confederation (ITUC-Africa)
    - Trade Union Congress of Eswatini (TUCOSWA)
    - Southern Litigation Centre
    - Federation of Organisations of the Disabled Persons
    - Free Access to Law Movement (FALM)
    - AfricanLII
    - Environmental activists with specific interest in energy
- Other groups of beneficiaries and affected persons
  - Workers unions
  - Women

- Youth
- Children
- Disabled population
- Human rights activists
- Land rights activists
- Minority and vulnerable groups

3.6 Stakeholder list

Contact details of key stakeholder groups who will be informed about and engaged in the project (based on the stakeholder analysis) have been identified as per Table 13. The level of interest indicated is based on interest expressed to participate in interviews, the inception and validation workshops and feedback on the project documentation. The level of interest may change during the implementation phase and the stakeholder list and plan will be updated accordingly. Impact indicates the extent of the impact that the initiative or topic of minigrids is expected to have on a stakeholder, indicating a direct or high impact compared to an indirect or low impact.

This list is also to expand during implementation as further stakeholders are identified. Stakeholders or stakeholder groups with limited capacity to participate effectively in the stakeholder engagement activities will be supported to do so.

Table 13: Stakeholder list

#	Stakeholder organization	Stakeholder category	Interest	Impact	Contact person(s)	Contact details
1	Eswatini Energy Regulatory Authority (ESERA)	Regulatory body	High	High	S Magagula F Matsebula S Dlamini S Khumalo	magagulas@esera.org.sz matsebulaf@esera.org.sz dlaminins@esera.org.sz khumalos@esera.org.sz
2	Eswatini Electricity Company (EEC)	Parastatal	High	High	Liyandza Mthembu Lwati Dvuba Bongumenzi Makhanya Khulile Fakudze Bhekumusa Ziyane	liyandza.mthembu@eec.co.sz lwati.dvuba@sec.co.sz bongumenzi.makhanya@sec.co.sz khulile.fakudze@sec.co.sz> bhekumusa.ziyane@sec.co.sz
3	Eswatini Environment Authority (EEA)	Regulatory body	Medium	High	Ishmael Ndwandwe Isaac Dladla	indwandwe@sea.org.sz gdladla@sea.org.sz
4	Microprojects Program unit	Government	High	High	Bongani Bhembe	bonganijbhembe@gmail.com
5	World Bank	Development Partner	Medium	Medium	Joseph Kapika Sam Oguah L Tibone	jkapika@worldbank.org soguah@worldbank.org ltibone@worldbank.org
6	EU Eswatini	Development Partner	Medium	Low	Miguel Pascoal	Miguel.PASCOAL@eeas.europa.eu
7	African Development Bank (AfDB)	Development partner	Medium	Medium	KAHUBIRE, EDITH BIRUNGI	E.KAHUBIRE@AFDB.ORG
8	Tifiso Energy	Private Sector / Baseline Energy Suppliers / Sustainable Energy Practitioners	High	Medium	Sifiso Dlamini	tifiso@hotmail.com
9	Ecollibri	Private Sector / Baseline Energy Suppliers / Sustainable Energy Practitioners	High	Medium	Ivana Capra Marcelino J. Silveira	info@ecolibri.it ivana.capra@ecolibri.it mret.marteeza@gmail.com
10	Whatsupp Solar	Private Sector / Baseline Energy Suppliers /	High	Medium	None provided	info@wattsupsolar.co.sz

#	Stakeholder organization	Stakeholder category	Interest	Impact	Contact person(s)	Contact details
		Sustainable Energy Practitioners				
11	Ministry of Tinkhudla Administration	Government	High	High	C B Dlamini	cbdlamini@microprojects.org.sz
12	Ministry of Finance	Government	High	High	Nokuthula Dlamini Siphe-okuhle Fakudze	nokuthula2311@gmail.com siphe.fakudze@gmail.com
13	Ministry of Economic Planning and Development	Government	Medium	Medium		
14	Ministry of Commerce, Industry and Trade (SMME Unit)	Government	Medium	High	Mluleki Sakhile Dlamini	mlulekisakhile@yahoo.com
15	Ministry of Agriculture	Government	Medium	Low	Nelson Mavuso	nelsonmavuso@ymail.com
16	Renewable Energy Association of Eswatini (REASWA)	Private Sector / industry association / Baseline Energy Suppliers / Sustainable Energy Practitioners	High	Medium	Mluleki Msibi	mlulekismsibi@gmail.com
17	Centre for Sustainable Energy Research (CSER) from the University of Eswatini	Research Institution / Academia	High	Medium	Mduduzi Mathunjwa	mmmathunjwa@gmail.com
18	Deputy Prime Minister's Office	Government	Medium	Medium	-	makhosinimndawe@gmail.com
19	Business Women Forum Eswatini	Private sector / Women empowerment / small business development	Medium	Low	Mrs Carol Ngcobo	carol.amrecruitment@gmail.com
20	Swazi Fair Trade Organisation (SWIFT)	Private sector / Women empowerment / small business development	Medium	Low	Julie Nelson	julie@swazifairtrade.org
21	United Nations Capital Development Fund/Finmark Trust	Development Partner	High	High	Sabelo Mabuza Kgomotso Tolamo Prudence Mnisi	sabelom@finmark.org.za KgomotsoT@finmark.org.za prudencemnisi@cfi.org.sz

#	Stakeholder organization	Stakeholder category	Interest	Impact	Contact person(s)	Contact details
22	Coordinating Assembly of Non-Governmental Organisations (CANGO)	Non-Government Organisation	Medium	Low	General contact only.	cango@cango.org.sz
23	Imbita	Private sector / women's empowerment	Medium	Low	Tenele Dlamini	taneledlamini86@yahoo.com
24	Eswatini Standards Authority (SWASA)	Parastatal	Medium	Medium	M Mondlane	mmondlane@swasa.co.sz
25	Trade Union Congress of Eswatini (TUCOSWA)	Workers rights / Trade Union Federation	Medium	Low	General contact only.	tucoswa@swazi.net
26	Independent	Environmental Activist	Medium	Medium	Rex Brown	rbrown@ecs.co.sz
27	Independent	Environmental Activist	Medium	Medium	Rod de Vletter	devletter@gmail.com
28	Southern Litigation Centre	Human rights protection	Low	Low	General contact only.	Enquiries@salc.org.za
29	Federation of Organisations of the Disabled Persons	Non government organisations / Persons with Disabilities	Low	Low	General contact only.	fodswa@swazi.net maktxt@gmail.com.
30	Ministry of Tourism and Environmental Affairs (Climate Change Unit) and GEF focal point	Government	High	High		dkn19m@yahoo.com theregoesthecat@yahoo.co.uk hlobskhos@yahoo.com
31	Eswatini National Youth Council	Semi-governmental / Youth protection	Medium	Medium	General contact only.	info@snyc.org.sz
32	Swaziland Action Group Against Abuse	NGO/ Gender based violence, sexual abuse and human traficking	Medium	Low	General contact only.	director@swagaa.org.sz
33	African network for Prevention and Protection Against Child Abuse and Neglect (ANPPCAN)	Children (Labour/Rights)	Low	Low	General contact only. Eswatini does not host a chapter office, but South Africa does. Contact for ANPPCAN South Africa, Ms. Carol Bower.	http://www.anppcan.org regional@anppcan.org carolb1@iafrica.com

#	Stakeholder organization	Stakeholder category	Interest	Impact	Contact person(s)	Contact details
34	SOS Children's Villages International	Children (Labour/Rights)	Low	Low	General contact for Eswatini office	http://www.sos.org.sz
35	Save the Children	Children (Labour/Rights)	Low	Low	General contacts at both the international office and office of South African affiliate organisation	https://www.savethechildren.net info@savethechildren.org info@savethechildren.org.za
36	African Child Policy Forum (ACPF)	Children (Labour/Rights)	Low	Low	General contact only	https://www.africanchildforum.org Info@africanchildforum.org
37	African Centre for Women (ACW)	Women rights / empowerment	Medium	Low	macharia@un.org	http://www.peacewomen.org/civil-society-organisation/african-centre-women
38	Women in Africa	Women rights / empowerment	Medium	Medium	General contact only	https://wia-initiative.com/en/ contact@wia-initiative.com
39	African Regional Organisation of the International Trade Union Confederation (ITUC-Africa)	Workers	Low	Low	General contact only, but Eswatini affiliate: TUCOSWA	http://www.ituc-africa.org/ info@ituc-africa.org
40	Sustainable Energy for All (SE4All)	Sustainable energy	Low	Low	Africa Hub	https://www.se4all-africa.org/the-africa-hub/who-we-are/the-seforall-initiative/ SE4All.Africa@afdb.org
41	International Renewable Energy Agency (IRENA)	Sustainable energy	Low	Low	None specified	https://www.irena.org/ info@irena.org; NDabla@irena.org, BZeyi@irena.org, EWanjiru@irena.org
42	South African Centre for Renewable Energy and Energy Efficiency (SACREE)	Sustainable energy	Medium	Low	Kuda Ndhlukula, Executive Director SACREEE; Mzwandile Thwala, MNRE Official attached at SACREE	kuda.ndhlukula@sacreee.org thwalamm@gmail.com
43	Minigrids Partnership (MGP)	Minigrids	Medium	Low	None specified	https://minigrids.org
44	Africa Minigrid Developers Association (AMDA)	Minigrids	Medium	Low	General contacts	http://africamda.org/ communications@africamda.org engororano@africamda.org

#	Stakeholder organization	Stakeholder category	Interest	Impact	Contact person(s)	Contact details
45	Free Access to Law Movement (FALM)	Law Defenders	Low	Low	Ginevra Peruginelli, Researcher, Institute of Theory and Techniques of Legal information (ITTIG) Marja Hinefelaar, Director of Research and Programs, Southern African Institute for Policy and Research (SAIPAR)	http://www.fatlm.org/members/current/ peruginelli@ittig.cnr.it marja.hinfelaar@saipar.org
46	AfricanLII	Law Defenders	Low	Low	None specified	https://africanlii.org/
47	Mvundla Community	Direct beneficiaries of pilot 1	High	Medium	TBC	TBC
48	Ekubekezeleni, Bulimeni	Direct beneficiaries of pilot 2	High	Medium	TBC	TBC

4. Stakeholder Consultation and Engagement during Project Development

As part of the project development phase, and in addition to the desk review and data collection exercise, the PPG team of National and International Consultants identified key stakeholders and engaged with them in a series of in-person and online meetings. The purpose of these meetings was to discuss the project objective, the suitability of the proposed strategy to the present needs of Eswatini and its alignment with national plans and ongoing market development. The discussions also aimed to identify the gaps that the AMP can work to fill, especially in the presence of several projects targeting energy access and renewable energy development financed by development partners other than the UNDP.

Due to COVID-19 pandemic, the PPG International Consultants were not able to perform a field mission to meet with national stakeholders in-person. Most engagements were therefore done online. In select cases, where restrictions allowed, a hybrid approach was followed with a meeting hosted both physically and online. Consultation meetings and bilateral calls conducted online during the period from September 2020 to February 2021 are captured in Table 14.

Visits to the targeted pilot sites were done in person by country representatives with informal stakeholder consultations. Technical and data constraints meant that pilot project beneficiaries could not participate in the online validation workshop. Additional opportunities will be sought to include them in this planning phase. The stakeholder engagement program in a subsequent section will direct future engagements during implementation.

Table 14: Stakeholder engagement during project development

Interaction type	Type of information disclosed	Location and dates	Individuals, groups and/or organisations consulted	Key issues discussed and concerns raised	Responses to issues raised	Process to provide feedback to stakeholders
Workshop (inception meeting)	Introduction to the scope of AMP program and national project	9 September 2020, Both at the Royal Villas Hotel, Ezulwini and online	14 organisations represented by 31 people (Centre for Sustainable Energy Research (CSER), Eswatini Electricity Company (EEC), Eswatini Energy Regulatory Authority (ESERA), Finmark Trust, IRENA, Japan International Cooperation Agency (JICA), JICA South Africa Office, Microprojects, Ministry of Natural resources and Energy (MNRE), Ministry of Tourism and Environmental Affairs Renewable Energy Association of Eswatini (REAESWA), Swaziland Standards Authority (SWASA), UNCDF, UNDP)	No social or environmental issues were raised by participants related to solar PV minigrids. The approach to gender and social and environmental safeguards was shared with stakeholders.	N.A.	Stakeholder interview process initiated for individual inputs.
Stakeholder interviews	Obtaining input from stakeholders regarding priorities and needs to shape the project design.	Conducted online on multiple dates between September and December 2020	26 organisations (Eswatini Energy Regulatory Authority, Ministry of Natural Resources and Energy, United Nations Climate Development Fund/Finmark Trust, Eswatini Electricity Company, Eswatini Environment Authority, Micro Projects, Renewable Energy Association of Eswatini (REASWA), Centre for Sustainable Energy Research (CSER), Ministry of Economic Planning and Development, Ministry of	Land use rights for women in rural areas was raised as a key challenge facing women with regards to participation in economic activities. A deliberate gender mainstreaming and social safeguards framework was recommended by stakeholders for incorporation in the minigrid project.	Incorporated into the gender analysis and action plan and social and environmental safeguards framework are part of the Project Documentation.	Validation workshop and copy of Project Document circulated for comment

Interaction type	Type of information disclosed	Location and dates	Individuals, groups and/or organisations consulted	Key issues discussed and concerns raised	Responses to issues raised	Process to provide feedback to stakeholders
			Finance, Ministry of Tinkhundla, Ministry of Tourism and Environmental Affairs (Climate Change Unit), Swazi Fair Trade (SWIFT), Tifiso Energy (EEC pilot project developer), Ministry of Agriculture, Ecollibri, Whatsapp Solar, Business Women Forum Eswatini, CANGO, Women and Law in Southern Africa, Imbita, Ministry of Commerce, Industry and Trade)			
Stakeholder consultation at the second pilot site (Ekubekezeleni, Bulimeni area)	Informal consultation to enquire about needs, interest and affordability.	November 2020	Informal conversations with community members	Discussions confirmed interest in energy access. Existing challenges with limited road access and absence of electricity were raised. No other social or environmental issues received spontaneous mention.	N.A.	Community members will be actively engaged in more comprehensive consultation as part of the project development and implementation.
Sharing of project information with workshop invitation	Draft project documentation shared for preparation	5 January 2020	Invitations extended to more than 45 stakeholders across 15 stakeholder categories	N.A.	N.A.	N.A.
Workshop (Validation meeting)	Overview of project design	15 January 2021	Participation by 32 stakeholders from 17 organisations (Centre for Sustainable Energy Research (CSER), Director of Meteorology (Climate Change Unit), Eswatini Electricity	No environmental concerns raised. Request for more deliberate inclusion of youth in project activities	Project Document amended to reflect this priority.	Validation report with response matrix and amended Project Document

Interaction type	Type of information disclosed	Location and dates	Individuals, groups and/or organisations consulted	Key issues discussed and concerns raised	Responses to issues raised	Process to provide feedback to stakeholders
			Company (EEC), Ecolibri Wind Energy, Eswatini Energy Regulatory Authority (ESERA), Coordinating Assembly of Non-Governmental Organizations (CANGO), Microprojects, Ministry of Agriculture, Ministry of Finance, Ministry of Natural Resources and Energy (MNRE), Ministry of Tourism and Environmental Affairs, Renewable Energy Association of Eswatini (REAESWA), Southern Africa Centre for Renewable Energy and Energy Efficiency (SACREEE), Swaziland Standards Authority (SWASA), Tifiso Energy, UNCDF, UNDP, University of Eswatini (UNESWA), World Bank, and one independent environmental consultant / activist.)			

Table 15: Stakeholder engagement at the Mvundla near Sigcineni pilot project, preceding and parallel to project development

Interaction type	Type of information disclosed	Location and dates	Individuals, groups and/or organisations consulted	Key issues discussed and concerns raised	Responses to issues raised	Process to provide feedback to stakeholders
Stakeholder consultation at the	Consultation and engagement by the developer including	A comprehensive list of engagement events is available	The Mvundla community near Sigcineni, as a collective	In addition to general project information and consultation, community	Funding is being sought.	Onsite Q&A, The engagement is ongoing.

Interaction type	Type of information disclosed	Location and dates	Individuals, groups and/or organisations consulted	Key issues discussed and concerns raised	Responses to issues raised	Process to provide feedback to stakeholders
first pilot site (Mvundla, Manzini)	preliminary, informal enquiry regarding productive uses, ongoing consultation.	dating from 16 January 2019 to February 2021	and each individual household, Additional consultations with the MNRE, EEC and Eswatini Environment Authority (EEA)	engagement highlighted the need and opportunity for the minigrid system to support PUEs in the community. Ideas from the community regarding productive were: • Welding workshop • Hammer mill • Internet Café and Secretarial Services Centre	In numerous engagements with the community, the hammer mill is deemed most pressing.	
KaNdinda Royal Kraal Meeting	Project details	KaNdinda Royal Kraal 29/05/2020	EEC, Royal Kraal Inner Council, Mvundla Community	Project details were discussed, and blessings sought from the KaNdinda Royal Kraal, the KaNdinda chiefdom traditionally governs the Mvundla community. Inner Council shown the project site.	Inner Council granted official blessings for the project	Onsite Q&A
Community Training at the first pilot site (Mvundla, Manzini)	Community training on the use of the solar PV system.	9 October 2020	The Mvundla community in Sigcineni,	Introduction to Solar Power Minigrid operation, load management and customer interaction EEC requirements to warrant customer connection. Electricity and Safety	Issues were incorporated in Minigrid management system in the main	Onsite Q&A and incorporation into the development of the minigrid management system.

The dissemination of project information during PPG consultations constituted sharing of a discussion outline and questions of relevance to the stakeholder, presentation of PowerPoint slides to stakeholders who had not attended the inception meeting, followed by an exchange of additional information by e-mail, as required.

In inviting feedback on the project document and participation in the validation workshop, stakeholders were offered a non-government contact point should there be any questions or sensitive issues they wanted to raise or discuss. Similarly, those facing challenges attending or participating in the online meeting, were invited to submit their contact details to be contacted by either the social and environmental specialist or the national consultant.

Initial comments and feedback from participants in the meetings and workshops were summarized in the Stakeholder Engagement Report (issued in November 2020). The comments and recommendations from stakeholders and the UNDP review team shaped the updated project strategy, which has been presented to stakeholders at end of the PPG phase to obtain final comments on the design and validate the overall project strategy before submission to GEFSEC.

5 SEP Development: Strategy for Stakeholder Engagement during Project Implementation

5. Stakeholder Engagement Program (SEP)

5.1 Purpose and objectives

The overall objective of the stakeholder engagement program is to achieve a transparent decision-making process with greater input from stakeholders and their support of the decisions that are taken. The program seeks to define a technically and culturally appropriate approach to consultation and disclosure.

The goal of this SEP is to improve and facilitate decision making and create an atmosphere of understanding that actively involves project-affected people and other stakeholders in a timely manner, and that these groups are provided sufficient opportunity to voice their opinions and concerns that may influence project decisions. The SEP is intended as a useful tool to guide communications between the AMP project and stakeholders.

Unlike gird-connected power plants, the successful operation of minigrids requires continuous collaboration between operators and end-users. In the design of the pilots under the AMP in Eswatini, it is important to understand the needs and priorities of minigrid system operators, but also the needs and priorities of the communities in which the minigrids will be located, to obtain the necessary local support and ensure sustainability and longevity of the intervention.

Furthermore, the enhancement of the commercial viability of solar PV systems depends on the level of flow of information between stakeholders from the private sector and decision makers in the public sector. This flow will guarantee that the decisions made are well-informed and constitute the best use of resources to serve the best interest of the country and beneficiaries. The flow will also guarantee that investors, developers and minigrid system operators are actively engaged in the continued development of regulations governing the energy sector before they become legally binding and are given the opportunity to utilize their technical expertise in the formulation of national plans and laws aiming to increase energy access rates and elevate the living conditions for populations in the rural areas.

The program therefore notes the methods and channels through which to disseminate project information as well as to ensure regular, accessible, transparent and appropriate consultation. The scope and frequency of communication will be tailored to the identified stakeholder list and the initial analysis of levels of interest for each stakeholder. The aim is to appropriately and effectively consult with and engage stakeholders to achieve transparency without overload. Accordingly, stakeholders with a high level of interest will be actively engaged, while others may receive less frequent and more targeted updates.

5.2 Engagement methods and communication mediums

Notwithstanding the COVID-19 restrictions and social distancing recommendations, different types of engagement mediums is possible inside Eswatini. The following list presents the main engagement mediums to be utilized by the project team during implementation to ensure continuous engagement and active participation of stakeholders.

1) In-person meetings:
    - Consultation workshops: These workshops will have a pre-structured agenda, which will be designed to present a specific result/report and discuss with stakeholders the best way forward. These workshops will also be an opportunity to gain consensus from stakeholders on a specific action plan prior to proceeding with implementation. Therefore, stakeholder consultation meetings and workshops are included in the project design as part of the main activities to be carried out by the consultants in charge of each output.
    - Interviews and focus groups: These will be conducted with different groups of indirect beneficiaries, with special attention to System Operators and NGOs, to overcome their generally low participation capacity and ensure that their input is integrated in the different stages of project implementation. The Project Manager will be responsible for ensuring that these interviews and focus groups have been conducted by the responsible consultants, as appropriate.
    - Community based consultations and focus groups: These consultations will focus on the pilot locations to identify and discuss stakeholder concerns, needs and experience/impact within the community environment, but will also extend to neighboring villages and communities. The PMU, in support from the system operator or appointed service providers, will be responsible for conducting these consultations on a regular basis and reporting to the Project Steering Committee or Board.

2) Written communication:
    - Emails: Email communication is widely used in Eswatini to provide direct access to individuals and representatives of organizations. Emails will be used as the main tool for organizing meetings, i.e. sending invitations to participants, sending the meeting minutes after the meeting, etc.
    - Letters: Being the formal method for communication and conveying messages between public parties, letters will be requested by the project team and provided by the relevant authority, as appropriate.
    - Survey forms: Several activities under the project implementation strategy constitute undertaking a needs assessment or other types of analyses, with some involving undertaking a survey to collect information. The responsibility for the surveys is that of the consultant undertaking the analysis. However, the PMU will be responsible for supporting the project consultants with the sampling process and surveying procedure to ensure the results are as representative and inclusive as possible.
    - Project brochures and manuals to present the results of specific studies and outcomes of certain activities.

3) Online meetings and phone calls: Virtual communication is sometimes preferred since it is quicker and easier compared with email and letters, and a viable alternative to in-person meetings. Online applications and telecommunication tools will be used throughout project implementation to facilitate the work and ensure the project team has easy access to stakeholders, and vice versa.

4) Capacity development and training. Both pilot projects will provide support for small business development to the pilot communities through training and capacity building/support programs with a particular focus on women-owned businesses. Small business development support will be offered in partnership with the MSME Unit and the Department of Cooperatives, both within the Ministry of Commerce, Industry and Trade (MCIT) to support the establishment, formalisation and growth of small businesses and cottage industries

through training and mentoring, value chain development, developing linkages to market and opening trade opportunities to regional and global networks.

5) Other engagement activities. Another element foreseen for the pilot is making available EE cooking appliances to households. The exact scope, focus and structure will be dependent on a status quo and needs assessment and consultation with the community.

Although the mode of communication may vary according to task and participants, all consultations and engagement activities will be undertaken with the goal of ensuring full participation of relevant stakeholders, whereby all participants will be provided sufficient notice to prepare well and provide input for the project. Moreover, the AMP in Eswatini project will also use all possible opportunity, i.e. workshops, meetings, trainings and awareness events, to promote diversity and gender balance. Balanced representation of relevant stakeholders will be ensured by reaching out to both men and women and different groups through appropriate communication means and encouraging their participation, noting the most socially and culturally acceptable method of communication and language and consultations for each group of stakeholders.

While engagement is expected to be part of all activities, engagement activities are foreseen as a key part of the following project activities:

- **Output 1.2, National Dialogue.** Facilitated engagement among key stakeholders to formulate the expected contribution of minigrids in Eswatini. Engagements will include regular meetings structured around an annual workplan, an established interface with the regional project through National Representatives to the regional Community of Practice, as well as access to regional expert inputs into discussions.
- **Output 1.3, Capacity building**. Training events hosted for public stakeholders.
- **Output 1.4, DREI Analysis**. Risk analysis and risk costing developed based on interviews and meetings with industry stakeholders held during the first nine months of implementation.
- **Output 2.1, PUE overlay pilot project**. Stakeholder consultation to identify preferred / priority PUEs and electrical equipment or appliances for the pilot implementation. Stakeholder engagement (surveys, focus groups, interviews, etc.) to track socio-economic impacts with specific focus on gender and youth. Mechanisms offered to receive questions, feedback and concerns or issues. Participation of community representatives on the Project Board / Steering Committee.
- **Output 2.2, Energy Hub pilot project.** Stakeholder consultation to develop the Energy Hub pilot, including footprint of minigrid network, preferred / priority PUEs and electrical equipment or appliances for the pilot implementation. Stakeholder engagement (surveys, focus groups, interviews, etc.) to develop baseline and track socio-economic impacts with specific focus on gender and youth. Mechanisms offered to receive questions, feedback and concerns or issues. Participation of community representatives on the Project Board / Steering Committee.
- **Output 2.3, Capacity building.** Capacity building for potential developers and operators, including public sector players involved in project design and evaluation of proposals. Training material to incorporate experience gained from country-specific experience and pilot projects. It is foreseen that participation in the initial training courses will be (in part or fully) sponsored by the AMP to encourage participation and reach. Inclusion of women and youth in training will be given priority, targeting at least 50% participation by women and appropriate representation by youth and other vulnerable groups, as relevant.
- **Output 3.1. Quality Assurance and Monitoring Framework.** Website established as part of data strategy to provide access to all project information and provide contact details / options available to stakeholders as detailed under Public Disclosure of Information and Grievance Mechanism in this plan.
- **Output 3.4.** Development of lessons learned and case studies to incorporate stakeholder inputs on experiences and impacts.
- **Output 3.5. Knowledge Network** (or local Community of Practice). Established among active and interested industry role-players to encourage information sharing, collaboration and innovation related to minigrid development and rural energy access. Schedule of topics and events to be developed by the community.

Interface with regional project to access knowledge resources, cross-country experiences and South-South learning.
- **Output 3.6. Inception meeting** including broad stakeholder representation across all the categories and stakeholder groups already identified.
- **Output 3.6. Evaluation**. Stakeholder interviews included as part terminal evaluation.

5.3 Public Disclosure of Information (PDI)

In the interest of transparency, the following measures will be established to receive feedback and to ensure ongoing communications with stakeholders (outside of a formal consultation meeting):

- A project website will be created to make available all project related information including reports, publications, events, training opportunities, etc.
- The project website will provide a facility to receive feedback and to ensure ongoing communications with stakeholders (outside of a formal consultation meeting). Additionally, a contact point within the PMU will be provided for this purpose.
- The Grievance Mechanism (Section 8 below), further describes channels and opportunities for feedback and concerns to be raised.

5.4 Diversity, inclusion and gender-balance

From the social and environmental safeguards perspective, this is ensured by including at least one representative from each stakeholder group, including those representing vulnerable or disadvantaged groups.

6. SEP Implementation: Resources, Responsibilities and Timeline

The size of the project does not allow for extensive stakeholder engagement measures or dedicated staff for this purpose. Stakeholder engagement will therefore form part of the broader interactions with project stakeholders. The frequency of communication will be guided by the specific level of stakeholder interest. Specific opportunities for engagement will coincide with anticipated outputs and the development phases for deliverables and milestones towards outputs. More deliberate consultation and engagement activities will be implemented for the two pilot projects and as part of the project monitoring and reporting activities.

At the national level, project-affected, marginalized and disadvantaged stakeholders have been identified, including persons with disabilities and other disadvantaged groups as per the list of stakeholder groups provided above in this document. This list will also be completed at the local level for the pilot sites. As relevant, the following assessments will be conducted as part of the stakeholder engagement taking into account their involvement in each project component:

- Identify limitations for understanding project information and participating in consultation process (e.g. language differences, lack of transportation, accessibility of venues, disability)
- Develop measures to support and accommodate engagement (e.g. provide information in accessible formats, choose convenient locations for consultations, ensure venues are accessible, provide transportation to meetings, change time of meetings to accommodate needs, provide facilitation and explain complex issues and terminology, provide support workers for assisting participants with disabilities, provide simultaneous interpretation (language, signing)
- There is no budget specified for SEP activities, but has been included in the budgets of related outputs, notably the interfacing for training with the regional program, National Dialogue, Community of Practice, stakeholder consultation for pilot projects and extensive data collection for the monitoring of impacts.

The anticipated stakeholder interfaces, parties responsible to lead engagement and ensuring communication to specified stakeholders as well as the frequency of communication is provided below:

Table 16: Stakeholder engagement plan

#	Stakeholder category (alphabetically listed)	Engagement approach[88]	Type of Information (shared and collected)	Communication channels or methods	Frequency[89]	Responsible party for engagement
1	Academic community	Involve (potentially partner)	Policy, regulatory, technology /industry and project developments. Training needs and training offerings.	Emails, website, webinars, workshops, community of practice events, meetings, training events	Frequent	PMU
2	Baseline energy supplier(s)	Collaborate / Partner	Policy, regulatory, technology /industry and project developments. Pilot project developments. Update on outputs and findings. Active participation in project design and industry developments.	Progress updates, emails, newsletters, website, webinars, workshops, community of practice events, meetings, training events.	Very frequent	PMU
3	Children protection / rights	Keep informed	General information on clean energy minigrid sector developments. Detailed information related to pilot project scope of activities. Invite questions and inputs on risks, opportunities and developments.	Newspapers, radio, website. All project information available online and from the PMU.	Occasional	PMU
4.1	Development Partner (general)	Consult	Policy, regulatory, technology /industry and project developments. Project developments. Update on outputs and findings.	Progress updates, emails, newsletters, website, webinars, workshops, community of practice events, meetings, training events.	Less frequent	PMU, Implementing Partner
4.2	Development Partner (co-financier)	Involve	Policy, regulatory, technology /industry and project developments. Pilot project developments. Update on outputs and findings.	Progress updates, emails, newsletters, website, webinars, workshops, community of	Frequent	PMU, Project Board, Implementing Partner, National Dialogue

[88] Inform (provide stakeholders with balanced and objective information to assist them with understanding developments, progress, issues, opportunities and solutions). Consult (obtain feedback from stakeholders on design, findings, analyses, options and/or decisions). Involve (Work directly with stakeholders throughout the process to ensure concerns and/or views are consistently understood and considered. Collaborate (Collaborate with stakeholders as partners throughout the process, including in the analyses and development of solutions and in making decisions).

[89] Where Very frequent is likely to be ongoing or at least once a month, Frequent is likely to be monthly to quarterly, Less frequent: once or twice a year and Occasional: on an ad hoc basis, but with all general information readily available for access.

#	Stakeholder category (alphabetically listed)	Engagement approach[88]	Type of Information (shared and collected)	Communication channels or methods	Frequency[89]	Responsible party for engagement
			Active participation in project design details and alignment / interface requirements, as relevant for areas of co-finance.	practice events, meetings, training events. If interested, may participate in Project Board / Steering Committee.		
5	Energy sector, suppliers and businesses	Involve	Policy, regulatory, technology /industry and project developments. Project developments. Update on outputs and findings. Invite inputs on design and sector developments.	Interviews with stakeholder representatives, Surveys, polls, and questionnaires, Public meetings, workshops, and/or focus groups with specific groups. Training and knowledge sharing events. Community of Practice.	Less frequent	PMU, identified project partners and Community of Practice
6	Environmental activists	Consult	Policy, regulatory, technology /industry and project developments. Project developments. Invite questions, concerns and inputs on risks, opportunities and developments.	Interviews with stakeholder representatives, Surveys, polls, and questionnaires, Public meetings, workshops, and/or focus groups with specific groups. Training and knowledge sharing events.	Frequent	PMU, identified project partners and Community of Practice
7	General public	Inform	General information on clean energy minigrid sector developments. Detailed information related to pilot project scope of activities. Invite questions, concerns and inputs on risks, opportunities and developments.	Newspapers, radio, website. All project information available online and from the PMU.	Occasional	PMU
8.1	Government (directly involved)	Collaborate / Partner	General information on clean energy minigrid sector developments. Detailed information related to pilot project scope of activities. Active engagement on industry / sector development, opportunities, roadmap / vision.	Part of Project Board / Steering Committee, progress updates, emails, newsletters, website, webinars, workshops, community of practice events, meetings, training events.	Very frequent	PMU, Project Board, National Dialogue

#	Stakeholder category (alphabetically listed)	Engagement approach[88]	Type of Information (shared and collected)	Communication channels or methods	Frequency[89]	Responsible party for engagement
				Recipients of training and capacity building.		
8.2	Government (less directly involved)	Consult	Share general information on clean energy minigrid sector developments. Consult regarding opportunities for collaboration and coordination. Invite questions, concerns and inputs on risks, opportunities and developments.	Emails, website, webinars, newsletters. Invite to knowledge sharing events. Interviews / meetings with stakeholder representatives.	Less frequent	PMU, Implementing Partner, National Dialogue
9	Human rights protection / Law defenders	Keep informed	General information on clean energy minigrid sector developments. Invite questions, concerns and inputs on risks, opportunities and developments.	Newspapers, radio, website. All project information available online and from the PMU.	Occasional	PMU
10	Impacted communities	Involve (potentially partner)	Detail pilot project information, design information and consultation on design elements, needs assessments, priorities, etc. (Specific focus on youth, women and other vulnerable or marginalized groups that are identified).	Interviews with stakeholder representatives, surveys, polls, and questionnaires, Public meetings, workshops, and/or focus groups with specific groups (youth, women, etc.) Compliance with government and UNDP stakeholder consultation / project disclosure with appropriate disclosure periods, as relevant.	Very frequent	PMU, Project Board, Implementing Partner
11	Land rights	Keep informed	General information on clean energy minigrid sector developments. Invite questions and inputs on risks, opportunities and developments.	Newspapers, radio, website. All project information available online and from the PMU.	Occasional	PMU
12	People with disabilities	Keep informed	General information on clean energy minigrid sector developments.	Newspapers, radio, website. All project information available online and from the PMU.	Occasional	PMU

#	Stakeholder category (alphabetically listed)	Engagement approach[88]	Type of Information (shared and collected)	Communication channels or methods	Frequency[89]	Responsible party for engagement
			Invite questions and inputs on risks, opportunities and developments.			
13.1	Regulatory body (Energy)	Collaborate / Partner	General information on clean energy minigrid sector developments. Detailed information related to pilot project scope of activities. Active engagement on all aspects of overall project, industry / sector development, opportunities, roadmap / vision.	Likely owner of PMU and therefore project information. Reporting to Project Board / Steering Committee, progress updates, emails, newsletters, website, webinars, workshops, community of practice events, meetings, training events.	Very frequent	PMU, Project Board, Implementing Partner, National Dialogue
13.2	Regulatory body (Environment, other)	Consult	General information on clean energy minigrid sector developments, highlighting specific matters with regulatory scope or area of interest. Invite questions and inputs on risks, opportunities and developments.	Emails, website, webinars, newsletters. Invite to knowledge sharing events. Interviews / meetings with stakeholder representatives. Consult with regards specific regulatory aspects.	Frequent	PMU, Project Board, Implementing Partner
14	Sustainable energy sector	Consult	Policy, regulatory, technology /industry and project developments. Project developments. Update on outputs and findings. Invite inputs on design and sector developments.	Interviews with stakeholder representatives, Surveys, polls, and questionnaires, Public meetings, workshops, and/or focus groups with specific groups. Training and knowledge sharing events. Community of Practice.	Less frequent	PMU, identified project partners and Community of Practice
15	Women	Consult	General information on clean energy minigrid sector developments, highlighting specific relevance to women equity and empowerment. Invite questions, concerns and inputs on risks, opportunities and developments.	Specific gender engagement as captured in gender action plan (Annex **Error! Reference source not found.**). Pilot project beneficiaries as detailed for Impacted communities. Women in general: newspapers, radio, website and	Less frequent	PMU

#	Stakeholder category (alphabetically listed)	Engagement approach[88]	Type of Information (shared and collected)	Communication channels or methods	Frequency[89]	Responsible party for engagement
				targeted communication to national women's organizations. All project information available online and from the PMU.		
16	Worker unions	Keep informed	General information on clean energy minigrid sector developments. Invite questions, concerns and inputs on risks, opportunities and developments.	Newspapers, radio, website. All project information available online and from the PMU.	Less frequent	PMU
17	Youth	Keep informed	Policy, regulatory, technology /industry and project developments. Training and/or career opportunities. Withing pilot project communities,	Newspapers, radio, website. Pilot project beneficiaries as detailed for Impacted communities. All project information available online and from the PMU.	Less frequent	PMU

In implementing the SEP, the following requirements will apply:

- All communication will be available in English, one of two official languages and the official medium of instruction in Eswatini. English will be used to facilitate a common and broader project understanding outside of the country borders.
- At the discretion of the PMU, translations of printed material, written and spoken communication will be available in Swazi, official and national language of Eswatini. At the very least, communications to impacted communities, i.e. beneficiaries of the pilot projects, must be available in both English and Swazi.
- The COVID-19 pandemic has had an impact on stakeholder engagement, limiting engagement to online channels and excluding communities with limited or no access to online facilities. The extent to which this will continue into the implementation phase is uncertain, but should it persist, alternate opportunities to allow for information flow and ensure participation must be implemented. Examples may include delivery of information through the local radio, paper posts on key local community places, word to mouth through local leaders, among others.

8. Grievance Mechanism

As part of the project's compliance with the UNDP SES requirements, the project shall ensure setting up a suitable Grievance Redress Mechanism (GRM). This includes a procedure for stakeholders and affected communities to express their grievances and communicate their concerns and recommendations to the project team, as well as a procedure for the project team to address these grievances by taking the necessary actions, i.e. providing clarifications, opening investigations, or making changes to the project's implementation plan as may be required.

In the area of ensuring open communication on grievances, the project intends to implement the following measures:

1) Two boxes will be installed at the pilot project sites. The first will be placed inside the pilot boundaries while the second will be located outside the project boundaries. These boxes will be checked on a regular basis by the system operator to check for new comments from stakeholders.
2) A dedicated email will be established or earmarked for stakeholders to use for questions, recommendations and grievances. The email address will be made available on all printed material, in the email signature of the PMU team and displayed on the sign carrying the name of the pilot projects.
3) The contact details for the project officers will be displayed at several central locations around the pilot location, i.e. community centers at villages receiving electricity from the pilot project and nearby villages as appropriate.

The responsibility of responding to or addressing the grievances received will depend on the nature of the grievance. Nevertheless, the PMU will be responsible for following up until actions are taken to close a grievance, including communicating with relevant persons and/or authorities on behalf of the project.

While it is not anticipated in Eswatini, it should also be clarified to all relevant parties at pilot sites that there will be zero tolerance for any reprisals or retaliatory actions against any stakeholders. Should it be necessary, preventative and response measures specific to the circumstances should be identified together with relevant stakeholders. Measures may include respect for confidentiality; adjustments to means and timing of communications, meetings, transportation; use of trusted intermediaries, interpreters, facilitators and other consultants; clear response protocols for notification, reporting, and support for protection strategies.

All stakeholders should also be informed of the availability of UNDP's Accountability Mechanism (Stakeholder Response Mechanism, SRM, and Social and Environmental Compliance Unit, SECU) as additional avenues of grievance redress.

9. Monitoring and Reporting

Component 3 calls for annual progress reporting to include monitoring of any gender, environmental and social risks and related management plans. The need for social (including gender and youth) and environmental impacts to be baselined and tracked is also included as a priority under the respective pilot projects. Engagement for monitoring and reporting will take the approach detailed under Section 5.2, as relevant for each stakeholder group and data integrity. Feedback from stakeholder engagements will be reported back to project-affected and broader stakeholder groups using a relevant channel or media which may include verbal feedback, tailored newsletters/bulletins or sharing of social and environmental assessment reports or monitoring reports.

As project information changes, the SEP should be reviewed and modified accordingly to ensure its effectiveness in securing meaningful and effective stakeholder participation. Hence, the SEP presented in this document will undergo further review and development by the project team throughout the project lifetime. Similarly, the scope and focus of the SEP will be modified to reflect the lessons learned from the implementation of SEP in Eswatini, but also in other national projects participating in the AMP program. Equally important is the review and update of SEP procedures based on the feedback received from the Project Board and stakeholders.

Annex 10: Environmental Social Management Framework (ESMF)

Refer separate ESMF document.

Annex 11: Gender Analysis and Gender Action Plan

1. Background

UNDP prioritizes gender mainstreaming as its main strategy to achieve gender equality and women's empowerment. Gender mainstreaming is the process of assessing any planned action in all areas and levels to determine the implication for women and men. It is a strategy for making women's, as well as men's, concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of projects so that women benefit equally. Gender mainstreaming aims to transform unequal social and institutional structures in order to make them profoundly responsive to gender, and, when realized, it ensures that both women and men benefit equally from the development process. It involves much more than simply adding women's participation to existing strategies and programmes. Special attention and action is often required to compensate for the existing gaps and inequalities that women currently face.

The UNDP Gender Equality Strategy 2018-2021 is aligned with the 2030 Development Agenda and UNDP's Strategic Plan. The strategy recognizes gender equality as a human right as well as instrumental to the achievement of sustainable development. It considers women and men as active agents of change and development, not simply beneficiaries and vulnerable groups and it recognizes how working with men and boys is of critical importance to change gender norms and attitudes and achieve gender equality.

The GEF Council approved a new GEF Policy on Gender Equality[90], in November 2017. The policy outlines the need to address gender equality and promote women's empowerment across GEF operations, and, in particular, in its projects and programs. The policy requires gender-responsive actions, from design to implementation, monitoring and evaluation to ensure that GEF programs and projects are not only designed with a good understanding of relevant gender differences, roles and needs, but also actively pursue activities that contribute to equal access to and control over resources, decision-making, and empowers women and girls.

Both UNDP and the GEF require a gender responsive approach, an approach in which the particular needs, priorities, power structures, status and relationships between men and women are recognized and adequately addressed in the design, implementation and evaluation of activities. The approach seeks to ensure that women and men are given equal opportunities to participate in and benefit from an intervention and promotes targeted measures to address inequalities and promote the empowerment of women.

2. Context and gender situation in Eswatini

As an absolute monarchy with male head of state, it is a *de jure* and *de facto* patriarchy. Decision-making power and wealth are concentrated at the top of government. The head of state, by one estimate, is tied for 31st largest landowner in the world,[91] with 1 million hectares (60% of the nation's land) in his possession and he is able to evict citizens, including women, from this land at will via appointed officials.[92] The head of state maintains a polygynous marital status and has faced allegations of both early[93] and forced [94] marriage. While the status and actions of the head of state are certainly not representative of all forces within the country, neither should they be completely ignored.

UNDP/GEF project measures supporting gender equality in Eswatini will likely need to: a) be locally acceptable and realistically achievable, b) be incrementalistic in nature, c) emphasize win-win outcomes

[90] GEF/C.53/04 (http://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.C.53.04_Gender_Policy.pdf)
[91] "The World's 101 Biggest Private Landowners."
[92] Dlamini, "Traditionalist Elliot Mkhatjwa Calls for Nation-Wide Protests against King's Decision to Evict Women Vendors at Mafutseni."
[93] "Swazi King Drops Sex-Ban Tassels."
[94] Amnesty International, "Swaziland: Human Rights at Risk in a Climate of Political and Legal Uncertainty (AFR 55/004/2004)."

for both women and men, d) and proceed with broad engagement and buy-in from community stakeholders, including area chiefs and *inkhundla* officials.

2.1 Demographics

Eswatini's population is around 1.1 million, with 1% annual population growth, generally negative levels of net annual migration (approximately -40,000), and a crude birth rate of around 25 (per 1,000).[95]

Table 17 Eswatini Demographics (2019)[96]

Sex	Population	Percent of Total
Male	562,789	49%
Female	585,341	51%

Women's life expectancy of 64 years is considerably higher than that of men (55 years). These are 2018 estimates, up from the 2005 averages of 45 and 41 years, respectively, at the height of HIV/AIDS-related mortality.[97] The full range of causes of national male excess mortality from 2005 to 2020 is not entirely clear (life expectancy rebounded 19 years for women vs. 14 years for men) but further investigation is warranted to see if electricity services could potentially play a role in helping close the gap for men.

The fertility rate (births per woman) has been steadily falling since the early 1980's and currently stands at three births per woman (2018 estimate).[98] Thirty-eight percent of the population is under the age of 15 (more than half are under the age of 25) and three quarters live in rural areas.[99] The youthful nature of the population means that there is a high dependency ratio, with women and older children predominantly shouldering the responsibility of caregiving. At least one nationally present organization active in women's economic empowerment urged that due to this fact, patience is required on the part of programs supporting women's income generating activities. Women's business activity, even cottage industry, may have to be paused for periods of time to cope with family illness, childbirth, childrearing, or periods of intense own-farm production. Swazi women are reported to be highly likely to restart their activities once their time poverty conditions have improved. Thus, program Monitoring and Evaluation Frameworks should correspondingly prioritize long-term results and not "penalize" the temporary cessation of activities.

2.2 Legal rights and framework

In Eswatini, two legal frameworks apply. The first is uncodified Eswatini law and customs (together known as customary law), and the second is a combination of partly codified Roman and Dutch legislation (civil law).[100] The 2005 Constitution provides for equality before the law and three separate organs of government (executive, branch, legislature, judiciary), but the King's supreme executive authority over other branches of government, created via a 1973 Emergency Decree, has been upheld by the courts, giving him control over many appointments and effective veto power across the board. This dynamic has resulted in the halting progress and/or delayed enactment of several constitutional provisions related to gender equality. There have, however, been recent legal developments of interest, including the passage of legislation related to gender-based violence and women's political participation, as well as rulings of the High Court relevant to gender equality.

Started in 2009,[101] but not receiving Royal assent and becoming law of the land until 2018, the Sexual Offenses and Domestic Violence (SODV) Act domesticates some of the provisions of the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) and aligns with the Sustainable

[95] World Bank, "World Bank Open Data."
[96] World Bank.
[97] World Bank.
[98] World Bank.
[99] World Bank.
[100] Social Institutions and Gender Index, "Kingdom of Eswatini."
[101] Social Institutions and Gender Index.

Development Goals and African Union Agenda 2063 approaches to tackling gender-based violence.[102] Gender-based violence remains an important social issue, though recent statistics are scarce. A 2007 survey found 38% of young women (ages 18-24) experienced sexual violence, 9% experienced coerced sex, and 5% experienced physically forced sex, all before turning 18.[103]

The Women in Elections Act, like SODV, also became law in 2018. In 2019, of the 73 members in the House of Assembly, seven were women (10%) whereas out of 30 Senate members, 12 were women (40%).[104] In the event that women hold fewer than 30% of House seats, the Constitution calls for the House to elect one woman from each region (four total), and this happened in November 2018.[105] In the Senate, where 10 of the 30 members are indirectly elected by the House, the Constitution stipulates that half shall be women; while of the 20 senators appointed by the king, eight are required to be women.

The concept of *marital power*, until it was struck down by the high court in 2019,[106] granted husbands the right to conclude contracts and administer property without wives' consent but required wives to seek their husbands' consent before doing the same, effectively "relegating married women to the legal status of minors under the guardianship of their husbands."[107] Even though the institution of *marital power* contradicted equality provisions in the Constitution, it persisted in some legal form for more than a decade. Care may have to be taken during MG program implementation to address lingering social norms related to marital power, especially insofar as they affect intra-household decisions to purchase electricity-using appliances for home or work or for women to champion productive use ventures.

The Constitution permits women and men equal access to land for domestic use but in practice landholding is skewed. There are two types of land in the country, Swazi National Land (SNL) and Title Deeds Land (TDL). SNL can be granted via the area chief, but traditionally as it is governed by customary law, women could only make requests to access this land through a male relative.[108] TDL is bought and sold on the market, meaning women's lower ownership rates could also reflect their lower access to resources to purchase land in addition to any complicating factors resulting from their marital status. The abolition of marital power is expected to improve the situation of women's landholding, but still does not fully resolve the pluralistic legal framework that applies to SNL in a way that protects women's land rights across the board (see, for example, the recent court case of Ethel Dlamini as widow[109]).

Gendered dynamics of land tenure could potentially affect the MG pilots in at least two ways:

- Through the ownership over the actual MG site and environs, influencing feelings of control, decision-making and governance over the project;
- Through providing a sense of long-term security in productive use endeavours, giving assurance to entrepreneurs and those enabling them that they won't be dispossessed;
- Through the potentially rising value of land around the Energy Hub pilot, which if successful could in the future become an important commercial centre of gravity.

A MG support program would do better to rely on persuasion and consensus building for its gender inclusion efforts rather than being overly proscriptive and legalistic. This is because the legal framework for gender rights and protection, due to the existence of mixed and overlapping sources of law as well as the supreme power vested in the monarch, is uneven and sometimes unreliable.

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[102] Southern Africa Litigation Centre, COSPE Onlus, and Foundation for Socio-Economic Justice, "Eswatini's Sexual Offences & Domestic Violence Act: A Summary."
[103] Together for Girls, "Eswatini."
[104] Inter-Parliamentary Union, "Eswatini - House of Assembly."
[105] Inter-Parliamentary Union, "Eswatini."
[106] Southern Africa Litigation Centre, "PRESS STATEMENT."
[107] Southern Africa Litigation Centre, "Eswatini."
[108] Kelly et al., *Women's Equal Property and Land Rights Hold Key to Reversing Toll of Poverty and HIV/AIDS in Swaziland: A Human Rights Report and Proposed Legislation*.
[109] "Eswatini Court Upholds a Widow's Rights to Customary Land Use – A Beacon of Hope?"

2.3 Marriage customs

Eswatini's is a patrilineal culture where, according to tradition, women join their husbands' households, children remain with their fathers if the marriage is dissolved, and male children inherit from their fathers. (Though the Constitution calls on Parliament to ensure the best interests of children are accounted for in custody matters and that children can inherit regardless of sex—this is not always put into practice.) These traditions can render houses—and by extension any associated electricity connections—predominantly male property by default. Also, these marriage customs can have the effect of weakening women's social influence across a range of issues because, for example, wives may lack allies when living among in-laws, they may fear losing their children over a disagreement, and finally, disadvantaged in inheritance matters, many have fewer economic resources at their disposal. Since 2005, children are only able to be granted citizenship through their fathers.[110]

With regards to marriage, while the Constitution stipulates that no woman uphold any custom to which she is opposed, and that polygamy is prohibited in civil marriages, polygamy and customary practices do still exist. This includes *inhlanti* (where a younger sister or paternal niece is given for marriage to a woman's husband if she cannot bear children) and *kwendzisa* (an arranged marriage which often takes place at a young age).[111] There also exists a cultural practice of bride price (*emalobola*) whereby the husband's family pay a price to the bride's family, often creating normative expectations for the woman to serve her husband and in-laws and reducing her bargaining power since the bride price will have to be returned in case of marital dissolution.[112] There is no civil divorce in the legal sense, which conflicts for example with religious marriage customs of the country's Muslim minority, but marriages can be dissolved on a number of grounds, including death, adultery, and desertion.[113]

For widows of both civil and customary marriages, the Constitution offers the right to inherit the estates of their spouses, but some widows are nevertheless dispossessed, or pressured to marry their deceased spouses' brothers. Mourning customs are still prevalent whereby a widow is expected to withdraw from public life and also wears special garments (*kuzila*), which can create social stigma and negatively affect her ability to work.[114] In pluralistic Swazi law, some traditional authorities may only recognize a male heir, complicating the inheritance process, especially if customs prevent women from approaching or petitioning a chief during the mourning period, which can last two planting seasons.

Special program considerations may be needed to be able to fully include widows in stakeholder consultation meetings within the pilot sites and assist them with any travel and logistical barriers preventing them from benefiting from the project. To the extent allowable and feasible, the pilot projects should encourage couples to view and treat electricity connections and appliances as joint property and decisions regarding their use as joint as well. If a female beneficiary becomes widowed or divorced during the program implementation, there may a desire for program implementers to advocate on her behalf to maintain or restore her access to any rightful business assets, including land and equipment, directly implicated through the program's support.

2.4 Education

The net enrolment rate in primary school is similar, and approaching universal, for boys and girls as seen in Table 18.[115] Completion rates are significantly lower than enrolment rates, however, and there is a fair amount of student attrition overall moving into secondary education. On average, boys are slightly more likely than girls to drop out of primary education and girls are slightly more likely than boys to drop out of secondary education. Pregnancy was the primary motivating reason of 10% of the boys who

[110] "World Report 2020."
[111] Coordinating Assembly of NGO's (CANGO), "Shadow Report to the United Nations Committee on the Elimination of Discrimination Against Women."
[112] Tadesse and Daniel, *Gender Mainstreaming Experiences from Eastern and Southern Africa*.
[113] Social Institutions and Gender Index, "Kingdom of Eswatini."
[114] Owen, "Issues of Discrimination in Widowhood in Swaziland That Require Addressing in the Context of CEDAW."
[115] Department of Gender and Family Issues, "The Kingdom of Eswatini's Country Progress Report on the Implementation of the Beijing Declaration and Platform for Action."

dropped out of secondary school, but 42% of girls who left at this stage in their education did so because of pregnancy (2017 estimate).[116]

Table 18 Enrolment rates by schooling level (2014-2017)[117]

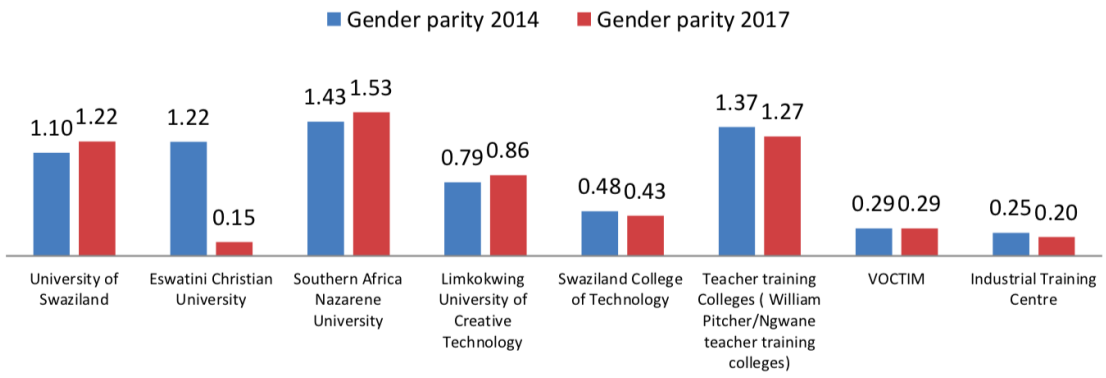
Year	Primary school level (%)		Secondary school level (%)	
	Male	Female	Male	Female
2014	93.7	94.4	23.6	34.2
2015	93.9	94.8	23.7	32.1
2016	93.4	94.9	22.6	34
2017	94.5	93.5	26	38.7

Table 19 Schooling completion rates (2014)[118]

Primary education completion (%)		Lower secondary education completed (%)		Upper secondary education completed (%)	
Male	Female	Male	female	Male	Female
64	76.7	47.09	54.33	31.09	33.4

In tertiary education, there are slightly more women enrolled but these enrolments are highly uneven depending on the institution, with technical/STEM-focused enrolling disproportionately more young men (see Figure 7, note that a score of '1' indicates gender parity, numbers greater than 1 mean more women than men are enrolled). This signals two potential gender hurdles for MG development. First, it will be difficult (though not impossible[119]) to attract balanced numbers of men and women to work as MG designers, installers, technicians, and entrepreneurs. Second, there are likely gender norms associating certain pieces of electrical equipment and machinery with male ownership and use, potential hindering the gender equitable rollout of certain PUE activities unless certain support measures are put in place.

Figure 7 Gender Parity in Tertiary Institutions in 2014/17[120]



[116] Department of Gender and Family Issues.
[117] Department of Gender and Family Issues.
[118] Department of Gender and Family Issues.
[119] A professional recruiter reported having a number of strong female applicants for an executive level opening at the energy regulator in 2020.
[120] Pg. 29 from: Department of Gender and Family Issues, "The Kingdom of Eswatini's Country Progress Report on the Implementation of the Beijing Declaration and Platform for Action."

2.5 Labour force

The male participation in the labour force in general is increasing from 2016 to 2018 while the female participation is low compared to men and is also decreasing over the time period. Table 20 below shows the detailed labour force participation and unemployment rate for men and women.[121] [122] [123] The unemployment rate is also higher for women than men. In addition to differences in labour force participation, men also earn significantly more than women (67% more in 2014, [124] for example), though much of this difference likely stems from the structural composition of the workforce (i.e. men being overrepresented in higher productivity sectors and careers) compared to overt wage discrimination.[125]

Table 20 Labour Force Participation and Unemployment

Percent of men/women in adult labour force (aged 15 and above)	2007	2010	2014	2016	2018
Male	59.2	58.8	55.3	55.5	65.9
Female	45.2	55.2	46	46.5	41.4
Male/female unemployment rate (aged 15 and above, percent)	**2007**	**2010**	**2014**	**2016**	**2018**
Male	25.7	38	24.4	21.2	-
Female	31.2	30	32.2	24.8	-

2.6 Women in the MSME sector

Women are overrepresented in Eswatini in the MSME sector. Out of a total of 92,000 MSMEs, 65% of them are owned by women.[126] Women-owned MSMEs tend to be small and have low productivity, are often survivalist in nature (as opposed to opportunistic) and mostly do not employ other people.[127] In 2017, only 31% of the women-owned MSME businesses were classified as "high impact."[128] [129]

Women-led businesses cluster more so than men-led businesses in the informal market due to factors like: the high operating cost in formal markets, including high rents; the lack of business development and networking skills; mostly lower education levels among women entrepreneurs; and limited access to resources such as tenders and call for proposals.[130] Business informality has important implications for access to commercial credit and loans, which are generally restricted to entities with registration documents.[131]

[121] Department of Gender and Family Issues.
[122] UNDP, "Human Development Reports."
[123] International Labor Organization, "Labour Force Survey 2016, Eswatini."
[124] Department of Gender and Family Issues, "The Kingdom of Eswatini's Country Progress Report on the Implementation of the Beijing Declaration and Platform for Action."
[125] Brixiová and Kangoye, "Gender Disparities in Employment and Earnings in Sub-Saharan Africa: Evidence from Swaziland."
[126] Department of Gender and Family Issues, "The Kingdom of Eswatini's Country Progress Report on the Implementation of the Beijing Declaration and Platform for Action."
[127] Brixiová and Kangoye, "Gender Disparities in Employment and Earnings in Sub-Saharan Africa: Evidence from Swaziland."
[128] High impact refers to a business employing from 4 to 50 people and a turnover of E250 000 to E8 million.
[129] FinMark Trust, "Eswatini: Roadmap 2018-2022."
[130] UNESCO, "Revised Small, Micro, & Medium Enterprise Policy of Eswatini."
[131] Department of Gender and Family Issues, "The Kingdom of Eswatini's Country Progress Report on the Implementation of the Beijing Declaration and Platform for Action."

As such, female-led businesses appear to depend relatively more than male-led ones on informal credit mobilization (from family and social networks) and microfinance solutions.[132] Some microfinance providers include:

> **Inhlanyelo Fund**: This seed capital fund aims to promote grassroots entrepreneurs to the point they can connect with formal financial institutions. It offers collateral-free financing to women in all 55 constituencies of Swaziland. The loan application and follow-up process are carried out in close cooperation with the local community leaders. It is based on group lending and peer-pressure is used to ensure loan repayment. The maximum loan size is around USD 1765 (E25,0000).[133]
>
> **Imbita Women's Finance Trust**: Imbita is membership-based savings and credit group that uses local Management Committees (LMCs). For group lending, LMCs are used to mobilize the community and receive regular training and support from the head office. The beneficiaries are also not required to have collateral and the loans have a flat interest rate of 2.33% for individuals and 2.5% for groups.[134]
>
> **SWEET Microfinance**: It provides emergency (up to E50,000) and group loans (up to E113,000) to microentrepreneurs. The loans are from six to nine months with a flat 2.5-3% interest charge, depending.[135]

Box 11. Vukani BoMake

Business Women Eswatini (BWE) – Vukani BoMake Project

From Facebook: "Vukani BoMake Project is a Business Women Eswatini initiative. This project aims to empower rural women through vocational and business skills training. This will help them set up village textile factories so they can produce and sell their own products. Vukani BoMake Project was initiated in response to job losses as a result of the lockdown due to the COVID-19 pandemic. Business Women Eswatini saw it as an opportunity to empower unemployed women with vocational and business skills so they could sustain themselves. The three Tinkhundla that are part of this project are: Lobamba, Nhlambeni and Manzini South Inkhundla. The project supports production of face masks, reusable sanitary pads, clothing and more."

Conversations with a project proponent revealed that while there is a strong need for electricity to enhance productivity in the textile sector, access to land and security of land tenure are arguably larger impediments to women's income generation, "*Without land, you have a serious problem."*

Another benefit of the Vukani BoMake project was that it allowed women to remain near their homes to work. This was a precaution in light of covid-19 to keep them from crowding together in distant factories, but also had other beneficial effects according to the U.S. Ambassador,[136] notably:

- More of their income was spent in their local communities;
- It allowed them to be closer to their families to have a better work-life balance;
- It may reduce their exposure to certain types of gender-based violence, to HIV infection, and to unwanted pregnancies.

There are reasons to believe the above may also, in the right circumstances, be collateral benefits of MG-assisted women's PUE promotion in rural areas of Eswatini.

Multiple respondents cited electric energy services as both a potentially productivity-enhancing business input and also a domestic, labour-saving strategy that could free up time for women to dedicate more hours each week to their MSMEs. Swazi women are reported to be very time-constrained multi-taskers, mostly on account of their competing domestic, agricultural and other income-generating activities, though recent detailed national time use surveys could not be located.

[132] Brixiová and Kangoye, "Gender Disparities in Employment and Earnings in Sub-Saharan Africa: Evidence from Swaziland."
[133] Alliance for Financial Inclusion, "Agricultural Finance Intervention in the Kingdom of Eswatini."
[134] Alliance for Financial Inclusion.
[135] Alliance for Financial Inclusion.
[136] Peterson, "Remarks by Ambassador Lisa Peterson."

Due to the characteristics of female-led MSMEs, mini-grid projects may have to adapt in order to maximally serve them. For example, this could entail developing connection modalities, pricing and tariff structures adapted to women's business activities; relaxing or reimagining certain criteria for project support; providing extra means to female-led businesses to grow and be in a position to exploit electricity for productive use; deliberately seeking out producer groups and cooperatives (see next section on the Microprojects Unit below); or other techniques.

2.7 Women and the Microprojects Unit

The Micro Projects Coordinating Unit (MPCU) is a semi-autonomous department lodged in the Ministry of Economic Planning and Development. In addition to managing projects for line ministries, its core function is the management of two funds, the Regional Development Fund (RDF) and the Community Development Special Fund (CDSF). The RDF is a grant facility provided through the annual government budget (E2 Million per *inkhundla*) meant to promote rural economic development. Local community groups of 10 or more people with a 10%, usually in-kind, equity contribution are able to apply through the *inkhundla* Constituency Centre for these grant funds in order to build infrastructure, such as for rural electrification or irrigation and potable water supply, or for other projects to improve local livelihoods. The CDSF has essentially the same modality but a 25% equity requirement.

Though there are no funding requirements related to the gender composition of applicant groups, women's participation is sought after as, reported by a staff member, over time this has been associated with project success/sustainability. "*If you want the project to succeed, you have to have women; women remain local and hardly travel, so they end up involved in the ongoing operations and maintenance.*"

Though information isn't readily compiled about the gender breakdown of the portfolio, anecdotally, women's groups are reported to be most interested in income generation opportunities (such as chair and tent rentals, and agricultural processing equipment such as hammer mills) as compared to 'pure' infrastructure projects. One of the few projects that was financially successful enough to have repaid the 90% RDF capital contribution (had it needed to) was a group investment in a hammer mill.

The main barriers to accessing the RDF or the CDSF are the equity contribution (often labour and materials) along with a credible business plan. It should be considered that some women may have lower asset levels, literacy (reading, writing, business, financial, digital), time availability, mobility, and agency/confidence to complete successful grant applications compared to male counterparts and thus may need additional support. If the applicant is a co-op interested in income generating activities, the Department of Cooperatives in the Ministry of Commerce, Industry and Trade (MCIT) is often able to provide assistance developing the business plan. Local leaders have lent varying degrees of support to women's group's projects, with some being much more progressive than others.

3. Gender Action Plan

The Gender Action Plan for Eswatini attempts to accomplish two primary tasks, first to make women—their needs and potential contributions--visible in the sector (including to government planners, development partners, and infrastructure developers), and second to demonstrate the techniques and processes that can make mini-grids an engine for opportunity for all individuals regardless of gender. Documentation and analysis of results from the latter, then, are also expected to help strengthen the former.

The gender strategy as applied to Component 1 (Policy and Regulation) is to increase the visibility of women in the sector. As women remain historically disadvantaged with respect to landholding and asset accumulation, as they own and manage (on average) smaller businesses, as a large share of their production is not monetized/quantified, traditional yardsticks for spotting mini-grid opportunities (e.g., geospatial economic indicators, national statistical accounts) likely present a view biased towards *male-centred* opportunities.

For this reason, it will be important to deliberately explore the concept of "hidden" *female* opportunities as well, for instance by ensuring that both male- and female-dominated crops, agro-processing value addition steps, and small commercial ventures are included and tagged as such. Similarly, domestic/household productive use that can lead to income generation, either directly through cottage production or indirectly by relaxing women's time poverty constraint, should not be overlooked. And women-centred institutions, such as self-help organizations, savings and credit groups, MFIs, agricultural coops, and more, should also be inventoried as potentially enabling infrastructure (like roads or proximity to markets) increasing the likelihood of success for PUE uptake. Data completeness at the opportunity mapping stage is a first critical step towards women's inclusion in the sector, inclusion which will also be strengthened by also raising women's profiles through the National Dialog to be established (Output 1.2) and via the activity that supports capacity building of public officials (Output 1.3).

The gender strategy for Component 2 (Business Model Innovation) calls for women and men to be co-equal beneficiaries of two productive use pilots. In this, the project should seek to execute concrete transactions of the type that are theoretically explored in the opportunity mapping/inventory activity (i.e., Output 1.1). This will likely involve additional effort "selling" the idea, finding and connecting with women, especially widows who may be secluded, establishing trust, convincing some women who are at first hesitant. "Selling" the idea also involves convincing male relatives and other community members and leaders that women's PUE is coherent with broader aspirations and presents a win-win proposition for all concerned. Promoting women's participation in PUE will also entail employing differentiated support strategies, building agency and soft skills in parallel, compensating for lower asset levels and financial inclusion, addressing a potential lack of formal premises from which to conduct business, and renegotiating expectations around reproductive work during the adoption of new appliances, for example.

Ultimately, the project hopes to confirm that it is feasible, even economically desirable, to expand mini-grid services to a wider swath of individuals, men and women, taking up PUE. The Project activities geared toward monitoring, capturing lessons learned, and exchanging knowledge with a wider community, and especially with national mini-grid developers, will also include insights from the gender mainstreaming and empowerment tasks. It is theorized that, under the right circumstances, access to electricity and to electricity-enabled lines of business might not only lead to rising incomes for women, but raise women's status within the household, strengthen their influence over expenditures and other major life decisions, and potentially even expand their roles in public life. At the very least, the Project must ensure that electricity provision does not lead to the disproportionate accrual of benefits to men and a weakening of women's relative bargaining position.

Based on the results on the gender assessment, the following action plan in Error! Reference source not found. **has been drafted to provide a "gender lens" over the project**, ensuring equitable participation and benefit incidence among women and men across the various program components. In the leftmost column are the overarching program objectives and main activities. In the column entitled "Gender Action" are strategies for ensuring appropriate mainstreaming and equitable benefit incidence.

Table 21 Gender Action Plan

Objective	Gender Action	Indicator and Targets	Responsible / Institutions	Timeline	Budget (USD)
Component 1: Policy and Regulation					
Output 1.1 Geospatial, techno-economic modelling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)	Include presence of women's co-ops, trade organizations, and finance providers as an added layer of MG opportunity map. [137] **Rationale:** MG in locales with strong women's organizations are more likely to have a positive gender impact. Tag value chains and value chain steps as "predominantly male," "predominantly female," or "mixed/neutral." **Rationale:** Enable later stage gender-informed analysis and decision-making. Ensure that gender analysis is performed during site selection. **Rationale:** Facilitate project screening and reporting; detect and mitigate any skewed gender impacts.	**Baseline:** No map in existence **Indicators:** • Number of women-focused organizations included in mapping • Percentage of PUE/MSME activities that are gender tagged **Target:** At least two dozen organizations in mapping and 50% of PUE/MSME activities gender tagged	MNRE, with data from UNCDF, ESMAP, telecoms	-	15,000
Output 1.2 An inclusive national dialogue to identify minigrid delivery models, a vision and roadmap is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification.	Include stakeholders in National Dialogue that promote gender equality, or that are active in issues or sectors or great importance to women. Ensure that the leadership group is representative and gender-balanced.	**Baseline:** 0 **Indicators:** • Number of organizations/agencies included in Dialogue with strong gender inclusion or empowerment focus • Percentage of core working group individuals that are female	MNRE, EEC, ESERA, Gender Coordination Unit, Department of Cooperatives, and others		No additional budget

[137] Organizations such as these could function as apex productive users of electricity, grassroots empowerment organizers, providers of training or credit providers, etc. but with a special ability to reach and work with women.

Objective	Gender Action	Indicator and Targets	Responsible / Institutions	Timeline	Budget (USD)
		Target: At least three organizations and 40% individuals			
Output 1.3 Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.	Ensure existing male and female staff have an equal opportunity to train and benefit from capacity building (e.g., by ensuring a minimum number of women included, requiring that recipients reflect overall organization gender balance, having a gender balanced committee review the selection process, etc.).	**Baseline:** Unknown staff gender balance, unknown number trained on MG **Indicator:** Number of existing male and female staff directly aided through capacity building and reporting satisfaction **Target:** At least on third of staff trained are female and 90% of all beneficiaries report that efforts were useful and relevant to their work	MNRE, ESREA, EEC, with UNDP Regional AMP		No additional budget
Output 1.4 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments and contribute to AMP Flagship Report on Cost Reduction	None.	-	-	-	-
Component 2: Business Model Innovation with Private Sector					
Outputs 2.1 Expansion of public utility mini-grid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of mini-grid systems for rural households	Identify existing and potential productive electricity use applications led by women and men. Build the necessary comprehension and buy-in among women and men of the community, including among leaders and between spouses, about the benefits of electricity-enabled businesses and women's involvement in them. Provide women and men, and paying special attention to the status of widows, with access to the ongoing business/financing/peer/agency-based	**Baseline (A):** TBD number and type of productive electricity users at start of project **Indicator (A):** Number of new, relative to baseline, productive users of electricity by: • Gender of lead, if sole prop or family partnership, or gender composition if group (mostly M/mostly F/mixed)	MNRE, EEC		10,000

Objective	Gender Action	Indicator and Targets	Responsible / Institutions	Timeline	Budget (USD)
	support needed to start or grow their ventures. If necessary, help facilitate land transactions. Support the ethical uptake of domestic electric appliances, especially those that reduce women's time burdens, through initiatives such marketing promotions, linkages to product and finance suppliers, defraying warranty or after sales support costs, etc.	• Type of activity and electric equipment in use • Improved income (informational indicator only) **Baseline (B):** TBD Number and type of domestic electricity appliances in use (not counting lights) **Indicator (B):** Number and type of domestic electricity appliances in use (not counting lights or phone chargers) **Baseline (C):** TBD average monthly MG revenue per connection **Indicator (C):** Average monthly MG revenue per connection **Target:** At least five new productive users, over 50% of them women, women-led enterprises, or women-majority groups; 5% increase in home appliances; and 10% increase in per customer revenue.			
Output 2.2 Pilot a mini-grid 'energy hub' model demonstrating productive uses as anchor off-taker of electricity that enables household electrification	Similar to above, ensure that the energy hub serves businesses owned by, employing, and serving both men and women in equitable numbers. Ensure composition of the Project Board is reflective of the gender balance in the community (e.g., by disseminating information widely, mandating	**Baseline:** 0 **Indicator:** • Businesses connected to 'hub' by type (individual, group, etc.) and gender	MNRE, developer, possibly EEC		20,000

Objective	Gender Action	Indicator and Targets	Responsible / Institutions	Timeline	Budget (USD)
	representation, and providing training support to both women and men in operations and management).	• Male and female employment (including owners) sustained directly by 'energy hub' and indirectly by businesses located there (# individuals impacted and FTEs) • Improved income (informational indicator only) • Gender balance of Project Board **Target:** At least 10 businesses, 20 individuals and 8 FTE created and sustained with at least a 40/60 F/M split; representative balance on Project Board			
Output 2.3 Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects	Develop a 2-5-page knowledge product for developers drawing on local examples that "makes the business case" for training and hiring women in local O&M, supporting them as potential business customers, and approaching them as adopters of electricity-consuming household technology.	**Baseline:** 0 **Indicator:** Presence and dissemination of pamphlet, Y/N **Target:** Pamphlet prepared and distributed to target audience	MNRE / PMU		1,500
Component 3: Digital, Knowledge Management and Monitoring and Evaluation					
Output 3.1 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	Develop standard gender impact tracking indicators (e.g., % of appliance custodians who are women, % of residential connections jointly registered to household members, improved income of female-led PUE ventures, etc.)	**Baseline:** None **Indicator:** Number of indicators defined with associated detailed data collection and measurement methodologies. **Target:** One	MNRE / PMU, with support from UNDP		5,000

Objective	Gender Action	Indicator and Targets	Responsible / Institutions	Timeline	Budget (USD)
Output 3.2 A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project	None.				
Output 3.3 Minigrids digital platform implemented to manage data from pilots, and to support minigrids scale-up and cost-reduction	Use gender disaggregated data collection during both pilots to analyse M/F differences in electricity-linked decision-making, purchasing, use, ownership, custody, profit-making, etc. Open-ended 'outcome harvesting' can be used to explore other welfare impacts, such as changes to gender relations, time use, health, leisure, etc. Package and share learnings with target audiences (National Dialogue, AMP, Community of Practice)	**Baseline:** None **Indicator:** Gender learning packages prepared and disseminated to target audiences. **Target:** One.	MNRE, PMU, with support from UNDP and regional project	-	5,000
Output 3.4 Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt at national and regional level.	Research and publication of a briefing note on gender impacts of rural electrification via mini-grids and role of women in MG development and management. Include a 1-2-page section on specific gender lessons learned and examination of how barriers can be overcome in the future.	**Baseline:** No such briefer exists specifically focused on the experience in Eswatini. **Indicator:** Publication of briefing note. **Target:** One briefing note. **Baseline:** None **Indicator:** Analysis complete, Y/N **Target:** Analysis complete	MNRE, PMU, with support from UNDP and regional project	-	Included in full task
Output 3.5 Local knowledge network established to promote MG development / rural energy access	Encourage participation of women in knowledge sharing and networking events.	**Baseline:** None **Indicator:** None **Target:** None	PMU, REAESWA	-	Included in full task

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Annex 12: Procurement Plan

The **procurement plan will cover a 12-month period**. The National Implementation Agency shall update the procurement plan throughout the duration of the project, at least annually by including contracts previously awarded. All procurement plans, their updates or modifications shall be published on the website of the National Implementation Agency.

General Information

Project Name: National child project under the GEF Africa Minigrids Program	
Country: Eswatini	**Implementing Partner:** Ministry of Natural resources and Energy (MNRE)
Date of First Procurement: 4th Quarter 2021	**Date of this Procurement Plan:** February 2021

A. Process Thresholds, Review and 12 Month Procurement Plan

1. Project Procurement Thresholds

The following UNDP procurement thresholds shall apply to procurement of goods and works:

Procurement method	Contract value	Type of requirement	Method of solicitation	Type of competition
Micro-purchasing	Below US $5,000	Goods, services or simple works	Canvassing (by phone, Internet, shopping, etc.)	Limited international or national
Request for quotation	US $5,000 to $149,999	Goods, services or simple works	Written request for quotation	Limited international or national
Invitation to bid	US $150,000 and above	Goods or works	Advertisement in international media	Open international
Request for proposal	US $150,000 and above	Services	Advertisement in international media	Open international
Direct contracting	Any amount within permissible circumstances	Services, goods or works	Direct invitation or negotiation	None

2. Prior or Post Review

The following UNDP prior or post review requirements apply to the various procurement and consultant recruitment methods used for the project.

	Level 1 (Country Level): Contracts, Assets and Procurement Committee	**Level 2 (Regional):** Regional Advisory Committee on Procurement (country offices only)	**Level 3 (HQ):** Advisory Committee on Procurement
Competitive procurement process			

	Level 1 (Country Level): Contracts, Assets and Procurement Committee	**Level 2 (Regional):** Regional Advisory Committee on Procurement (country offices only)	**Level 3 (HQ):** Advisory Committee on Procurement
Any contract or series of contracts including amendments to be awarded to a vendor *in a calendar year* that in aggregate has a cumulative value:	Above US $50,000 (above US $100,000 for Individual Contracts) and up to the standard delegated procurement authority – Direct Review by CAP Chairperson Above the standard delegated procurement authority and up to any increased delegated procurement authority – by CAP Committee	Above the delegated procurement authority and up to US $2 million (applies per year for Long-Term Agreements)	Country offices: above US $2 million (applies per year for Long-Term Agreements)
Direct contracting			
Any contract or series of contracts, including amendments to be awarded to a vendor *in a calendar year* that in aggregate has a cumulative value:	Above US $50,000 and up to 50 percent of the standard delegated procurement authority – Direct Review by CAP Chairperson Above 50 percent of the standard delegated procurement authority and up to 50 percent of any increased delegated procurement authority – by CAP Committee	Above 50 percent of the delegated procurement authority and up to US $2 million (applies per year for long-term agreements)	Headquarters units: above 50 percent of the delegated procurement authority Country offices: above US $2 million (applies per year for long-term agreements)
Amendment of all contracts			
Any amendment or series of amendments to a contract which, in aggregate, increases the contract value by 20 percent or the delegated procurement authority, whichever is less:	Above US $50,000 and up to the standard delegated procurement authority – Direct Review by CAP Chairperson. Above the standard delegated procurement authority and up to the increased delegated procurement authority - by CAP Committee	Above the delegated procurement authority and up to US $2 million (applies per year for long-term agreements)	Country offices: above US $2 million (applies per year for long-term agreements)
Ex ante review			
Ex ante review refers to the review of the procurement strategy roadmap prior to commencement of the procurement process for complex procurement actions with a value:	N/A	Above US $1 million and up to US $2 million (applies per year for long-term agreements)	Above US $2 million (applies per year for long-term agreements)
Notes:	1. The procurement support unit shall participate when requested in the committee review of ex ante submissions. 2. An ex-ante review is not required if: (a) The business unit has had a previous successful experience in the procurement of similar goods/services/works that was already subject to an ex-ante review; or (b) There is sufficient specific corporate guidance and templates on the procurement of the said goods/services. 3. Irrespective of the above, the procurement authority may submit the cases for ex ante review if significant risks are perceived.		

Table 1: Expected Goods and Non-Consulting Services under the GEF project "National child project under the GEF Africa Minigrids Program", Eswatini

No	General Description	Contract Value USD (cumulative)	Procurement Method	Procured by	No of Contracts	Advertisement Date (quarter/year)	Implementation Start date (quarter/year)	Comments	Prior or Post review
1	Organisation, logistics and catered venue for inception meeting (Output 3.6)	3,000	Request for Quotation	MNRE/ESERA	1	Q4 / 2021	Q4 / 2021	National	Post
2	Travel and per diems for nominee(s) to attend regional Community of Practice event	4,000	Request for Quotation	ESERA	1	Q3 / 2022	Q3 / 2022	International	Post
3	GIS modeling and mapping contract including gender sensitive markers (Complete delivery on Output 1.1)	149,000	Request for Quotation	UNCDF	1	Q1 / 2022	Q2 / 2022	International	Post
4	Organisation, logistics and catered venue for one physical meeting for the National Dialogue per year (year 1) (Output 1.2). *To save cost and number of contracts, this can be scheduled to dovetail with the Project Board meeting, Item 11, below.*	1,500	Request for Quotation	MNRE / ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
5	Contractual services for the tailoring of universal or generic knowledge / training / learning material sourced from the regional project for relevance to the Eswatini context. (Output 1.3)	4,000	Request for Proposals	ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
6	Contractual services to facilitate stakeholder engagement, market research and data collection for pilot 1 (Output 2.1)	3,500	Request for Quotations	ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
7	Contractual service for the design, development and operation of the PUE overlay pilot project (Output 2.1). *Potential to be procured as a complete turnkey project, together with equipment, construction and delivery (refer item 1, Table 2 below).*	12,500	Request for Proposals	ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
8	Contractual services for the development of accredited training material (Output 2.3)	8,000	Request for Proposals	ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
9	Hosting of capacity building and training events, including sponsored participation (Output 2.3)	5,000	Request for Quotation	ESERA	1	Q2 / 2022	Q3 / 2022	National	Post

No	General Description	Contract Value USD (cumulative)	Procurement Method	Procured by	No of Contracts	Advertisement Date (quarter/year)	Implementation Start date (quarter/year)	Comments	Prior or Post review
10	Project website development, hosting and annual maintenance (Year 1) (Output 3.4)	4,500	Request for Quotation	ESERA	1	Q3 / 2021	Q1 / 2022	National	Post
11	Organisation, logistics and catered venue for one physical meeting for the Project Board (Year 1) (Output 3.6) *To save cost and number of contracts, this can be scheduled to dovetail with the National Dialogue meeting, Item 4, above.*	1,000	Request for Quotation	MNRE / ESERA	1	Q1 / 2022	Q1 / 2022	National	Post
12	Local support services for development and implementation of monitoring framework (Output 3.4)	4,000	Request for Quotation	ESERA	1	Q4 / 2021	Q4 / 2021	National	Post
13	Contractual services for the packaging of case studies, lessons learnt and knowledge sharing material (Year 1). (Output 3.4 and 3.5)	2,000	Request for Quotation	ESERA	1	Q2 / 2022	Q2 / 2022	National	Post
14	Support services for the inception of the Knowledge Network, development and implementation of a workplan / knowledge events (Output 3.5)	3,000	Request for Quotation	ESERA	1	Q3 / 2022	Q3 / 2022	National	Post
15	Professional services for audit of PMU (Year 1)	2,000	Request for Quotation	ESERA	1	Q2 / 2022	Q3 / 2022	National	Post
16	Procurement of Digital Platform	23,000	Request for Quotation	ESERA	1	Q4 / 2021	Q4 / 2021	National	Post

Table 2: Expected Works Contracts under the GEF project "National child project under the GEF Africa Minigrids Program", Eswatini

No	General Description	Contract Value USD (cumulative)	Procurement Method	Procured by	No of Contracts	Advertisement Date (quarter/year)	Implementation Start date (quarter/year)	Comments	Prior or Post review
1	Procurement of equipment and construction of complete PUE overlay with metering infrastructure (Output 2.1) *(Potential to procure in combination with Item 7, Table 1, above and Item 2, below)*	19,000	Request for Quotation	ESERA	1	Q3 / 2022	Q3 / 2022	International	Post
2	Procure electrical appliances / equipment to make available to small businesses or households (Output 2.1) *(Potential to procure in combination with Item 7, Table 1, above and Item 1, above)*	3,000	Request for Quotation	ESERA	1	Q3 / 2022	Q3 / 2022	International	Post

Table 3: Expected Consulting Services under the GEF project "National child project under the GEF Africa Minigrids Program", Eswatini

No	General Description	Contract Value USD (cumulative)	Procurement Method	Procured by	No of Contracts	Advertisement Date (quarter/year)	Implementation Start date (quarter/year)	Comments	Prior or Post review
1	Project / Finance Assistant	18,000	Advertisement	UNDP	1	Q4 / 2021	Q1 / 2022	National	Post
2	Consulting services from Regional Panel of Experts (Output 1.2, 1.3, 2.1, 2.3, 3.4 and 3.6)	17,000	Direct Contracting	UNDP	1	N.A.	Q1 / 2022	International	Post
3	Gender specialist (Year 1 and 2) (Support for Output 1.1 and Output 2.2)	20,053	Request for Quotation	ESERA	1	Q3 / 2022	Q4 / 2022	International	Post
4	SES specialists to support, socio-economic safeguards and ESMF assessment, data collection, monitoring and management (Support for Output 2.1)	4,000	Request for Quotation	ESERA	1	Q3 / 2022	Q4 / 2022	National	Post
5	National Consultant to support the full Derisking Renewable Energy Investment (f) analysis (Output 1.4)	10,000	Request for Quotation	ESERA	1	Q4 / 2021	Q1 / 2022	National	Post

No	General Description	Contract Value USD (cumulative)	Procurement Method	Procured by	No of Contracts	Advertisement Date (quarter/year)	Implementation Start date (quarter/year)	Comments	Prior or Post review
6	International Consultant for the full Derisking Renewable Energy Investment (DREI) analysis (Output 1.4)	40,000	Request for quotation from a roster of pre-qualified DREI consultants	ESERA	1	Q4 / 2021	Q1 / 2022	International	Post

Annex 13: GHG Emissions Reductions and Project's target contributions to GEF-7 Core Indicators (Eswatini)

1. Introduction

A financial model has been developed during the PPG Phase (the AMP Financial Model) the main objective of which is to take a standardized approach at analyzing minigrid pilots which will receive support from national child projects and **provide revised estimations for the projects' target contributions to GEF-7 Core Indicators** to replace those developed during the PFD Phase. Box 1 presents the indicators AMP projects report on.

Box 12: AMP & GEF-7 Core Indicators

AMP projects contribute to the following GEF-7 Core Indicators:

- **Core indicator 6: Greenhouse Gas Emissions Mitigated** captures the amount of GHG emissions expected to be avoided through the GEF project's investment in renewable energy minigrids. It should be measured above a baseline value. Mitigation benefits include:
    - **Direct emissions reductions** attributable to the investments made during the project's supervised implementation period, totaled over the respective lifetime of the investments. For national child projects under AMP, direct emission mitigation arises from minigrid pilot investments under Component 2.
    - **Indirect emissions reductions** that could result from a broader adoption of the outcomes of a GEF project plus longer-term emission reductions from behavioral change[1] in the post-project period. Broader adoption of a GEF project proceeds through several processes including sustaining, mainstreaming, replication, scaling-up and market change. For national child projects under AMP, direct emission mitigation results from creating a general enabled investment environment for minigrid market development, and subsequent investment flows.
- **Context Sub-indicator 6.4: Increase in installed renewable energy capacity per technology** captures the increase in renewable energy generation or storage capacity and should be disaggregate by type of renewable energy technology (biomass, geothermal, ocean, small hydro, solar photovoltaic, solar thermal, wind power, and storage). All AMP national child projects will be contributing to the increase of solar photovoltaic and/or storage capacity.
- **Core indicator 11: Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment** captures the total number of direct beneficiaries including the proportion of women beneficiaries. Direct beneficiaries are all individuals receiving targeted support[1] from a given project. For AMP national child projects this refers to the investments in minigrids projects under Component 2. AMP national child projects will be reporting on this indicator disaggregated by customer segment. Box 13 below provides additional details on this.

For the purpose of estimating greenhouse gas (GHG) emissions reductions (ER), assumptions are made in terms of what level of concessionality is applied to the use of GEF INV funds to support minigrid pilots (defined in terms of a percentage of capital expenditure costs (CAPEX) to be covered by GEG INV hereinafter referred to as 'CAPEX subsidy levels'.

The AMP Financial Model takes a different **approach at estimating CAPEX subsidy levels**[138] than the one used at PIF stage. This approach results in a level of subsidy which is a function of the difference in the levelized cost of electricity (LCOE)[139] between the clean energy minigrid and a notional diesel-only minigrid. As such, the model estimates for each of the minigrid pilots, the LCOE of the renewable energy minigrid and of a diesel-only minigrid serving an equivalent market, and the resulting level of subsidy (as a % of CAPEX) required to make the renewable energy minigrid LCOE

[138] The price that would have to be paid for each unit of electricity output (e.g kWh) to cover total costs of electricity supply (including capital investments, operating costs, and financing costs) over the lifetime of the system.

[139] The AMP national child projects provide capital cost subsidies, preset as a share of "reasonable" capital costs or based on lowest-subsidy bids, to provide direct financial support for one or more eligible minigrid operator(s) to: (i) develop minigrid projects, and/or (ii) purchase productive use appliances/electromechanical equipment to be leased to and used by minigrid customers.

equal to that of the diesel-only minigrid. LCOEs and subsidy levels are indicative and meant only for the purpose of updating greenhouse gas (GHG) emissions reductions (ER) at the PPG Phase.

At PIF stage, it was assumed that all minigrid pilots would be greenfield minigrid projects and only residential customers of these minigrids were considered as direct beneficiaries of the project. The PPG Phase has provided more nuance as to the types of minigrid pilots that will receive Program support and their respective direct beneficiaries. The former include the following **three types of minigrid pilots:** (1) Greenfield minigrids, (2) Hybridization of existing or planned diesel minigrids, and (3) A productive use overlay to an existing or planned minigrid; and the latter are described in Box 13 below.

Box 13: Project (Pilot) beneficiaries

AMP national child projects will be reporting on the number of people who are 'direct beneficiaries' of the project. As per GEF's definition, **direct beneficiaries** are all individuals receiving targeted support from a given project, and **targeted support** is the intentional and direct assistance of a project to individuals or groups of individuals who are aware that they are receiving that support and/or who use the specific resources.

In the context of AMP, **only minigrid customers gaining access to electricity and/or improved electricity services are considered direct beneficiaries of the project**. Those community members who benefit from accessing goods and services enabled by electricity, are considered indirect beneficiaries. The exact definition of direct beneficiaries for each type of pilot is presented below.

Type of pilot	Targeted support provided by the project	Direct beneficiaries
Greenfield	Providing access to clean/reliable/affordable electricity to **new minigrid users** through development of new minigrid sites	**All new minigrid customers**
Hybridization	Providing improved electricity services to **all existing as well as new users of an existing minigrid**, based on a larger share of renewable energy and a clear path for diesel phase-out	**All existing as well as new customers of the hybridized minigrid**
PUE Overlay	Providing improved electricity services to **all existing as well as new users of an existing minigrid** through the addition of productive use equipment for use by Commercial/PUE users, which improves sustainability of the minigrid for all its customers	**All existing as well as new customers of the minigrid to which a PUE Overlay is added**

Project direct beneficiaries are categorized in three different customer segments as show in the table below.

Customer Segment	AMP - Program-level definition	# people per minigrid connection
Residential (households)	All households connected to a minigrid regardless of whether they use electricity in the household for value-adding activities.	5 people (household residents)
Social (community and public institutions)	Churches, community centers, health facilities, educational facilities, street lighting, government buildings, and public buildings.	4 people (employees)
Commercial/PUE (productive users of electricity)	Customers who are engaged in value-adding activities powered/enabled by electricity, who in turn provide goods and services to indirect project beneficiaries. Commercial loads such as lighting, cooking, information and communication, refrigeration, space heating/cooling, and motive power are used for value-adding activities such as restaurants, shops, sewing services, beauty salons, internet-cafes, as well as transformation processes, like rice milling, usually embedded in agricultural supply chains.	3 people (owners, employees)

This annex contains the results and calculations of project contributions to GEF-7 Core Indicators, describes the pilots that will be developed under the project to contribute to these results, and the methodologies used to estimate direct Greenhouse Gas (GHG) emissions reductions (ER) expected at CEO Endorsement Request. To that end, it is structured as follows:

- **Section 2– Executive Summary** presents a snapshot of project results and contributions to GEF-7 Core indicators and a comparison with same calculations at PFD/PIF stage
- **Section 3– Minigrid Investment Pilots** describes the type of pilot that the Eswatini National Child Project will provide support for
- **Section 4- AMP Financial Model Calculations & Methodology** presents the calculations for the pilot(s) and describes inputs and methodology used

2. Executive Summary - Project Results

The Eswatini National Child Project aims to support deployment of the following 2 minigrid pilots in the country (i) A productive use overlay to an existing Solar PV-battery minigrid, to increase capacity utilization factor of this existing minigrid, reduce its LCOE and increase optimal usage of existing minigrid asset and (ii) A greenfield Solar PV-battery minigrid, to bring access to clean and affordable electricity to a previously unserved rural community, with lower operating costs and GHG emissions than a comparable (notional) diesel-only minigrid. Section 0 describes the pilots in more detail.

The following table shows the project's updated target contributions to GEF-7 Core Indicators as estimated at the time of CEO endorsement request submission and compares them with those targets included in the Program Framework Document (PFD) and the Eswatini Project Concept[140] approved by the GEF Council in December 2019. Section 0 describes the methodology used and calculations in more detail and Section **Error! Reference source not found.** – provides details on the GEF Core indicators that AMP national child projects will report on.

Table 22: Project Results – Expected at PIF and at CEO Endorsement

Project GEF-7 Core Indicators		**Expected at PIF**	**Expected at CEO Endorsement**
6	**Greenhouse Gas Emissions Mitigated** (metric tons of CO2e)	5,400 (direct) 54,611 (indirect top-down)	2,444 (direct) 54,000 (indirect) [141]
6.4	**Increase in installed solar PV capacity** (MW) and battery storage (MWh) *(Units of measure: Megawatt (MW) and Megawatt hour (MWh))*	0.1 (solar PV)	0.02 (solar PV)[142] 0 (storage)
11	Number of **direct beneficiaries** benefitting from energy access via minigrids, disaggregated by gender and by customer segment (residential, social, commercial/productive use), as co-benefit of GEF investment	16,263 (of which 51% women)	459 people (of which 51% women) -------- 400 people (residential) 8 people (social) 51 people (commercial/PUE)

[140] All documents approved by the GEF on its December 2019 Council.

[141] 10% of the indirect GHG ER of this and all AMP national child projects have been removed from each project and allocated to the AMP regional child project, in line with the apportioning of the overall program budget and reflected in the PFD allocation of GHG emissions reductions across the different child projects. This reflects the benefits of national child projects accessing the regional child project's support which is expected to contribute and enhance the enabling conditions required for minigrids development across AMP countries.

[142] The model estimated 0.49 kW and 0.165 kWh of solar PV and battery storage capacity; however the targets have been set based on assumptions regarding the type of site that would be targeted to develop PUE overlay which is sites which already have underutilized solar PV and battery storage capacity.

Project GEF-7 Core Indicators		Expected at PIF	Expected at CEO Endorsement
			459 people (total) -------- 80 connections (residential) 2 connections (social) 17 connections (commercial/PUE)) ***99 connections (total)***

The table below shows these results disaggregated for each individual pilot under the project.

Table 23: Project Results - Eswatini National Project under the Africa Minigrids Program (AMP)

Project GEF-7 Core Indicators		Pilot 1	Pilot 2
6	**Greenhouse Gas Emissions Mitigated** (metric tons of CO2e)	784 (direct)	1,660 (direct)
6.4	**Increase in installed renewable energy capacity** per technology (MW – solar) (MWh - storage)	0 (solar PV) 0 (storage)	0.02 (solar PV) 0 (storage)
11	Number of **direct beneficiaries** benefitting from energy access via minigrids, disaggregated by gender and by customer segment (residential, social, commercial/productive use), as co-benefit of GEF investment	132 people (total) 100 people (residential) 8 people (social) 24 people (commercial/PUE) --------- 20 connections (residential) 2 connections (social) 8 connections (commercial/PUE) ***30*** connections ***(total)***	327 people (total) 300 people (residential) 0 people (social) 27 people (commercial/PUE) ---------- 60 connections (residential) 0 connections (social) 9 connections (commercial/PUE) ***69*** connections ***(total)***

Indicative Minigrid Systems

Various aspects of these pilots remain to be defined during project implementation (e.g. CAPEX subsidy levels, estimated number of households, commercial, social, and/or productive use customers that will be served by each of these minigrids). Hence, for the purpose of estimating an indicative subsidy requirement and indicative GHG emissions reductions, the financial models for each of these 2 pilots simulate representative, standardized minigrid system profiles (Indicative minigrid systems).

It is important to note that the representative indicative minigrid system profiles simulated by this financial model has been built to oversize the system capacity and CAPEX upfront to have enough electricity generation, storage and distribution capacity to meet demand growth from local communities for up to 10 years. This approach has been adopted to ensure overall GHG ER estimates are easier to make during this modeling stage. However, AMP aims to support developers to optimize their minigrid system designs and hence, this approach of oversizing may not be

relevant for actual pilot deployment during implementation stage and does not constitute any recommendation in terms of the appropriate sizing of the pilots' minigrid systems.

The following are the characteristics of the Indicative minigrid system that would take the productive use overlay approach (Pilot 1):

- Pilot 1 will use a Productive Use Overlay approach to optimize an **existing minigrid which is already serving 20 households and 2 social users (churches)**, by adding productive users and productive use equipment.
- Based on assumptions for estimated electricity demand from each of these customers over a 20-year period, the financial model estimated a **baseline minigrid system with Solar PV capacity of 4.0 kWp and battery capacity of 15 kWh to serve these customers.** No diesel genset backup is modelled.
- Since the exact number and power load of PUE equipment to be overlayed on this existing minigrid is currently unknown, for the purpose of LCOE estimation and GHG emission reduction calculation, we estimate 8 PUE equipment – 4 commercial users (1 sewing equipment, 3 internet cafes/printers) and 4 Productive users (1 rice/corn mill, 2 welding machines, 1 egg incubation center) will be overlayed on existing Solar PV-battery minigrid.
- Based on assumptions for estimated electricity demand from each of these existing 20 residential and 2 social users and the newly proposed PUE overlay customers over a 20-year period, the financial model estimated a **minigrid system with Solar PV capacity 34 kWp and battery capacity of 145 kWh** to serve these customers. No diesel genset backup is modelled.
- This Levelized Cost of Energy (LCOE) of the indicative baseline 4 kWp 15 kWh Solar PV-battery minigrid system is estimated at $7.51/kWh whereas the LCOE of the indicative 34 kWp 145 kWh Solar PV-battery minigrid system with PUE overlay is estimated at of $5.61/kWh, thereby achieving the desired result of reduced LCOE due to improved capacity utilization factor.
- For the purpose of this financial modeling exercise of PUE overlay Pilot 1, no subsidy is envisaged to be provided for increased capex of Solar PV-battery minigrid system due to PUE overlay. However, the total cost of 8 PUE equipment deployed, estimated to be $25,000 will be completely subsidized by the GEF National Child Project resources.

The following are the characteristics of the Indicative greenfield minigrid system (Pilot 2):

- The minigrid would serve **60 residential customers, 6 commercial customers (1 restaurant, 5 internet café/printer/microwork services) and 3 productive use customers (1 rice/corn mill, 1 peanut butter machine, 1 egg incubation unit)**.
- Based on assumptions for estimated electricity demand from each of these customers over a 20-year period, the financial model estimated a **baseline notional, diesel-only minigrid of capacity 45.3 kW** to serve these customers.
- An indicative greenfield **minigrid system with Solar PV of capacity 49 kWp and a battery of capacity 165 kWh** is modelled to be deployed to serve the same set of customers. No diesel genset backup is modelled.
- The capital expenditures (CAPEX) required to hybridize this minigrid system are estimated at **USD 300,007 based on an average CAPEX cost of USD 6,093 per kW of installed solar PV capacity**.
- This Levelized Cost of Energy (LCOE) of this indicative 49 kWp greenfield Solar PV-battery minigrid system is estimated at $1.63/kWh whereas the LCOE of the baseline notional 45.3 kW diesel-only minigrid system is estimated at of $1.03/kWh.
- To achieve LCOE parity between the baseline notional diesel-only minigrid system and the hybridized Solar PV-battery-diesel system, **the financial model estimates a CAPEX subsidy of approximately USD 185,825 per minigrid, or 45% of CAPEX, would be necessar**y.

The following are the estimated results at CEO ER stage of the 2 proposed minigrid pilots (Pilot 1 and Pilot 2) receiving support from the Eswatini National Child Project based on the 2 minigrid system profiles described above:

- The allocated INV budget of USD 160,000, and assuming that this entire amount will be used as capital expenditures (CAPEX) subsidies for minigrid investment pilot(s), will be used to provide 100% CAPEX subsidy (US$ 25,000) for the 8 PUE equipment to be overlayed on the existing Solar PV-battery minigrid of Pilot 1 and 45% CAPEX subsidy (US$ 135,000) for the proposed greenfield Solar PV-battery minigrid of Pilot 2.
- • The number of direct project beneficiaries (GEF Core indicator 11) from both pilots together is expected to be around **459 people of which 400 people are residential users, 8 people are social users and 51 people are commercial users**. This is due to the project's support for 69 new minigrid connections (60 residential, and 9 commercial), and the improvement of electricity services for 30 minigrid connections (20 residential, 2 social, and 8 commercial/PUE).
- The increase in renewable energy capacity installed is estimated at **49 kWp for solar PV** and the increase in storage capacity is estimated at **165 kWh**.
- The lifetime global environmental benefits that will accrue from the adoption of off-grid solar technologies is estimated at **2,444 tCO2e** (784 tCO2e due to Pilot 1 and 1,660 tCO2e due to Pilot 2). This is calculated for the 20-year period of the technology's lifetime.
- Indirect emission reductions amounting to 54,000 tCO2e are expected due to investments in minigrids completed during the 10-year influence period following project completion, predominantly through the replication of the sustainable technology value chain.
- The project yields an abatement cost of cost of 1,086 USD/tCO2e (854 USD/tCO2e due to Pilot 1 and 232 USD /tCO2e due to Pilot 2). This abatement cost takes into consideration overall upfront and replacement CAPEX of both pilots.

Comparison with respect to PIF Stage – Direct GHG ER

At PIF stage, it was estimated that US$280,554 would be used to provide CAPEX subsidies to cover 75% of the CAPEX needed to develop 2.17 greenfield minigrid sites at an average investment cost of US$3,450 per kW of installed solar capacity. Each of these minigrid sites was assumed to have 50 kW of installed solar capacity and serve a population of 7,500 people per minigrid (150 people per kW of installed capacity). Hence the total increased RE capacity expected from the project was estimated at 100-110 kW and the number of project direct beneficiaries at 16,263 people, resulting in direct GHG ER of 5.4 ktonCO2e over the technology's lifetime of 20 years.

At CEO ER stage, it is estimated that out of the USD160,000 GEF 'INV' budget under Component 2: (i) USD 25,000 will be used to provide 100% CAPEX subsidy for the 8 PUE equipment to be overlayed on the existing Solar PV-battery minigrid of Pilot 1 and (ii) USD 135,000 will be used to provide 45% CAPEX subsidy for the proposed greenfield Solar PV-battery minigrid of Pilot 2 based on an average investment cost of US$6,093 per kW of installed solar capacity. Assumptions on the number of people served by each minigrid have been revised downward with respect to PIF stage; the number of direct project beneficiaries from both pilots together is expected to be around 459 people. This is due to the project's support for 400 **minigrid residential customers (80 household connections, each household assumed to have 5 people), 8 social customers (2 connections, each assumed to benefit 4 people per connection), and 51 commercial/PUE customers (17 connections, each assumed to benefit 3 people per connection)** (6.12 people per kW of installed capacity)**.**

The table below compares key parameters used to determine project's results at PIF and CEO endorsement request stages.

Parameters to estimate project results	PIF Stage	At CEO Endorsement
Type of pilot	Greenfield minigrid	Pilot 1 – PUE Overlay of existing Minigrid Pilot 2 – Greenfield minigrid

Parameters to estimate project results	PIF Stage	At CEO Endorsement
GEF INV used as CAPEX subsidy (USD)	280,554	160,000 (25,000 for Pilot 1, 135,000 for Pilot 2)
Subsidy level	75%	Pilot 1 - 100% for PUE equipment CAPEX Pilot 2 – 45%
# minigrids	2.17	2
Minigrid installed solar PV capacity (kW/minigrid)	50	20
Minigrid battery storage capacity (kWh/minigrid)	Not defined	165
CAPEX per kW of installed solar capacity (USD/kW)	3,450	6,093
Number of people per unit of installed solar PV capacity (people per kW)	150	6.12
Number of people served by minigrid (people/minigrid)	7,500	325
Annual RE generation (MWh/year/minigrid)	158	107.9
Emission factor of diesel-only minigrid (tCO2/MWh)	0.786	UNFCCC methodology (refer Section IV)
Minigrid annual GHG ER (tCO2/year/minigrid)	124	Pilot 1 – 39 Pilot 2 – 83 Total Project - 122
Project annual GHG ER (tCO2/year)	268.7	Pilot 1- 784 Pilot 2 – 1,660 Total Project – 2,444

At PIF stage, power generation per minigrid was estimated at 158 MWh per year, considering a 40% solar capacity factor (fraction of installed solar PV capacity that can effectively generate electricity) and a 90% availability factor (fraction of time the minigrid system is online and available to generate power during a given year). Based on annual generation, the comparison with a diesel only minigrid (with an emission factor of 0.786 tons CO2e/MWh), yields annual project GHG ER of **268.76 metric tons of CO2e resulting in direct GHG ER of 5.4 ktonCO2e over the technology's lifetime of 20 years.**

At CEO ER stage, power generation per minigrid is estimated at **43.8 MWh per year for Pilot 1 and 64.6 MWh per year for Pilot 2.** Based on annual generation, the comparison between the existing Solar PV-battery minigrid with and without PUE Overlay (Pilot 1) and between the greenfield Solar PV-battery minigrid and a notional diesel only minigrid (Pilot 2), yields annual project GHG ER of **122 metric tons of CO2e (39 tCO2e for Pilot 1 and 83 tCO2e for Pilot 2)**. Hence the total number of direct GHG ER over 20 years for the project is now estimated at **2,444 tons of CO2e (784 tCO2e for Pilot 1 and 1,660 tCO2e for Pilot 2)**.

Comparison with respect to PIF Stage – Indirect GHG ER

Indirect emissions mitigation at PIF stage was estimated at 54,611 tCO2e. This was done using a top-down approach, on the basis that the project contributes to an enabled environment which subsequently attracts investment in renewable energy minigrids adding approximately 2 MW of installed capacity over a 10-year post-project period. Indirect emissions mitigation from these minigrids is calculated over their technology lifetime of 20 years. The methodology assumes that minigrids will electrify either 33%, 20% or 15% (in this case 25%) of the unelectrified population (408,000 people). The selection of this minigrid electrification factor was based on several

criteria, including (1) current levels of grid coverage; (2) recent and ongoing initiatives for grid extension; (3) geographical size of countries; and (4) spread of off-grid communities in terms of population density. Thereafter the methodology applies a causality factor varying between 20% and 80%, chosen based on the state of the minigrid market development and ongoing baseline initiatives in each country; for this project it was estimated at 60%.

A similar methodology has been applied at CEO ER stage to revise estimations of indirect GHG ER arising from renewable energy minigrid investments expected to occur over a 10-year post-project period, enabled in part by project contributions. **Emissions mitigation at CEO ER stage has been estimated at 36,000 tCO2e**[143] as a result of renewable generation capacity additions of 1.6 MW. The methodology assumes that minigrids will electrify either 30%, 20% or 15% (in this case 30%) of the rural unelectrified population (258,139 million people). It also assumes a causality factor of 60% to estimate what percentage of GHG ER can be attributed to enabling conditions to which the project has contributed.

Parameters to estimate indirect GHG ER	PIF Stage	At CEO Endorsement
Unelectrified population (million people)	408,000	266,960
National electrification rate (%)	66%	77%
Unelectrified rural population (people)	NA	258,139
Minigrids Total Electrification factor (% of total unelectrified population)	25%	NA
Minigrids Rural Electrification factor (% of unelectrified rural population)	NA	30%
Number of people to be electrified by minigrids (people)	102,000	77,442
Average minigrid market size (# households/minigrid)	100	100
Average minigrid system size (kW per minigrid)	10	10
Number of people per unit of installed solar PV capacity (people per kW)	50	50
Installed RE capacity over post-project 10-year period (MW)	2.0	1.6
Causality factor (attribution to AMP) (%)	60%	60%

3. Eswatini - Minigrid Investment Pilots

The Eswatini National Child Project will support the following two minigrid investment pilots:

- **Pilot 1 will use a Productive Use Overlay approach**
    - Pilot 1 for Eswatini will be an existing minigrid system (already consisting of 20 households and 2 social users (churches)) upon which the project will add a PUE Overlay.
    - It is to be noted that the minigrid system upon which the project will add a PUE Overlay, is already installed and is significantly oversized. The 35kWp, 200kWh solar PV-battery system was developed

[143] 10% of the indirect GHG ER of this an all AMP national child projects have been removed from each project and allocated to the AMP regional child project, in line with the apportioning of the overall program budget and reflected in the PFD allocation of GHG emissions reductions across the different child projects. This reflects the benefits of national child projects accessing the regional child project's support which is expected to contribute and enhance the enabling conditions required for minigrids development across AMP countries.

solely for residential and community use. As a public sector pilot project, it was intended to assess system performance for rural electrification.

- Therefore, the model does not consider investments in additional solar or battery installed capacity and will focus instead on improving the utilization of the existing 35kWp, 200kWh solar PV-battery system. The project will only invest the capex required for PUE equipment, which will be financed entirely from the project budget.
- Pilot 1 is estimated to overlay 8 PUE equipment – 4 commercial users (1 sewing equipment, 3 internet cafes/printers) and 4 Productive users (1 rice/corn mill, 2 welding machines, 1 egg incubation center) on existing Solar PV-battery minigrid.

- **Pilot 2 will develop a Greenfield Solar Battery minigrid**.
  - Pilot 2 is estimated to be a greenfield Solar PV-battery minigrid that would serve 60 residential customers, 6 commercial customers (1 restaurant, 5 internet café/printer/microwork services) and 3 productive use customers (1 rice/corn mill, 1 peanut butter machine, 1 egg incubation unit)
  - It is estimated that project will be adding 49 kWp of installed solar capacity and 165 kWh of battery storage.

The allocated GEF project INV budget of USD 160,000 will be used to provide: (i) 100% CAPEX subsidy (USD 25,000) for the 8 PUE equipment to be overlayed on the existing Solar PV-battery minigrid of Pilot 1 and (ii) 45% CAPEX subsidy (USD 135,000) for the proposed greenfield Solar PV-battery minigrid of Pilot 2. Hence, an estimation of minigrid capex subsidy required for LCOE parity is not necessary for Eswatini Pilot 1.

The table below provides a brief description of each pilot, the allocated budget and the expected increase in renewable energy (RE) capacity.

Table 24: Eswatini National Child Project – Minigrid investment pilots

Pilot Summary			
Pilot # / name	**Pilot 1. Mvundla (Sigcineni) PUE Overlay**	**Pilot 2. Energy Hub pilot**	**Combined**
Type of Pilot	Productive use overlay to an existing MG	Greenfield MG with a focus on productive use	
Objective:	Pilot extension project to demonstrate productive use as anchor load in Mvundla near Sigcineni, Manzini area	Mini-grid Energy Hub pilot demonstrating productive uses as anchor off-taker of electricity that enables household electrification	
Technology:	Solar PV + Battery	Solar PV + Battery	
Total number of minigrids	1	1	
Budget Allocated (USD) (estimated CAPEX subsidy):	25,000	135,000	160,000
Use of GEF INV funds	Provide CAPEX subsidies for 100% of the cost of PUE equipment	Provide CAPEX subsidies for 45% of the cost of the greenfield minigrid systems	
System Sizing & Increase in RE Capacity			
Pilot #	**Pilot 1**	**Pilot 2**	**Combined**
Solar PV Capacity (kWp)	35 (existing) 34 (required)	0 (existing) 20 (required)	35 (existing) 83 (required)
	0 (Incremental)	**49 (Incremental)**	**49 (incremental)**
Battery Capacity (kWh)	200 (existing) 145 (required)	0 (existing) 165 (required)	200 (existing) 310 (required)
	0 (Incremental)	**165 (incremental)**	**165 (incremental)**

The following table shows the number of new user connections by customer segment and the resulting number of direct beneficiaries for each pilot and the project.

Table 25: Eswatini National Child Project – New minigrid connections and direct beneficiaries

Existing and new minigrid connections				
Pilot # / name	**Pilot 1. Sigcineni (Mvundla) PUE Overlay**		**Pilot 2. Energy Hub pilot**	**Combined/Project**
Customer segment	**Existing users**	**New users**	**New users**	**New users**
Residential	20	0	60	**60**
Social	2 (churches)	0	0	**0**
Commercial	0	1 (Sewing services) 3 (Internet Café & Printer) *4 (total)*	1 (Restaurant/eatery) 5 (Internet Café & Printer) *6 (total)*	**1 (Restaurant/eatery)** **1 (Sewing services)** **8 (Internet Café & Printer)** ***10 (total)***
Productive users	0	1 (Rice/Corn Mill) 2 (Welding Machine) 1 (Egg Incubation) *4 (total)*	1 (Rice/Corn Mill) 1 (Peanut butter machine) 1 (Egg Incubation) *3 (total)*	**2 (Rice/Corn Mill)** **2 (Welding Machine)** **1 (Peanut butter machine)** **2 (Egg Incubation)** ***7 (total)***
Total connections	**22**	**8**	**69**	**77**
Pilot direct beneficiaries	**108**	**24**	**327**	**459**

4. AMP Financial Model Calculations & Methodology

Solar PV Minigrid system sizing. The AMP financial model uses customized demand metrics and typical average load profiles of various customer types to estimate optimized Solar PV-battery system size configuration using the formulas described in the Box below.

The Solar PV capacity configuration was estimated using the formula below:

$$\textbf{Solar PV Capacity for a Solar PV Battery system (kW)} = \text{Daily electricity consumption in Year 3 (kWh)} \times \textit{Seasonal Multiplier}\ (1.28) \div (1 - \textit{Losses Factor}\ (8\%)) \div \textit{Daily peak sun hours}\ (\textit{hours})$$

Solar PV capacity is a function of:

- Electricity demand parameters – namely, the expected daily average electricity consumption in Year 3 (kWh/year)
- Weather parameters – namely the average Solar Irradiation (daily average number of hours of peak sun at a solar radiation of 1 kW/m2) received by the proposed minigrid pilot location (or a provincial/national average if an exact minigrid pilot location has not been defined), a Seasonal multiplier to account for solar irradiation variations throughout the year, and a generation and distributions losses factor.

The battery capacity configuration was estimated using the formula below:

$$\textbf{Battery Capacity for a Solar PV} - \textbf{Battery system(kWh)} = \text{Average daily electricity consumption in Year 3 (kWh)} \times \textit{Night time fraction}\ (\%) \times \textit{Night time demand to be met by battery}\ (\%) \div (\textit{Usable Energy}\ (60\%)) \times (1 + \textit{Battery Oversizing Factor})$$

Battery capacity configuration is based on the expectation that a percentage of the minigrid night-time electricity consumption in Year 3 (100% if Solar PV-battery; 70% if Solar PV-Battery Diesel) will be met by battery and the assumption that only 60% of installed battery capacity can be utilized to supply customer demand due to limitations of typical battery discharge depth. Night-time electricity consumption is estimated as 50% and 39% of the average daily electricity demand for Pilots 1 and 2 respectively. An overall oversizing factor (67%) is applied to account for increased night-time electricity demand and battery capacity degradation over time.

Power generation. Electricity generated from Solar PV minigrids in the first year of installation is derived from the following formula: (Solar PV Capacity Installed in kW) x (Capacity Utilization Factor) x 365 days x 24 hours. After the

first year of installation, an annual 1% degradation factor is applied to the amount of kWh generated by each Solar PV installation. Electricity generated is used to supply demand and to charge batteries; any remaining electricity is considered excess electricity.

Only renewable electricity generated to meet consumer demand is used for the purpose of estimating GHG emissions reductions. Hence, annual renewable electricity generation (excluding excess electricity) is estimated using the following formula: (Annual electricity consumption of residential and non-residential consumers in year y (MWh)) / (1 – Loss factor) x Renewable energy fraction of total power generation (100%).

Loss of electricity due to the use of battery. Electricity losses due to the use of battery have been built into the system, since battery capacity is estimated based on the assumption that only 60% of battery capacity is usable to supply customer demand. These battery capacity/electricity loss assumptions are in addition to generation and distribution system losses (8%) built into the models due to inverter losses and transmission and distribution losses.

Findings/highlights/conclusions for Eswatini Pilot 1.

- **Existing minigrid significantly oversized.** The existing minigrid system upon which the project will add a PUE overlay is oversized enough, but additional investments are needed to increase installed capacity (solar, storage) to accommodate PUE overlay. Nevertheless, additional investments in Solar PV-battery capacity to accommodate PUE overlay are not planned to be supported by the project budget.
- **PUE overlay will improve LCOE.** The proposed PUE overlay over this existing minigrid system will improve its capacity utilization factor and therefore also decrease the estimated Levelized Cost of Energy (LCOE) of this minigrid system from $7.51/kWh without PUE overlay to $5.61/kWh with PUE overlay.
- **Subsidy of up to 100% of upfront capex of 8 PUE equipment proposed to be overlayed, estimated to be a total of US$ 25,000, is proposed.** The financial modeling exercise of the existing Solar PV-battery minigrid considers 100% PUE equipment CAPEX to be subsidized with GEF project budget but not the increased Solar PV-battery minigrid CAPEX due to increased system capacity to accommodate PUE overlay.
- **PUE overlay will increase annual and lifetime carbon emission savings.** The proposed PUE overlay over this existing minigrid system will improve its capacity utilization factor and therefore also increase the lifetime carbon emission savings from this minigrid system. The financial modeling exercise of the existing Solar PV-battery minigrid system estimated an annual carbon emission reduction of 12 tCO2e without PUE overlay and 51 tCO2e with PUE overlay, thereby achieving an effective GHG emission reduction of 39 tCO2e per annum. The modeling exercise also estimated a lifetime (20-year) carbon emission reduction of 242 tCO2e without PUE overlay and 1,026 tCO2e with PUE overlay, thereby achieving an effective GHG emission reduction of 784 tCO2e over a 20-year lifetime.
- **PUE overlay will decrease lifetime carbon abatement costs.** The proposed PUE overlay over this existing minigrid system will increase its capital efficiency by decreasing the lifetime carbon abatement costs (lifetime capex divided by lifetime carbon emission savings) from $3,517 without PUE to $854 with PUE overlay.

Methodology and calculations – Pilot 1

Step 1 – Defining Indicative minigrid system characteristics.

- The model simulates a Solar PV-battery MG system, both with and without the addition of a productive use of electricity (PUE) overlay, for a custom sized minigrid demand/market.
- Customized demand metrics and typical average load profiles of various customer types are provided to the model as inputs, and an optimized Solar PV-battery-diesel system size configuration is computed by the model (proposed to be deployed under this GEF project).
- In this case, financial model estimated a baseline minigrid system (without PUE overlay) of Solar PV capacity of 4.0 kWp and battery capacity of 15 kWh to serve these customers. Based on assumptions for estimated electricity demand from each of these existing 20 residential and 2 social users and the newly proposed PUE overlay customers over a 20-year period, the financial model estimated a minigrid system with Solar

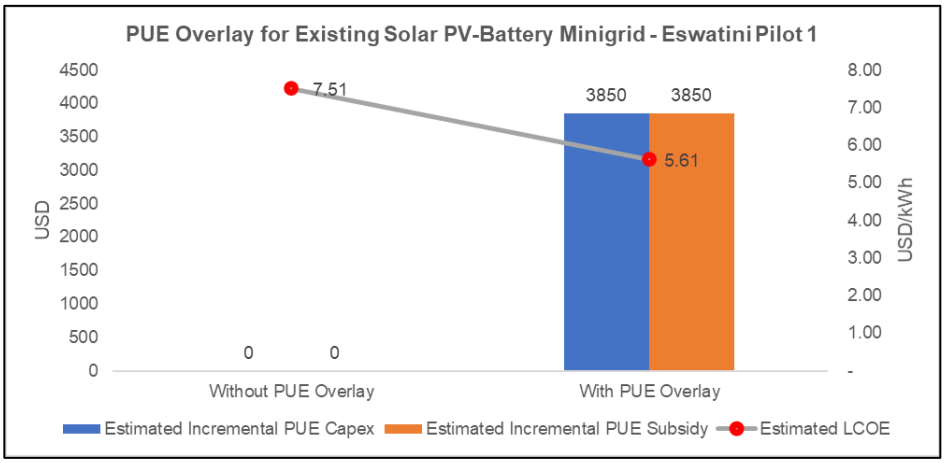
PV capacity 34 kWp and battery capacity of 145 kWh to serve these customers. No diesel genset backup is modelled in both with and without PUE overlay systems.

Step 2 – Estimating LCOE and subsidy levels.

- The model uses a combination of generic and country-specific inputs to estimate the all-in costs for the minigrid including capital expenditures (CAPEX), operational and maintenance costs (OPEX) and financing costs.
- The model calculates the Levelized Cost of Electricity (LCOE) for the proposed PUE overlay of existing minigrid system, that is the price that would have to be charged for the electricity to be able to recover all costs (CAPEX, OPEX and financing costs) over a 20-year period timeframe.
- Several assumptions/input values are included in the model for Capex, Opex, Capacity Utilization Factor (CUF), cost of capital and electricity demand from existing customers, to estimate all-in costs.
- With the proposed incremental CAPEX investments (under this GEF project) to add 8 more Productive Use Equipment (PUE – proposed to be sewing machines, internet café, rice/corn mill, 2 welding machines and an egg incubation unit), and using the same CAPEX, OPEX and financing costs as earlier, LCOE is recalculated with PUE overlay.
- The model compares the LCOEs of the existing Solar PV-battery minigrid in with and without PUE overlay scenarios; CAPEX subsidy of 100% of the cost of PUE equipment is envisaged with GEF project resources.

The PUE overlay proposed to be implemented under this project with GEF INV will result in increased capacity utilization of existing solar PV minigrid and hence, reduce its LCOE, as shown in the figure below.

Figure 8: Subsidy Level and LCOE with and without PUE Overlay for Existing Minigrid – Eswatini Pilot 1



Step 3 – Estimating GHG ER for indicative minigrid system.

- The model estimates environmental benefits for the Solar PV-battery minigrid system by comparing the GHG emitted between the Program scenario (with PUE overlay of existing Solar PV-Battery minigrid system) and baseline scenario (without PUE overlay of existing Solar PV-Battery minigrid system).
- Estimation of GHG emissions avoided is based on estimating CO2 emissions reduction using emission factors for various consumer types as per **AMS-III.BB: Electrification of Communities through grid extension or construction of new minigrids.** [144] This methodology is applicable to project activities involving

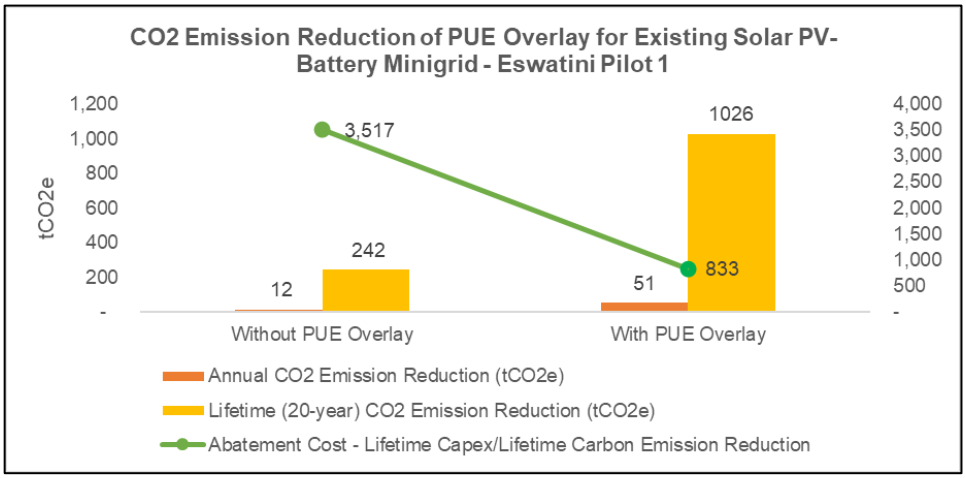
[144] https://cdm.unfccc.int/methodologies/DB/TI8KFU0GX1JBYZLOIJ6OMCSVYXCZUJ

electrification of a community of consumers (each consumer with a single electrical connection to a grid) through either: (a) Extension of an existing grid (national, regional or minigrid); or (b) Construction of new minigrid . No leakage or project activity emissions were considered.

- To that end, the model calculates emissions reductions as a function of incremental electricity generated from the PUE overlay added to the Solar PV- Battery minigrid over a 20-year period and a baseline emission factor which for residential consumers is chosen based on their average annual electricity consumption (a combination of 6.8, 1.3 and 1.0 tCO2e/MWh) and for non-residential users is 1.0 tCO2e/MWh.
- Annual electricity generated from the Solar PV Battery minigrid is derived from the following formula: (Annual electricity consumption of residential and non-residential consumers in year y (MWh)) / (1 – Loss factor).

The Figure below shows the GHG emission reductions due to deployment of PUE overlay of existing Solar PV-Battery Minigrid (Pilot 1) system. The direct GHG emissions reductions from PUE overlay of existing Solar PV-battery minigrid system estimated an annual carbon emission reduction of 12 tCO2e without PUE overlay and 51 tCO2e with PUE overlay, thereby achieving an effective GHG emission reduction of 39 tCO2e per annum. Also, estimated a lifetime (20-year) carbon emission reduction of 242 tCO2e without PUE overlay and 1,026 tCO2e with PUE overlay, thereby achieving an effective GHG emission reduction of 784 tCO2e over a 20-year lifetime. The project yields a GEF abatement cost of 854 USD/tCO2e.

Figure 9: Annual and Lifetime CO2 Emission Reduction (tCO2e) with and without PUE Overlay for Existing Solar PV Minigrid – Eswatini Pilot 1



Findings/highlights/conclusions for Eswatini Pilot 2.

- **Co-financing is key for Pilot 2 (greenfield solar battery minigrid system) to reach financial close and deliver the intended results.** GEF INV budget allocated to pilot 2 covers a fraction of the CAPEX costs for Pilot 2, and a fraction of the estimated subsidy contribution that would be required to reach LCOE parity with respect to a diesel-only baseline. Although the level of CAPEX subsidy will be defined in each case during project implementation by the respective Implementing Partner, it's worth noting that co-financing (as committed by the various areas / spheres of Eswatini's Government) will be critical to put the required infrastructure in place for the community that has been identified.
- **Estimated LCOE for the proposed greenfield solar-battery minigrid system is higher than LCOE of a comparable diesel-only minigrid system.** The financial modeling exercise of proposed 49 kWp 165 kWh

greenfield solar-battery minigrid system estimated an LCOE of $1.63/kWh when compared to an LCOE of $1.03/kWh of a comparable (notional) diesel-only minigrid system.

- **Subsidy of 45% of upfront capex would reduce LCOE of solar-battery system to be equal to that of comparable notional diesel-only minigrid system.** The financial modeling exercise of proposed 49 kWp 165 kWh greenfield solar-battery minigrid system estimated an LCOE of $1.03/kWh with a 45% subsidy for upfront capex which is equal to an LCOE of $1.03/kWh of a comparable (notional) diesel-only minigrid system.
- **Annual and Lifetime Carbon Emission Savings.** The financial modeling exercise of proposed 49 kWp 165 kWh greenfield solar-battery minigrid system estimated an annual carbon emission reduction of 83 tCO2e and a lifetime (20-year) carbon emission reduction of 1,660 tCO2e when compared to a comparable (notional) diesel-only minigrid system.
- **Lifetime Carbon Abatement Costs.** The financial modeling exercise of proposed 49 kWp 165 kWh greenfield solar-battery minigrid system estimated a lifetime carbon abatement costs (lifetime capex divided by lifetime carbon emission savings) of $232 when compared to a comparable (notional) diesel-only minigrid system.

Methodology and calculations – Pilot 2

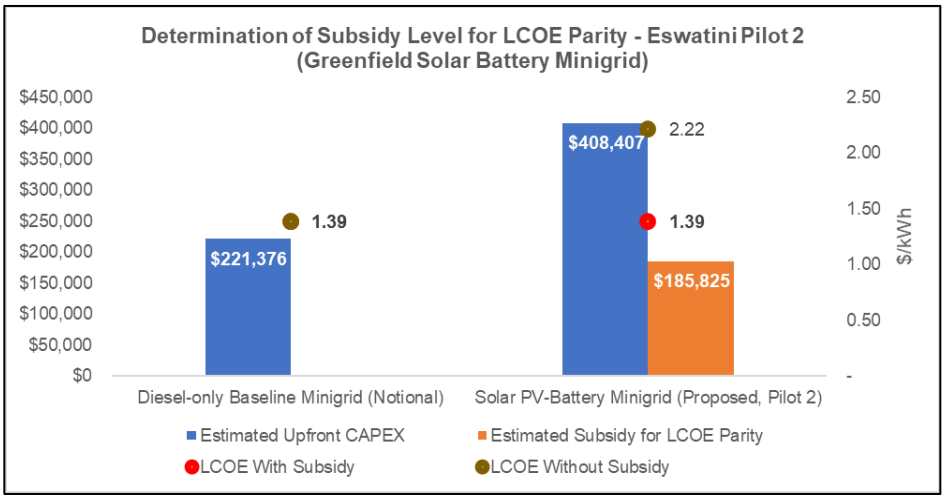
Step 1 – Defining Indicative minigrid system characteristics.

- The model simulates a greenfield Solar PV-battery MG system, without the addition of a productive use of electricity (PUE) overlay, for a custom sized minigrid demand/market.
- Customized demand metrics and typical average load profiles of various customer types are provided to the model as inputs, and an optimized Solar PV-battery-diesel system size configuration is computed by the model (proposed to be deployed under this GEF project).
- In this case, the minigrid would serve 60 residential customers, 6 commercial customers (1 restaurant, 5 internet café/printer/microwork services) and 3 productive use customers (1 rice/corn mill, 1 peanut butter machine, 1 egg incubation unit). Based on assumptions for estimated electricity demand from each of these customers over a 20-year period, the financial model estimated a baseline notional, diesel-only minigrid of capacity 45.3 kW to serve these customers. An indicative greenfield minigrid system with Solar PV of capacity 49 kWp and a battery of capacity 165 kWh is modelled to be deployed to serve the same set of customers. No diesel genset backup is modelled.

Step 2 – Estimating LCOE and subsidy levels.

- The model uses a combination of generic and country-specific inputs to estimate the all-in costs for the minigrid including capital expenditures (CAPEX), operational and maintenance costs (OPEX) and financing costs.
- The model calculates the Levelized Cost of Electricity (LCOE) for the proposed PUE overlay of existing minigrid system, that is the price that would have to be charged for the electricity to be able to recover all costs (CAPEX, OPEX and financing costs) over a 20-year period timeframe.
- The model compares the LCOEs of proposed greenfield 49 kWp 165 kWh Solar PV-battery minigrid with that of a notional 45.3 kW/56.6 kVA diesel-only minigrid system modelled in the financial model.
- To achieve LCOE parity of a comparable notional diesel-only minigrid (with a diesel genset of 45.3 kW/56.6 kVA capacity), a subsidy of 45% of upfront capex (USD 135,000) is necessary for the greenfield Solar Battery minigrid system as shown in the figure below.

Figure 10: Subsidy Level for LCOE Parity – Eswatini Pilot 2



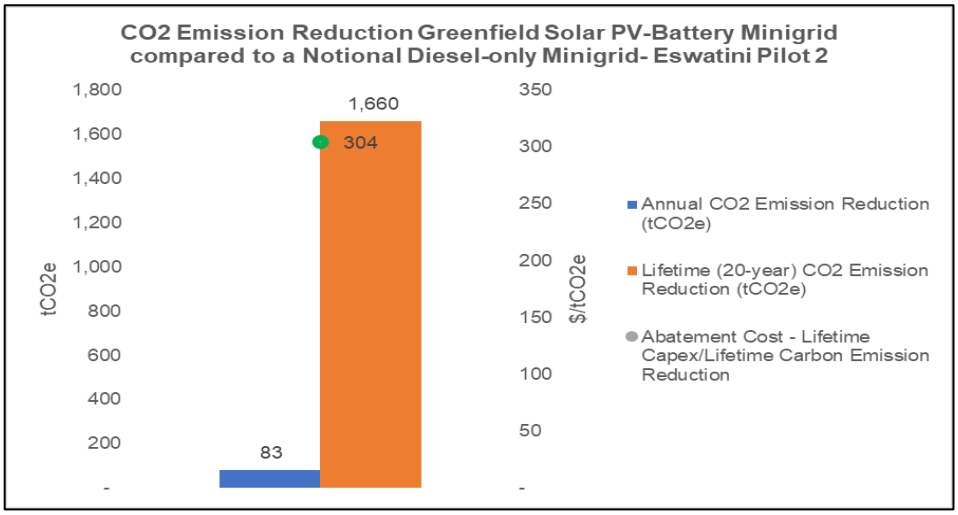
Step 3 – Estimating GHG ER for indicative minigrid system.

- The model estimates environmental benefits for the proposed greenfield Solar PV-battery minigrid system by comparing the GHG emitted between the Program scenario (greenfield Solar PV-Battery minigrid system deployed) and baseline scenario (notional diesel-only minigrid system deployed).
- Estimation of GHG emissions avoided is based on estimating CO2 emissions reduction using emission factors for various consumer types as per **AMS-III.BB: Electrification of Communities through grid extension or construction of new minigrids.** [145] This methodology is applicable to project activities involving electrification of a community of consumers (each consumer with a single electrical connection to a grid) through either: (a) Extension of an existing grid (national, regional or minigrid); or (b) Construction of new minigrid . No leakage or project activity emissions were considered.
- To that end, the model calculates emissions reductions as a function of electricity generated from the Solar PV- Battery minigrid over a 20-year period and a baseline emission factor which for residential consumers is chosen based on their average annual electricity consumption (a combination of 6.8, 1.3 and 1.0 tCO2e/MWh) and for non-residential users is 1.0 tCO2e/MWh.
- Annual electricity generated from the Solar PV Battery minigrid is derived from the following formula: (Annual electricity consumption of residential and non-residential consumers in year y (MWh)) / (1 – Loss factor).

The Figure below shows the GHG emission reductions due to deployment of greenfield Solar PV-Battery Minigrid (Pilot 2) system. The direct GHG emissions reductions from proposed greenfield Solar PV-battery minigrid system estimated an annual carbon emission reduction of 83 tCO2e. Also, estimated a lifetime (20-year) carbon emission reduction of 1,660 tCO2e over a 20-year lifetime. The project yields a GEF abatement cost of 232 USD/tCO2e.

[145] https://cdm.unfccc.int/methodologies/DB/TI8KFU0GX1JBYZLOIJ6OMCSVYXCZUJ

Figure 11: Annual and Lifetime CO2 Emission Reduction (tCO2e) for Greenfield Solar PV Minigrid compared to a notional Diesel-only Minigrid – Eswatini Pilot 2



Inputs and assumptions.

Key inputs are summarized in the tables below:

- The following are the **inputs used to determine system sizing** (load profile of the customers, day-night usage split, capacity utilization factor and system oversizing requirement to compensate for yield degradation and internal electricity losses).

Input	Units	Values – Pilot 1	Values – Pilot 2
Average daily consumption by customer segment/type			
Residential	kWh / day	0.543	0.142
Social (Church)	kWh / day	0.1	
Commercial	kWh / day		6-90
Productive users	kWh / day	0.4-67.5	4.5-12
Day/Night consumption Split			
Day Time Electricity Consumption	%	50%	61%
Night Time Electricity Consumption	%	50%	39%
Connection of customers to the minigrid			
% of total demand - Year 1	%	75%	75%
% of total demand - Year 2	%	85%	85%
% of total demand - Year 3	%	100%	100%
Technical inputs			
Solar Irradiation (kWh/m2)	kWh/m2	1570	1570
Solar Capacity Utilization Factor %	%	21%	21%
Seasonal Multiplier	-	1.28	1.28

Input	Units	Values – Pilot 1	Values – Pilot 2
Usable Battery Energy %	%	60%	60%
Battery Oversizing %	%	67%	67%
Diesel Generators Power Factor	-	0.8	0.8

- **OPEX.** The following are the inputs used to estimate the operational and maintenance costs (OPEX) for the minigrid systems analyzed.

Input	Units	Values – Both Pilots
RE Minigrid Operations & Maintenance (OPEX)		
Annual Insurance Costs as % of Minigrid Capex	% upfront CAPEX	2%
Annual 0&M Costs as % of Minigrid Capex	% upfront CAPEX	2%
Number of kWh per Liter of Fuel	kWh / Liter of diesel	3.50
Fuel Cost Per Liter	US$ / Liter of diesel	0.86

- **CAPEX.** The following are the inputs used to estimate the Capital expenditures (CAPEX) for the minigrid systems analyzed.

Eswatini Pilot 1.

Input	Units	Values – Pilot 1 (Existing Minigrid)
Minigrid CAPEX (Existing Minigrid – this CAPEX is not incrementally invested by this GEF project, only estimated for computation of LCOE)		
Solar PV + BoS + Inverter CAPEX (Energy Generation)	USD	NA (No project INV)
Battery CAPEX per kWh (Energy Storage)	USD	NA (No project INV)
Distribution Line CAPEX (Energy Distribution)	USD	NA (No project INV)
Site Development Costs	USD	NA (No project INV)
Other Costs - Transport, Installation, Soft Costs, Duties etc.	USD	NA (No project INV)
Total Minigrid CAPEX	**USD**	NA (No project INV)
Incremental PUE Overlay CAPEX (this CAPEX is proposed to be incrementally invested by this GEF project) for 8 PUE	**USD**	**25,000**

Eswatini Pilot 2.

Input	Units	Values – Pilot 2 (Greenfield Minigrid)
Minigrid CAPEX (Greenfield Minigrid – this CAPEX is proposed to be incrementally invested by this GEF project)		

Solar PV + BoS + Inverter CAPEX (Energy Generation)	USD	49,236
Battery CAPEX per kWh (Energy Storage)	USD	75,789
Distribution Line CAPEX (Energy Distribution)	USD	40,365
Site Development Costs	USD	38,651
Other Costs - Transport, Installation, Soft Costs, Duties etc.	USD	95,966
Total Minigrid CAPEX	**USD**	**300,007**

- **Unit Costs.** The following are the unit costs in terms of CAPEX per kWp of solar PV, CAPEX for kWh of battery, CAPEX per km of distribution lines etc. used to estimate the Capital expenditures (CAPEX) for the minigrid systems analyzed. These result in an average CAPEX per kW of installed capacity of USD 6,093 for Pilot 2..

Input	Units	Values – Pilot 1 (Existing Minigrid)	Values – Pilot 2 (Greenfield Minigrid)
Minigrid Unit Costs			
Solar PV CAPEX per kWp	USD	NA (No project INV)	1,000
Battery CAPEX per kWh	USD	NA (No project INV)	1,539
Diesel Genset (Notional Baseline System) CAPEX per kW	USD	NA (No project INV)	375
Distribution Line CAPEX per kWp	USD	NA (No project INV)	820
Blended Transport + Installation Costs per kWp	USD	NA (No project INV)	1,949

- **Capital Structure**. The following are the inputs used to estimate the Weighted Average Cost of Capital (WACC) for the minigrid investments analyzed. The capital structure reflects a pre-derisking scenario in which debt is not readily available to finance minigrid investments and instead, minigrid investors have to finance projects with 100% Equity.

Input	Units	Values – Both Pilots
RE Minigrid Financial structure and costs		
Equity %	%	100%
Debt %	%	0%
Cost of Equity %	%	25%
Loan Tenor (Years)	Years	8
Interest Rate %	% annual	20%
Weighted Average Cost of Capital (WACC)	% annual	25%

- **GHG Emission factors**. The model simulates a Solar battery Hybrid MG system, with or without the addition of a productive use of electricity (PUE) overlay, for three standard minigrid market sizes or for a custom sized minigrid market. Based on standard or customized demand metrics and typical average load profile of the customers, system size configuration is arrived at for each type of minigrid system.

- Estimation of GHG emissions avoided is based on UNFCCC methodology **AMS-III.BB: Electrification of Communities through grid extension or construction of new minigrids.**[146]
- It is assumed that all consumers (Type I (household) and Type 2 (non-household) will have metered connections for simplicity reasons.
- Since both minigrid pilots supported under this project are off-grid where baseline energy is supplied by diesel or fuel oil or a similar fossil fuel, emission factor of baseline fossil fuel based energy generation is used.
- The main GHG emission reduction computation formula (as provided in the UNFCCC methodology) is:
  Baseline emissions of Type I-M consumers, BET1M,y are calculated as:

Equation (6)

$$BE_{T1M,y} = \sum_{j=1}^{M_y} EC_{T1M,j,y} \times EF_{CO2,T1M}$$

Where:

$BE_{T1M,y}$ = Baseline emissions for Type I-M consumers in year *y* (t CO_2)

$EC_{T1M,j,y}$ = Annual electricity consumption of Type I-M consumer *j* in year *y* (MWh)

$EF_{CO2,T1M}$ =

1. If $EC_{T1M,j,y}$ is equal to or less than 0.055 MWh/y, then use a default value of 6.8 (t CO_2/MWh);
2. If $EC_{T1M,j,y}$ is less than or equal to 0.250 MWh/y but greater than 0.055 MWh/y, then:
   (a) For the portion up to and including 0.055 MWh/y, use a default value of 6.8 (t CO_2/MWh);
   (b) For the portion greater than 0.055 MWh/y, use a default value of 1.3 (t CO_2/MWh);
3. If $EC_{T1M,j,y}$ is greater than 0.250 MWh/y but less than or equal to 0.500 MWh/y, then:
   (a) For the portion up to and including 0.055 MWh/y use a default value of 6.8 (t CO_2/MWh);
   (b) For the portion greater than 0.055 MWh/y and less than 0.25 MWh/y use a default value of 1.3 (t CO_2/MWh); and
   (c) For the portion greater than 0.25 MWh/y use a default value of 1.0 (t CO_2/MWh);
4. If $EC_{T1M,j,y}$ is greater than 0.500 MWh/y then use a default value of 1.0 (t CO_2/MWh) for the entire portion (i.e. default values of 1.3 (t CO_2/MWh) or 6.8 (t CO_2/MWh) are not eligible for any of the portions)

M_y = Number of Type I-M consumers in year *y*

j = Type I-M consumer (j = 1, 2, 3, …)

[146] https://cdm.unfccc.int/methodologies/DB/TI8KFU0GX1JBYZLOIJ6OMCSVYXCZUJ

This formula is summarized in the table below:

Emission Factor (for CO2 Emission Reduction Computation)	Value
Emission factor Residential (<55 kWh Annual Consumption)	6.82
Emission factor Residential (55-250 kWh Annual Consumption)	1.30
Emission factor Residential (>250 kWh Annual Consumption)	1.00
Emission factor Commercial	1.00
Emission factor Industrial	1.00
Emission factor Social	1.00

GHG emission reduction estimation at PIF stage was made based on Capacity Utilization Factor (CUF), wherein amount of electricity units generated from the minigrid (using CUF of installed capacity) was multiplied with emission factors to arrive at GHG emission reduction estimates. The methodology used here is comparable to the one used during PIF stage, but it is more detailed due to the use of different emission factors for different types of customers (as required by the UNFCCC methodology).

Annex 14: Additional agreements.

The co-financing commitments received from the Ministry of Natural Resources and Energy (MNRE), Eswatini Energy Regulatory Authority (ESERA), Eswatini Electricity Company (EEC), UNDP Country Office and United Nations Capital Development Fund (UNCDF) are included below.

Ministry of Natural Resources and Energy (MNRE) including World Bank Loan

ESWATINI
Income Tax Building
Fourth Floor
Mhlambanyatsi Road
Telephone: (+268) 2404 6244/8
Fax: (+268) 2404 4708
E-mail: mnre@swazi.net

GOVERNMENT
Ministry of Natural Resources and Energy,
P. O. Box 57,
Mbabane,
Eswatini.

Our Ref: NRF/E/114. **16TH FEBRUARY, 2021.**

UNDP Resident Representative in Eswatini,
4th Floor, UN House,
Somhlolo Rd,
Mbabane,
Eswatini.

Dear Madam,

RE : CO-FINANCING COMMITMENT LETTER FOR THE NATIONAL CHILD PROJECT UNDER THE AFRICA MINI-GRIDS PROGRAM – ESWATINI.

Reference is made to the above captioned subject matter.

In my capacity as the Principal Secretary for the Ministry, I am pleased to express my full support and endorsement of the UNDP-supported, GEF-financed "National child project in Eswatini", which is part of the Africa mini-grids program. The project is aligned with, and supportive of, the government's national priorities and commitments towards the sustainable development goals.

The Ministry of Natural Resources and Energy will support the GEF-funded project through in-kind co-financing amounting to **USD 8 234.16** (equivalent to E121 042.08) through staff time and use of vehicles as well as complementary co-financing amounting to **USD 13 605 442.18** (equivalent to E 200 000 000.00) through the Ministry's rural electrification program that aims to provide access to electricity for households and businesses in rural areas. The World Bank has also committed to support the Ministry through a loan for the mapping of potential areas for mini-grid

1

deployment in Eswatini which is envisaged to cost **USD 154 053.**

The total co-financing from the Ministry therefore is equivalent to **Thirteen Million, Seven Hundred and Sixty Seven Thousand, Seven Hundred and Twenty Nine United States Dollars and Thirty Four Cents (USD 13 767 729.34)** throughout the duration of the project.

The Ministry would like to thank the Global Environment Facility for its support to this important initiative and looks forward to the commencement of the project and our continued collaboration.

Grateful for your understanding, cooperation and due process thereon.

Yours faithfully,

DORCAS N. DLAMINI (MRS).

PRINCIPAL SECRETARY.

Eswatini Energy Regulatory Authority (ESERA)

1st Floor RHUS Office Park, Karl Grant Street, Mbabane.
P.O. Box 7137, Mbabane, H100
Tel: (+268) 2404 2103/1439/8425
Fax: +268 2404 8474
Email: info@esera.org.sz
Website: www.sera.org.sz

Your Ref :
Our Ref : REG/TEC/PRO/01-04

12 February, 2021

UNDP Resident Representative in Eswatini
4th Floor, UN House
Somhlolo Rd
MBABANE
Kingdom of Eswatini

Dear Madam,

RE: CO-FINANCING COMMITMENT LETTER FOR THE NATIONAL CHILD PROJECT UNDER THE AFRICA MINI-GRIDS PROGRAM - ESWATINI

The Eswatini Energy Regulatory Authority (ESERA) is pleased to express full support for the UNDP-supported, GEF-financed "National child project in Eswatini", which is part of the Africa mini-grids program. The project is aligned with, and supportive of, the government's national priorities and commitments towards the sustainable development goals.

The Authority has been nominated as responsible party to this project and therefore pledges to contribute USD440,499 (Four Hundred and Forty Thousand, Four Hundred and Ninety-Nine US dollars Only) as part of its commitment and support towards the project. This amount includes consultancy fees for the development of the Mini-grids regulatory framework (Component 1 on Policy and Regulation) and financing of the operational costs of the Project Management Unit.

This support is, however, made pending final approval of the project by both GEF and the Authority's approval structures.

ESERA would like to thank the Global Environment Facility for its support to this important initiative and looks forward to the commencement of the project and our continued collaboration.

Sincerely,

Vusumuzi N. Mkhumane
CHIEF EXECUTIVE OFFICER

1st Floor RHUS Office Park, Karl Grant Street, Mbabane,
P.O. Box 7137, Mbabane, H100
Tel: (+268) 2404 2103/1439/8425
Fax: +268 2404 8474
Email: info@esera.org.sz
Website: www.sera.org.sz

Your Ref :
Our Ref : REG/TEC/PRO/01-04

23 March, 2021

UNDP Resident Representative in Eswatini
4th Floor, UN House
Somhlolo Rd
MBABANE
Kingdom of Eswatini

Dear Madam,

RE: CLARIFICATION ON CO-FINANCING COMMITMENT LETTER FOR THE NATIONAL CHILD PROJECT UNDER THE AFRICA MINI-GRIDS PROGRAM - ESWATINI

1. The above subject matter refers.

2. Reference is made to our letter (dated 12 February 2021) regarding Eswatini Energy Regulatory Authority's co-financing commitment towards the Africa Mini-Grids Program for Eswatini.

3. Following a request for clarification by your officials during a virtual meeting held on Wednesday, 18th March 2021, the Authority wishes to provide this as follows:

    i. As indicated in the referred letter, ESERA pledges to contribute a total amount of USD 440,499 as part of her commitment and support for the project.
    ii. This amount comprises of USD59,088 as complimentary Public Investment for the development of a mini-grids regulatory framework for the Eswatini Electricity Supply industry and USD381,411, which is an in-kind contribution towards the operational costs of the Project Management Unit (PMU). The in-kind contribution covers office expenses, staff salaries and other such needs for the PMU.

4. The Authority would like to reiterate that this support is, however, made pending final approvals by both GEF and the Authority's approval structures.

5. I trust that this informs you sufficiently.

Sincerely,

Vusumuzi N. Mkhumane
CHIEF EXECUTIVE OFFICER

Eswatini Electricity Company (EEC)

Eswatini Electricity Company (EEC)

Head Office, Eluvatsini House
Mhlambanyatsi Road
P O Box 258 Mbabane H100
Tel: +268 2409 4000 Fax: +268 2409 4001

Our Ref: MD.65/ESM
Your Ref:

14 June 2021

UNDP Resident Representative in Eswatini
4th Floor, UN House Somhlolo Rd
Mbabane,
Eswatini

Attention: Rose Ssebatindira

Dear Madam,

RE: COMMITMENT LETTER FOR THE NATIONAL CHILD PROJECT UNDER THE AFRICA MINI-GRIDS PROGRAM -ESWATINI

In my capacity as the **Acting Managing Director**, I am pleased to express our full support and endorsement of the UNDP-supported, GEF-financed "National child project in Eswatini", which is part of the Africa mini-grids program (AMP). The project is aligned with, and supportive of, the government's national priorities and commitments towards the sustainable development goals.

The Eswatini Electricity Company (EEC) will support the GEF-funded project with collaboration on and access to the EEC Sigcineni minigrid pilot project. Under the AMP, productive use of energy piloting activities will take place as an overlay to the newly developed 35kWp, 200kWh solar PV-battery minigrid system developed as a public investment to the value of $256,000 (USD)[1].

The EEC would like to thank the Global Environment Facility for its support to this important initiative and looks forward to the commencement of the project and our continued collaboration.

Yours faithfully,

ERNEST S. MKHONTA
MANAGING DIRECTOR (A)

[1] E3.56 million at an exchange rate of 13.88 : 1 as at 27 May 2021

Cc: Principal Secretary: Ministry of Natural Resources and Energy;
GEF-Operational Focal Point;
Ministry of Tourism and Environmental Affairs;
General Manager Research and Development;

Mr. Oliver Waissbein
Principal Technical Advisor, Energy
United Nations Development Programme
304 East 45th Street
New York, NY 10017, USA

10 May 2021

Re: Co-financing for the UNDP-supported, GEF-funded National Projects in Eswatini and Malawi under the Africa Mini-Grids Program

Dear Mr. Waissbein,

We write to you in connection with the above-named Projects and wish to inform you that UNCDF is pleased to act as a co-financing partner to the Projects.

UNCDF, in partnership with UNDP, conducted a SADC regional market scoping study related to clean energy contributions to real economy growth, as part of a wider financial inclusion diagnostic also known as MAP. Eswatini and Malawi were included in the study, along with three other countries. The Scoping study served as the basis for a clean energy country report developed for all five countries respectively. The country studies include desktop research based on the scoping study, as well as extensive demand side analytics, leveraging the FinScope data sets for each country. The country reports describe the landscape of energy and clean energy provision at country level, and highlight opportunities and barriers to energy and clean energy usage. The research is intended to inform programmatic interventions at country level, inform further research into specific opportunities (like mini-grids), as well as to catalyse investment related to opportunities highlighted.

UNCDF is pleased to confirm the above research initiatives as co-financing towards the above programme on clean energy in Eswatini and Malawi. The details of this co-financing support are as follows:

Country	Co-financing amount (USD)	Type
Eswatini	910,000	*Other – Research was provided to the Ministry of Finance*
Malawi	644,000	*Other - – Research was provided to the Ministry of Finance*
Total	**1,554,000**	

We believe that the proposed Projects provide an important platform to advance renewable energy mini-grids in Eswatini and Malawi. We look forward to the commencement of the Project and to explore ways in how we can possibly continue our collaboration, at country or regional level.

Yours sincerely,

Mike McCaffrey
Regional Digital Hub Lead for East and Southern Africa
UNCDF

United Nations Development Programme (UNDP), Eswatini Country Office

UNITED NATIONS DEVELOPMENT PROGRAMME

Empowered lives.
Resilient nations.

Eswatini Country Office

5 May 2021

Dear Mr. Kurukulasuriya,

RE: UNDP Support - Eswatini National Child Project under the Africa Mini-grids Program

I am pleased to express my full support and endorsement of the UNDP-supported, GEF-financed "Eswatini national child project," which is part of the Africa mini-grids program. The project is aligned with, and supportive of, the government's national priorities and commitments towards the sustainable development goals, the UNCDF and CO CPD (2021-2025), respectively.

This is to therefore to confirm USD 50,000 (fifty thousand) TRAC 1 complimentary cash contribution to the project and to pledge in-kind co-financing support of $4,000,000 (four million) to be mobilized in collaboration with government over the four (4) years duration of the project. The cash contribution is earmarked for component 3 of the project, namely Knowledge Management, Monitoring and Evaluation.

We appreciate the Global Environment Facility critical support to this important project and look forward our continued collaboration.

Sincerely,

Rose K. Ssebatindira
Resident Representative

Pradeep Kurukulasuriya
Executive Coordinator and Director
Nature, Climate and Energy
United Nations Development Programme
304 East 45th Street, FF-9th Floor
New York, NY 10017
UNITED STATES OF AMERICA

Annex 15: GEF Core indicators

Core Indicator 6	**Greenhouse gas emission mitigated**					***(Metric tons of CO_2e)***
			Expected metric tons of CO_2e (6.1+6.2)			
			PIF stage	Endorsement	MTR	TE
		Expected CO_2e (direct)	5,400	2,444		*2,444*
		Expected CO_2e (indirect)	54,611	18,000		*18,000*
Indicator 6.2	Emissions avoided Outside AFOLU					
			Expected metric tons of CO_2e			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Expected CO_2e (direct)	5,400	2,444		
		Expected CO_2e (indirect)	54,611	18,000		
		Anticipated start year of accounting	2021	2021		
		Duration of accounting	20	20		
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Technology	Capacity (MW)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Solar PV Battery Minigrid	0.1	0.02		
Core Indicator 11	**Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment**					***(Number)***
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Female	8,294	234		
		Male	7,969	225		
		Total	16,263	459		

Annex 16: GEF 7 Taxonomy

Level 1	Level 2	Level 3	Level 4
☒ **Influencing models**			
	☐ **Transform policy and regulatory environments**		
	☒ **Strengthen institutional capacity and decision-making**		
	☒ **Convene multi-stakeholder alliances**		
	☒ **Demonstrate innovative approaches**		
	☐ **Deploy innovative financial instruments**		
☒ **Stakeholders**			
	☐ **Indigenous Peoples**		
	☒ **Private Sector**		
		☐ Capital providers	
		☐ Financial intermediaries and market facilitators	
		☐ Large corporations	
		☒ SMEs	
		☒ Individuals/Entrepreneurs	
		☐ Non-Grant Pilot	
		☐ Project Reflow	
	☒ **Beneficiaries**		
	☒ **Local Communities**		
	☒ **Civil Society**		
		☐ Community Based Organization	
		☒ Non-Governmental Organization	
		☒ Academia	
		☒ Trade Unions and Workers Unions	
	☒ **Type of Engagement**		
		☒ Information Dissemination	
		☒ Partnership	
		☒ Consultation	
		☒ Participation	
	☒ **Communications**		
		☒ Awareness Raising	
		☒ Education	
		☐ Public Campaigns	
		☐ Behavior Change	
☒ **Capacity, Knowledge and Research**			
	☐ **Enabling Activities**		
	☒ **Capacity Development**		
	☒ **Knowledge Generation and Exchange**		
	☐ **Targeted Research**		
	☐ **Learning**		
		☐ Theory of Change	
		☐ Adaptive Management	
		☐ Indicators to Measure Change	
	☒ **Innovation**		

	☒ **Knowledge and Learning**		
		☒Knowledge Management	
		☒Innovation	
		☒Capacity Development	
		☒Learning	
	☒ **Stakeholder Engagement Plan**		
☒**Gender Equality**			
	☒**Gender Mainstreaming**		
		☒Beneficiaries	
		☐Women groups	
		☒Sex-disaggregated indicators	
		☒Gender-sensitive indicators	
	☒**Gender results areas**		
		☐Access and control over natural resources	
		☒Participation and leadership	
		☒Access to benefits and services	
		☒Capacity development	
		☒Awareness raising	
		☐Knowledge generation	
☐**Focal Areas/Theme**			
	☒**Climate Change**		
		☒**Climate Change Adaptation**	
			☐Climate Finance
			☐Least Developed Countries
			☐Small Island Developing States
			☐Disaster Risk Management
			☐Sea-level rise
			☐Climate Resilience
			☐Climate information
			☐Ecosystem-based Adaptation
			☐Adaptation Tech Transfer
			☐ National Adaptation Programme of Action
			☐National Adaptation Plan
			☐Mainstreaming Adaptation
			☐Private Sector
			☐Innovation
			☐Complementarity
			☐Community-based Adaptation
			☐Livelihoods
		☒**Climate Change Mitigation**	
			☐ Agriculture, Forestry, and other Land Use
			☐Energy Efficiency
			☐ Sustainable Urban Systems and Transport
			☐Technology Transfer
			☒Renewable Energy
			☐Financing
			☐Enabling Activities
		☐**Technology Transfer**	
			☐ Poznan Strategic Programme on Technology Transfer
			☐Climate Technology Centre & Network (CTCN)
			☐Endogenous technology
			☐Technology Needs Assessment
			☐Adaptation Tech Transfer

		☐ **United Nations Framework on Climate Change**	☐ Nationally Determined Contribution
	☒ **Rio Markers**		
		☐ Paris Agreement	
		☒ Sustainable Development Goals	
		☐ Climate Change Mitigation 0	
		☐ Climate Change Mitigation 1	
		☒ Climate Change Mitigation 2	
		☐ Climate Change Adaptation 0	
		☐ Climate Change Adaptation 1	
		☐ Climate Change Adaptation 2	

Annex 17: Climate risk screening

Infrastructure development, including energy infrastructure, throughout Africa will be particularly vulnerable to increased climate variability. This, in turn threatens economic growth, development, and social welfare benefits of infrastructure expansion. Accordingly, the African Development Bank has prioritized climate risk management and adaptation with an emphasis on building resources and capacity to inform 'best practice' project designs. [147]

At a country level, consideration of resilience planning and resilience enhancing policies will increasingly be important for infrastructure and energy projects. In terms of the AMP, it is anticipated that the DREI analysis might contribute to identifying climate related risks that will benefit from national / policy intervention[148].

For the country, Renewable Energy minigrids contribute greater resiliency to the overall energy system through contributing spatial diversity, bringing generation closer to consumption areas, diversification of the generation mix, locational flexibility, reduced water requirements and modular and rapid deployment. The communities where RE minigrids are deployed benefit from reduced vulnerabilities related to broader grid outages, back-up capacity inherent to battery storage, reduced reliance on fuel availability, having local economies energized with lower cost, localised energy solutions that are insulated against price escalations/volatilities of fossil fuels[149].

However, as already experienced by minigrids, the "resilience benefits of mini-grids are only as strong as the resilience of the mini-grids themselves[150]." Climate vulnerabilities are experienced at three levels: generation, distribution and demand. Climate hazards and risks in these areas include:

- **Generation**. Reduced efficiency of solar PV due to higher temperatures and dust. Increased air temperatures lower solar PV efficiency and energy output. Dry conditions increase dust events. More intense storms (frequency, duration and impact) and extreme precipitation threatens generation infrastructure
- **Distribution**. Increased temperatures reduce the efficiency of distribution networks. More intense storms and severe convection threatens distribution infrastructure. Increased wildfire activity can directly damage distribution infrastructure.
- **Demand.** Increased temperatures increase energy demand for cooling and could potentially stress system capacities, decreased precipitation and increasing dry days will increase irrigation and potable water demand, changing weather patterns will however also impact crop production, rural economies and reduce demand for electricity, declining habitability of areas (desertification, changing water level) might prompt relocations/migration of communities, leaving infrastructure redundant.

PUEs embedded in agricultural value chains are especially vulnerable to (i) the risks of extreme weather on the agricultural production, (ii) lower demand for PUE employed for agricultural beneficiation as well as (iii) the wider economic impact of crop failures in the community and resulting (in)ability to pay for electricity (increased end-user credit risk).

These risks are aggravated by the logistical challenges facing remote rurally located communities with limited access to technical support, spare parts, maintenance capacity to address mini-grid issues/disruptions. At the moment "environmental" and "force majeure risks" have been thought[151] to have relatively low probability, while experience have shown the impact of such risks could range from low to medium. These risks are expected to increase to 2050.

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[147] Veit, Sebastian. (2010). Climate Risk Management for the Energy Sector in Africa: The Role of the African Development Bank. 10.1007/978-90-481-3692-6_8.

[148] Policy considerations may include grid interconnection processes, tailored government financing mechanisms, overarching policy/regulatory goals for resilient design and operation of infrastructure systems, safety, reliability, and robustness standards, rate structures or incentive programs cognizant.

[149] Sherry Stout. James Elsworth. NREL. 2020. Renewable Energy and Resilience. ccreee.org/event/climate-vulnerability-modelling/

[150] Mason Fried. 2020. Case Study: Climate Resilience Assessment of Mini-Grids in Ghana, Integrated Resource and Resilience Planning (IRRP) Project.

[151] David Manetsgruber, Bernard Wagemann, Bozhil Kondev, Katrin Dziergwa. Risk management for Mini-grids: A new approach to guide mini-grid deployment. Alliance for Rural Electrification. Available at: www.ruralelec.org

Eswatini is considered highly vulnerable to the impacts of climate change. It is disposed to natural disasters such as violent storms, epidemic diseases, floods, storms and forest fires. Consequences of severe, recent droughts for the country have resulted in 25% of the population being vulnerable and acknowledged as food and water insecure. Climate change is likely to increase both the occurrence and scale of these disasters and their associated impacts[152, 153]. Accordingly, the country has identified key sectors at risk to climate change which have been prioritized in adaptation strategies: agriculture, water, biodiversity and ecosystems, and health.

In response to these anticipated risks and hazards, resiliency measures to mitigate risks from climate change on the minigrid pilot developments in Eswatini will have to be considered in 5 areas:

Table 26: Climate risk minigrid system mitigation measures

Mitigation area	Checklist of potential resiliency measures considered
Resilience planning	- Proactive planning for climate risks, - Site selection with consideration of weather hazards, - Sizing of systems to limit risk exposure, and - Storm water drainage.
Structural measures	- Site- specific, hazard-based structural design - Structural design, reinforcements, fastener and material selection strengthened or weatherproofed against anticipated climate risks. - Natural ventilation, fans or heat pumps to maintain airflow around battery banks and other critical infrastructure. - Lighting protection.
Reliability measures	- Replacement parts kept, where feasible, to address unexpected failures.
Operations and community coordination	- Necessary tools and capacity to ensure mini- grid systems are well maintained and operate as intended - Enhanced panel cleaning and maintenance of all equipment vulnerable to dust - Pre-storm checklists to limit or avoid damage from flooding, hazardous objects, loose connections, etc. - Post-storm checklists to check for damage or increased vulnerabilities - Community skilled for critical on-site maintenance - Site maintenance and preparation to protect against wildfires (fire breaks, volunteer fire crew training, firefighting equipment)
Productive uses of energy	- Introduction of PUEs that also contributes to mitigation of climate risks e.g. introducing solar powered pumps and irrigation[154].

[152] https://www.adaptation-undp.org/explore/africa/swaziland

[153] https://climateknowledgeportal.worldbank.org/country/swaziland/vulnerability

[154] Where irrigation systems can support vulnerable smallholder farmers to sustainably enhance their production levels to such a degree that they can provide for their household nutritional demands and deliver produce to viable markets.

Annex 18: Energy Hub elements and design considerations

An Energy Hub has been identified as a possible vehicle to improve the business model for minigrids and encourage private sector participation. It is anticipated that the development and implementation of the pilot project will be led by the MNRE AMP project, with services procured from identified service providers - including tenders for EPC and O&M services.

This development of the Energy Hub concept will however depend on several role players, more broadly than delivery and operation of energy infrastructure) and active collaboration with the community to ensure the hub is responsive to the community needs while achieving the critical electricity sales for a sustainable operating model. A preliminary (concept) view of the elements of the 'Energy Hub' are illustrated in Figure 12 and unpacked in the following table.

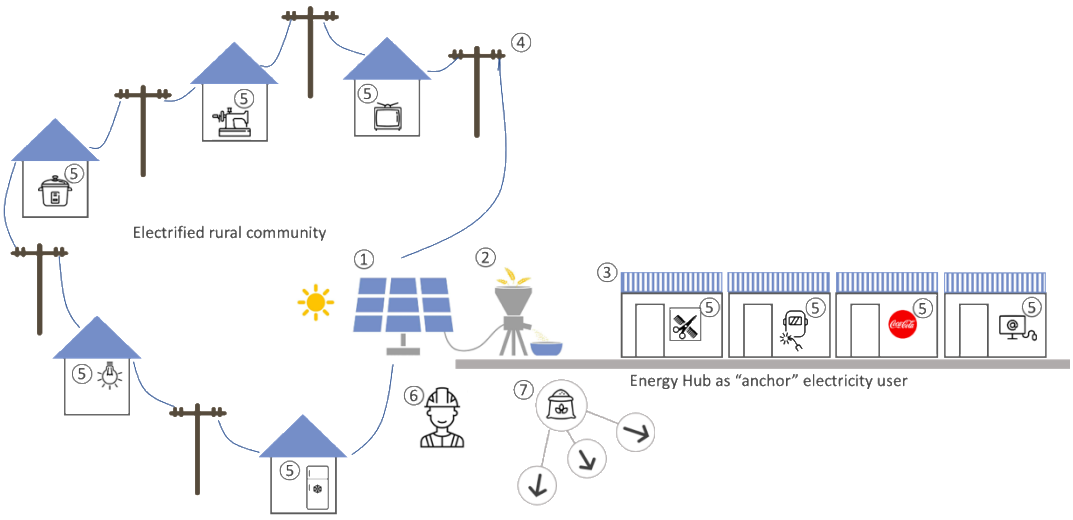

Figure 12: Elements of the 'Energy Hub' pilot

Table 27 describes the opportunities, role players and funding sources for each element (numbers in the table corresponding with the numbers of the elements illustrated in Figure 12.

Table 27: Elements of Energy Hub

No.	Element	Description and Opportunities	Role players and funding sources
1. & 4.	Minigrid system and household connections	Solar PV battery minigrid system including distribution network and advanced metering infrastructure that will allow remote monitoring and data collection and can support flexible and innovative tariffs that can respond to ability to pay and volumes consumed. In designing the system, two metrics are expected to guide system sizing: to achieve a minimum of 50% system utilization and ideally 80% of the revenue from commercial activities.	Funded by the MNRE and AMP project. Designed in collaboration with the minigrid operator identified through a procurement process. Procurement of services for: - System design and operation[155] - Engineering, procurement, construction

[155] It is critical that the system operator be identified early and be included from the start with the engagement of the community, the socio-economic considerations and design of the system.

No.	Element	Description and Opportunities	Role players and funding sources
2.	Anchor productive use(s)	Envisaged to be centered around a central processing hub of a suitable product, or delivery of a specific anchor service that supports economic activity and serves as primary off-taker of electricity. Because of accessibility challenges, opportunities to produce and transport for external markets will be limited. Besides a hammer mill for own usage, two opportunities may exist for economic activities with bigger reach: 1. Peanut butter production. Planting and producing groundnuts for processing into peanut butter. In processed form, shelf life is longer, and volumes reduced making transport easier. Dependent on interest and a market assessment. 2. Microwork services[156]. With an internet connection and a few computers[157], community members could participate in the global market, bringing revenue to the village that is not dependent on primary production or road infrastructure. Dependent on training and technical support.	PUE establishment funded by the Microprojects unit with co-finance by the community, with cash or in-kind. Business development support and community engagement led by (including funding support) by the Ministry of Commerce, Industry and Trade (MCIT) MSME unit. The MCIT Department of Cooperative Development may also contribute to establishing and supporting the business development.
3.	Small businesses	The hub should incorporate a number of diverse services, such as an internet café, lantern or mobile phone charging business for neighboring households (e.g. Solar Kiosk[158] or Solar Turtle[159], craft workshop, hairdresser, mechanic, welding or carpentry services, to provide a further layer of economic activity around the anchor user. Initial consultations with the community identified interest in a shop, welding workshop, sewing/seamstress, processing of poultry and cold storage, small scale meat distribution, and small scale confectionery.	Electricity connections and infrastructure funded by Microprojects, AMP and community. Business development, training and capacity building supported by the MCIT MSME Unit[160]. Other entities such as SEDCO, SWIFT (refer Table 8) and IMBITA (refer Table 8) could also offer valuable contributions to develop small and women-owned businesses.
5.	Efficient appliances	Another element foreseen for the pilot is making efficient electrical appliances available to households and small businesses. One option includes subsidizing the purchase of electric pressure cookers to displace less energy and time	Funded by AMP

[156] Microwork is any microtask that has been outsourced to a decentralized, online workforce. A microtask is a small job that requires a low level of skill and takes minimal time to complete. Microwork can often be found on crowdsourcing sites such as Amazon's Mechanical Turk (MTurk). Such sites specialize in connecting remote workers with businesses that have need of short-term freelance workers. The World Bank, as a part of a World Development Report, identified the "top two advantages of working as microworkers are the ability to work from home and the ability "to earn extra money besides regular jobs, with the former being particularly important for women."

[157] Should this be pursued, there may be further opportunity to collaborate with the Royal Science and technology Park https://rstp.org.sz/it-business-incubation/

[158] https://graftlab.com/portfolio_page/solarkiosk/

[159] https://www.solarturtle.co.za/products/solarturtle-hub/

[160] Additional support from SEDCO, Vukani Bomake Project, IMBITA Self-help groups and Swazi Fari Trade Organisation may also be of assistance, depending on the community needs and identified business opportunities.

No.	Element	Description and Opportunities	Role players and funding sources
		efficient, costly cooking fuels. Alternatively, a 'lease to own' option for electrical equipment used for economic activities can be explored. The exact scope and focus will depend on a status quo, needs assessment and interest identified in consultation with the community.	
6.	Minigrid system operator	Responsible for the operations of the minigrid system including the productive use and O&M. It is unlikely that the minigrid system will be feasible from the start with all businesses newly established, a small (although captive) market. The operator should be incentivized to actively grow the productive uses of energy to improve feasibility of the system.	Contracted by the MNRE or EEC to operate the system.

Further design considerations include:

- **Ownership of the minigrid system and Energy Hub.** The most appropriate ownership structure has to be identified in consultation with the community. The electricity infrastructure and productive use assets that benefits from funding by the GEF INV budget will be subject to the prescriptions of the AMP funding (refer Principles under Component 2). The hub platform and/or other small businesses accessing the productive use hub may be owned by a co-operative or women's group. Community consultation is essential in identifying the preferred business and ownership model, with a business start-up grant, if available for a small business of this kind, as a means to support its establishment.
- **System size.** The size of the pilot will depend on the scope of productive energy uses selected and number of households connected. Based on a modular approach that can expand cost effectively over time, the expectation is for this installation to start small, likely not more than a 20 – 30 kWp solar PV battery system at first. Sizing will further be informed by the results of a feasibility assessment, community needs as identified by local consultation and an informed allocation of the available budget to generation capacity, storage and the distribution infrastructure needs to service the community.
- **Monitoring and data collection.** As a pilot intended to inform future developments, data collection, analysis and interpretation are essential outputs to guide refinements and/or future decision making. The research criteria, monitoring system and baseline must form part of the design and an interface with Component 3 established to inform baseline development, tracking and reporting (refer Principle 6, obligation to report)
- **Social and environmental safeguards.** The pilot project must comply with UNDP's social and environmental standards, all social and environmental regulatory requirements, and all necessary approvals and authorizations under national legislation. Social and environmental indicators must be incorporated into the monitoring system to track compliance, progress and impact. (Refer Principle 7)
- **Gender equity and empowerment.** Clean energy access has the potential to markedly improve the lives of rural communities and particularly those of women and women-led households. The GEF and UNDP commitment to this development objective must be reflected in the monitoring framework, with all metrics disaggregated by gender, as appropriate. The Energy Hub design and selection of economic activities should also reflect this priority, giving preference to women's empowerment opportunities and deliberately circumventing systemic and cultural biases in stakeholder consultation, business selection, ownership, training opportunities, among others. (Refer Principle 7)
- **Youth development.** Considering the challenges of youth unemployment and underemployment throughout the region, the project presents an opportunity for deliberate inclusion of youth in development programmes, as part of the project development, beneficiaries and potentially included to support operations and maintenance of the system.

- **Development costs and licensing.** Quantifying the cost of design, development, licensing and all approvals and authorization will be an important parameter for future developments.

Annex 19: COVID related considerations and opportunities

By increasing the commercial viability of RE minigrids and thus encouraging access to long term, affordable and clean energy, AMP projects are well aligned with government efforts to respond to the pandemic and national priorities for long-term green and equitable recovery. The COVID-19 crisis has highlighted the importance of reliable and affordable access to electricity for enabling essential health service delivery , and underpinning the ability of communities to abide by social-distancing measures and overcome the disruption to economic activity . Also, over the medium to long term, access to reliable, affordable, clean energy will be crucial to support economic recovery. Not only are investments in off-grid renewable energy important levers to create jobs and generate financial savings but increasing energy access for the most vulnerable population creates opportunities for local economic development that enhance resilience to shocks and crises. Over the long term, access to reliable, clean energy reduces pressure on ecosystems and may contribute to reducing the likelihood and spread of zoonotic diseases .

The multidimensional COVID-19 crisis creates opportunities for the project to mitigate country- and project-level impacts, to contribute toward green recovery and building back better, and also to leverage global responses to COVID-19 to deliver global environmental benefits and/or climate adaptation and resilience benefits. The following opportunities as relevant for AMP have been identified for inclusion in each projects as relevant:

- **Leveraging economic recovery and stimulus plans**. Governments across the continent have been structuring and implementing stimulus and economic recovery plans, social programs and even policy reforms during the crisis. These offer a good opportunity to accelerate the energy transition and step-up climate ambition. Putting people back to work will be an important part of stimulus plans and clean energy is an important source for new job creation and has great potential to spur local economic activity. This creates opportunities for AMP as increased funding availability and public support for renewable energy projects could be leveraged to augment AMP's results. Also, increased support to energy consumers could address widening affordability gaps which pose risks for project implementation.
- **Promoting the inclusion of electric cooking into minigrid operators service offer**. With more attention paid to respiratory health issues as a result of the health crisis, an opportunity arises to address air pollution and make the case for accelerated decarbonization of the electricity matrix, clean transport, and clean cooking and heating technologies. AMP national child projects could provide a way to develop a broad array of energy services as part of a social protection program for the crisis response, particularly focused on provision of clean cooking e-technologies from minigrid operators, which are particularly important to reducing health-related vulnerabilities to COVID-19. Households switching to minigrid-powered electric cooking save money compared with traditional methods. Electric cooking also presents minigrid developers with a valuable opportunity to increase their load factor and boost their revenue.
- **Minigrid site selection with COVID-19 considerations.** AMP projects could also seek to help policymakers and regulators integrate elements from government strategies to respond and recover from the pandemic into energy sector planning. For instance, rural electrification strategies and plans could prioritize areas based on the presence of essential health facilities, key economic activities, particularly vulnerable populations, or other factors to concentrate efforts where COVID-19 impacts are highest. AMP national child projects can help enhance coordination between the energy and health sectors to ensure national electrification plans and minigrid sector planning consider the energy needs of the health sector.
- **Health facilities as beneficiaries of specific minigrid investment pilots.** AMP projects provide support to a number of specific minigrid investment pilots across AMP countries. Projects could use digital mapping tools to proactively identify minigrid sites that can benefit health facilities in addition to households, commercial, and productive users.
- **Improved business case for minigrids providing energy for health facilities.** With its focus on minigrid cost-reduction, AMP could potentially add value in reducing the cost and increasing the commercial viability of minigrids providing energy for healthcare facilities in several ways including supporting governments: (i) to improve data collection on energy access in the health sector and conducting comprehensive community energy needs assessments of health facilities that consider both electricity and thermal energy needs; and

(ii) to utilize specialized digital tools to assist minigrid operators in targeting health care providers and designing appropriate minigrid systems for rural health clinics.

- **Communities of Practice focused on COVID-19 impacts.** If there was enough interest among several countries AMP could specifically create a specific Community of Practice (CoP) to focus on impacts, risks and opportunities around minigrids and the global pandemic. This would allow AMP countries to document and exchange experiences and knowledge on how off-grid lighting and electrification can alleviate some of the disadvantages and challenges experienced by households, productive users, health facilities and communities without access to electricity in facing the different stages of the COVID-19 pandemic and bolster recovery efforts.

Annex 20: Budget per component and output

Component 1: Policy and Regulation

Atlas Activity (GEF Component)	Atlas Implementing Agent (Responsible Party, IP or UNDP)	Atlas Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Account Description	Amount Year 2021 (USD)	Amount Year 2022 (USD)	Amount Year 2023 (USD)	Amount Year 2024 (USD)	Amount Year 2025 (USD)	Total (USD)
Output 1.1. Geospatial, techno-economic modelling of least-cost off-grid renewable electricity technologies (minigrids, grid expansion, solar home systems)											
COMPONENT 1: Policy and Regulation	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	3 000	2 053			5 053
				72100	Contractual Services-Companies		70 000	73 000	3 000	3 000	149 000
					sub-total GEF	**-**	**73 000**	**75 053**	**3 000**	**3 000**	**154 053**
					Total Output 1.1	**-**	**73 000**	**75 053**	**3 000**	**3 000**	**154 053**
Output 1.2. An inclusive national dialogue to identify minigrid delivery models, a vision and roadmap is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification.											
COMPONENT 1: Policy and Regulation	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	2 000	2 000	2 000	7 000	13 000
				71300	Local Consultants	-	-	-	-	25 000	25 000
				75700	Training, Workshops and Confer	-	1 500	1 500	1 500	3 500	8 000
					sub-total GEF	**-**	**3 500**	**3 500**	**3 500**	**35 500**	**46 000**
					Total Output 1.2	**-**	**3 500**	**3 500**	**3 500**	**35 500**	**46 000**
Output 1.3. Capacity building provided to public officials (regulator, ministries) to identify and incorporate cost-reduction levers and innovative business models.											
COMPONENT 1: Policy and Regulation	**ESERA**	**62000**	**GEF**	71200	International Consultants		2 000	2 000	2 000		6 000
				72100	Contractual Services-Companies		5 000	5 000	5 000	2 000	17 000
				75700	Training, Workshops and Confer		2 000	2 000	2 000	2 000	8 000
					sub-total GEF	**-**	**9 000**	**9 000**	**9 000**	**4 000**	**31 000**
					Total Output 1.3	**-**	**9 000**	**9 000**	**9 000**	**4 000**	**31 000**

Output 1.4. Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments and contribute to AMP Flagship Report on Cost Reduction

Atlas Activity (GEF Component)	Atlas Implementing Agent (Responsible Party, IP or UNDP)	Atlas Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Account Description	Amount Year 2021 (USD)	Amount Year 2022 (USD)	Amount Year 2023 (USD)	Amount Year 2024 (USD)	Amount Year 2025 (USD)	Total (USD)
COMPONENT 1: Policy and Regulation	ESERA	62000	GEF	71200	International Consultants				-	-	-
				71600	Travel		7 500				7 500
				75700	Training, Workshops and Confer			3 000			3 000
					sub-total GEF	**-**	**7 500**	**3 000**	**-**	**-**	**10 500**
		4000	UNDP	71200	International Consultants		40 000	-	-	-	40 000
				71300	Local Consultants	-	10 000	-	-	-	10 000
					sub-total UNDP	**-**	**10 000**	**-**	**-**	**-**	**50 000**
					Total Output 1.4	**-**	**17 500**	**3 000**	**-**	**-**	**60 500**

Component 2: Business Model Innovation with Private Sector Engagement

Atlas Activity (GEF Component)	Atlas Implementing Agent (Responsible Party, IP or UNDP)	Atlas Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Account Description	Amount Year 2021 (USD)	Amount Year 2022 (USD)	Amount Year 2023 (USD)	Amount Year 2024 (USD)	Amount Year 2025 (USD)	Total (USD)

Output 2.1 Expansion of public utility minigrid pilot to incorporate Productive Use of Energy (PUE), innovative appliances and small business development, to demonstrate opportunities for improved feasibility of minigrid systems for rural households.

COMPONENT 2: Project and Business Model Innovation with Private Sector Engagement	ESERA, EEC	62000	GEF	71200	International Consultants	-	3 000	3 000	-	-	6 000
				71300	Local Consultants	-	4 000	2 000	2 000	2 000	10 000
				72100	Contractual Services-Companies	-	13 500	8 000	8 000	5 000	34 500
				72200	Equipment and Furniture	-	25 000	-	-	-	25 000

					sub-total GEF	**-**	**45 500**	**13 000**	**10 000**	**7 000**	**75 500**
					Total Output 2.1	**-**	**45 500**	**13 000**	**10 000**	**7 000**	**75 500**
Output 2.2 Greenfield pilot developed demonstrating productive uses use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids.											
COMPONENT 2: Project and Business Model Innovation with Private Sector Engagement	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	-	10 000	-	-	10 000
				71300	Local Consultants	-	10 000	5 000	2 000	2 000	19 000
				72100	Contractual Services-Companies	-	31 000	16 611	-	-	47 611
				72200	Equipment and Furniture	-	75 000	60 000	-	-	135 000
				71400	Contractual Services - Individ	-	10 000	5 000	-	-	15 000
					sub-total GEF	**-**	**126 000**	**96 611**	**2 000**	**2 000**	**226 611**
					Total Output 2.2	**-**	**126 000**	**96 611**	**2 000**	**2 000**	**226 611**
Output 2.3 Strengthen capacity of potential developers and operators to consider design parameters, innovative business models and cost-reduction levers, to improve project feasibility, with practical experience drawn from both pilot projects											
COMPONENT 2: Project and Business Model Innovation with Private Sector Engagement	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	2 000	2 000	2 000	1 405	7 405
				72100	Contractual Services-Companies	-	8 000	8 000	8 000	8 000	32 000
				75700	Training, Workshops and Confer	-	5 000	5 000	5 000	5 000	20 000
					sub-total GEF	**-**	**15 000**	**15 000**	**15 000**	**14 405**	**59 405**
					Total Output 2.3	**-**	**15 000**	**15 000**	**15 000**	**14 405**	**59 405**

Component 3: Digital, Knowledge Management and Monitoring and Evaluation

Atlas Activity (GEF Component)	Atlas Implementing Agent (Responsible Party, IP or UNDP)	Atlas Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Account Description	Amount Year 2021 (USD)	Amount Year 2022 (USD)	Amount Year 2023 (USD)	Amount Year 2024 (USD)	Amount Year 2025 (USD)	Total (USD)
Output 3.1. 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 based on standardized guidance from the regional project											
COMPONENT 3: Digital, Knowledge Management and Monitoring and Evaluation	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	3 000	-	-	-	3 000
				72100	Contractual Services-Companies	-	7 100	3 500	3 500	3 696	17 796
					sub-total GEF	**-**	**10 100**	**3 500**	**3 500**	**3 696**	**20 796**
					Total Output 3.1	**-**	**10 100**	**3 500**	**3 500**	**3 696**	**20 796**
Output 3.2. A Project Digital Strategy is developed and implemented, including linkages to and following guidance from the regional project											
COMPONENT 3: Digital, Knowledge Management and Monitoring and Evaluation	**ESERA**	**62000**	**GEF**	72100	Contractual Services-Companies	-	10 000	-	-	-	10 000
					sub-total GEF	**-**	**10 000**	**-**	**-**	**-**	**10 000**
					Total Output 3.2	**-**	**10 000**	**-**	**-**	**-**	**10 000**
Output 3.3. Minigrids digital platform implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction											
COMPONENT 3: Digital, Knowledge Management and Monitoring and Evaluation	**ESERA**	**62000**	**GEF**	71300	Contractual Services-Companies	-	23 600	600	600	600	25 400
				75700	Training, Workshops and Confer	-	5 000	-	-	-	5 000
					sub-total GEF	**-**	**28 600**	**600**	**600**	**600**	**30 400**
					Total Output 3. 3	**-**	**28 600**	**600**	**600**	**600**	**30 400**
Output 3.4. Active interface with regional project established, including, but not limited to, via (i) participating in Communities of Practice and (ii) capturing and sharing lessons learnt at national and regional level.											
COMPONENT 3: Digital, Knowledge Management and	**ESERA**	**62000**	**GEF**	71300	Local Consultants	-	2 000	5 000	3 000	3 000	13 000
				72100	Contractual Services-Companies	4 000	500	5 500	5 500	5 500	21 000

Monitoring and Evaluation				74200	Audio Visual&Print Prod Costs	-	500	1 000	1 000	1 000	3 500
				71600	Travel		4 000	4 000	4 000	4 000	16 000
					sub-total GEF	**4 000**	**7 000**	**15 500**	**13 500**	**13 500**	**53 500**
					Total Output 3.4	**4 000**	**7 000**	**15 500**	**13 500**	**13 500**	**53 500**
Output 3.5. Knowledge Network established to promote MG development / rural energy access											
COMPONENT 3: Digital, Knowledge Management and Monitoring and Evaluation	**ESERA**	**62000**	**GEF**	74200	Audio Visual&Print Prod Costs	-	1 000	1 000	1 000	1 000	4 000
				75700	Training, Workshops and Confer		3 000	3 000	3 000	3 000	12 000
					sub-total GEF	**-**	**4 000**	**4 000**	**4 000**	**4 000**	**16 000**
					Total Output 3.5	**-**	**4 000**	**4 000**	**4 000**	**4 000**	**16 000**
Output 3.6. M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation.											
COMPONENT 3: Digital, Knowledge Management and Monitoring and Evaluation	**ESERA**	**62000**	**GEF**	71200	International Consultants	-	3 000	3 000	3 000	31 000	40 000
				71600	Travel	-	-	-	-	4 000	4 000
				75700	Training, Workshops and Confer	3 000	1 000	1 000	1 000	1 000	7 000
					sub-total GEF	**3 000**	**4 000**	**4 000**	**4 000**	**36 000**	**51 000**
					Total Output 3.6	**3 000**	**4 000**	**4 000**	**4 000**	**36 000**	**51 000**

Annex 21: Diesel generation and use of generators in Eswatini

An IFC study, The Dirty Footprint of the Broken Grid, September 2019, assessed the prevalence of backup generators in developing countries. It includes off-grid, diesel and petrol and small as well as larger size generators. It found that Eswatini has a relatively small market (by number of units and energy generated) of diesel generators in use. Backup generator fuel consumption was less than 10 million liters per year and the installed capacity less than 100MW.

As discussed in *Section II of the Project Document, Development Context*, Eswatini has an extensive power network with a high rate of electrification. Reliable and affordable electricity supply from the national power grid means that diesel generators are mainly used for back up purposes during power outages and predominantly by business operations dependent on continued power supply.

Unelectrified areas are typically located in remote, rural areas. Electrification to these areas have been hindered by severe accessibility challenges that also present challenges for the transportation of generators and fuel. Accordingly, diesel generators are rarely used in these remote locations.

The country does not have information regarding the exact scale of diesel consumption for backup generators, as this is not recorded. Diesel is mostly procured in small containers (e.g. 20 litres) from fuel stations (for vehicles) to supply small backup generators. Fuel stations were previously not required to record this data and records of exact usage are therefore not available. The Ministry of Energy in Eswatini considers this to be minimal, confirming the findings of the IFC report.

Enquiries to the Ministry of Energy and specifically the Petroleum Regulation Unit confirmed that there is no known collective or group representing diesel generators active in the country. Diesel generators are also not used by any of the IPPs.

Data collected for the Mvundla community, where the PUE overlay pilot project will be implemented, showed existing energy sources include candles and paraffin for lighting and wood (biomass) and LPG (propane and butane) for cooking. Diesel generators were not previously used by the Mvundla community.

The needs assessment and design found RE minigrids with battery storage to offer the more suitable and cost-effective solution for Mvundla. The solar PV system at the pilot site incorporate battery storage to help meet peak demands in early mornings and evenings. Preliminary indications from the newly commissioned sites are that very little of the available capacity is being utilized. The PUE overlays are planned to utilize electricity during the day to even out the demand profiles, and help bring down the cost per kWh.

The historic trend and available RE capacity suggest there is no risk of the pilot beneficiaries reverting to diesel generation, the project being sabotaged by diesel generators or of current employment opportunities being impacted.

Anecdotal evidence from the site identified for the second, greenfield pilot, speaks of any heavy equipment and material being brough to the community by an ox because of poor accessibility. The preliminary assessment suggests that the use of a diesel generator is highly unlikely after the installation of a solar PV system with battery backup. If this site is confirmed for the second pilot project, a similar status quo and needs assessment will be completed to inform the system design and planning and to verify the preliminary findings.