



Part I: Project Information

Name of Parent Program

GEF-7 Africa Minigrids Program

GEF ID

10841

Project Type

MSP

Type of Trust Fund

GET

CBIT/NGI

CBIT No

NGI No

Project Title

Zambia National Child Project under the GEF Africa Minigrids Program

Countries

Zambia

Agency(ies)

UNDP

Other Executing Partner(s)

Rural Electrification Authority

Executing Partner Type

Government

GEF Focal Area

Climate Change

Sector

Energy Efficiency

Taxonomy

Influencing models, Stakeholders, Gender Equality, Capacity, Knowledge and Research

Rio Markers**Climate Change Mitigation**

Principal Objective 2

Climate Change Adaptation

No Contribution 0

Biodiversity

No Contribution 0

Land Degradation

No Contribution 0

Submission Date

8/31/2022

Expected Implementation Start

6/1/2023

Expected Completion Date

5/31/2027

Duration

48In Months

Agency Fee(\$)

122,755.00

A. FOCAL/NON-FOCAL AREA ELEMENTS

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCM-1-1	Promote innovation and technology transfer for sustainable energy breakthroughs for decentralized renewable power with energy storage	GET	1,363,947.00	13,550,000.00
Total Project Cost(\$)			1,363,947.00	13,550,000.00

B. Project description summary

Project Objective

The project objective is to support access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in low-carbon mini-grids in Zambia with a focus on cost-reduction levers and innovative business models?.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate investment in renewable energy minigrids	Technical Assistance	1. Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate renewable energy minigrids	<ul style="list-style-type: none"> •1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification 1.2 Minigrid DREI techno-economic analyses carried out to propose the most cost-effective basket of policy and financial derisking instruments 1.3 Programme to develop a competitive, skilled labour market in minigrids 	GET	151,795.00	1,125,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
2 Business model innovation with the private sector	Technical Assistance	2. Innovative business models based on cost reduction are operationalized, with strengthened private sector participation in renewable energy minigrid development.	2.1 Pre-feasibility studies for pipeline development 2.2 Productive use pathway study	GET	98,835.00	355,000.00
2. Business model innovation with the private sector	Investment	2. Innovative business models based on cost reduction are operationalized, with strengthened private sector participation in renewable energy minigrid development.	2.3 Pilots developed, including productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids	GET	650,000.00	7,500,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
3. Scaled-up financing	Technical Assistance	3. Financial sector actors are ready to invest in a pipeline of renewable energy minigrids and concessional financial mechanisms are in place to incentivize scaled-up investment.	3.1 Innovative financing solutions for minigrid development are identified and designed with supporting human and institutional capacity building	GET	136,515.00	2,600,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
4. Digital, knowledge management		Digitalization and data are mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge, awareness and network opportunities in the minigrid market and among stakeholders, including benefiting from linkages to international good practice	<p>4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project</p> <p>4.2 A ?Minigrids Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction</p> <p>4.2 Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized</p> <p>4.3 Engage with the regional project (AMP), via (i) Communities of Practice and (ii) capturing</p>	GET	138,907.00	450,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
			and sharing lessons learnt			
Monitoring and evaluation (M&E)		Monitoring and evaluation (M&E)		GET	63,900.00	270,000.00
Sub Total (\$)					1,239,952.00	12,300,000.00
Project Management Cost (PMC)						
	GET				123,995.00	1,250,000.00
Sub Total(\$)					123,995.00	1,250,000.00
Total Project Cost(\$)					1,363,947.00	13,550,000.00

Please provide justification

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Recipient Country Government	Rural Electrification Authority	In-kind	Recurrent expenditures	2,000,000.00
Recipient Country Government	Rural Electrification Authority	Public Investment	Investment mobilized	2,000,000.00
Recipient Country Government	Development Bank of Zambia	In-kind	Recurrent expenditures	50,000.00
Recipient Country Government	Development Bank of Zambia	Public Investment	Investment mobilized	1,500,000.00
Civil Society Organization	Zambia Cooperative Federation	In-kind	Recurrent expenditures	200,000.00
Civil Society Organization	Zambia Cooperative Federation	Public Investment	Investment mobilized	3,600,000.00
Donor Agency	African Development Bank	In-kind	Recurrent expenditures	4,000,000.00
GEF Agency	UNDP	In-kind	Recurrent expenditures	100,000.00
GEF Agency	UNDP	Grant	Investment mobilized	100,000.00
Total Co-Financing(\$)				13,550,000.00

Describe how any "Investment Mobilized" was identified

Co-financing investment (INV) has been identified by linking activities in ongoing and planned activities of REA, DBZ and ZCF with the Project. REA: estimation of annual expenditure on minigrad investment during 2023-2026; ZCF: replication in solar mills of the refurbishment/expansion in the pilot mills proposed to be supported by the Project; DBZ: DBZ-WB Off-grid loan facility can potentially be made available for loans to minigrad developers if they request and meet the participating bank's due diligence.

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	GET	Zambia	Climate Change	CC STAR Allocation	1,363,947	122,755	1,486,702.00
Total Grant Resources(\$)					1,363,947.00	122,755.00	1,486,702.00

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount (\$)

50,000

PPG Agency Fee (\$)

4,499

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	GET	Zambia	Climate Change	CC STAR Allocation	50,000	4,499	54,499.00
Total Project Costs(\$)					50,000.00	4,499.00	54,499.00

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)	0	13775	0	0
Expected metric tons of CO ₂ e (indirect)	0	644432	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)				
Expected metric tons of CO ₂ e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)		13,775		
Expected metric tons of CO ₂ e (indirect)		644,432		
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
Energy Storage		1.09		
Solar Thermal		0.45		

Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female		2,242		
Male		2,154		
Total	0	4396	0	0

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

Part II. Project Justification

1a. Project Description

1) *The global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)*[1];

1. According to the latest official reporting, Zambia's GHGs emission level was 127,786 MtCO₂ (million metric ton CO₂ equivalent) emissions from ?agriculture, forestry and land-use change (AFOLU) and, without AFOLU, 8,871 MtCO₂. Energy production and use were responsible for 6,444 MtCO₂ and industry and waste, 2,427 MtCO₂. AFOLU removals were -136,267 MtCO₂ implying that Zambia was a net sink in 2016, i.e., had negative net emissions (of 9,508 MtCO₂. It is worthwhile noting that the sink reduced by 83% in comparison with the 1994 figure of -56,866 MtCO₂, basically due to a steady increase over time in emission from AFOLU (86,063 MtCO₂ in 1994), energy-related emissions (2,178 MtCO₂ in 1994, industry and waste, 613 MtCO₂), while AFOLU removals have more or less remained at the same level (-142,929 MtCO₂) in 1994.

2. Access to electricity has increased from 14% (1993) to 42.2% in 2019 for the overall population, of which 37.7% are connected to the main grid and 4.7% off-grid access (mostly solar lanterns, 2.5%, rechargeable batteries 1.4%, solar home and lighting 0.7%)[2]. The rural electrification rate has only recently increased from just 5% in 2015 to close to 12% in 2019 (of which 4.1% were grid-connected and 7.8% off-grid). Grid extension is the most economical option for households in large, dense settlements that are close to the existing grid. ZESCO has a commercially-driven mandate and concentrates on the delivery of connections to economically-viable areas. ZESCO is responsible for both urban and rural areas but tends to focus on urban connections. Due to the challenges of electrifying rural areas, the Government established the Rural Electrification Authority (REA) as an autonomous agency in 2003.

3. REA is currently developing a new National Electrification Strategy (NES) in Zambia (with World Bank support) aided by geospatial modelling. To achieve universal electricity access in 2030, some 4.9 million new customers (meaning 17.9 million inhabitants) need to be supplied with electricity through grid densification, grid extension, minigrids (solar or hydro) and solar home systems (SHS). According to the geospatial analysis and modelling, grid densification and extension can connect about 28% of the new customers (implying that 58% of people would be grid-connected in 2030), and mini-grids can serve

about 27% of the new clients, while 45% would be served by stand-alone solutions. However, the national total investments required to reach universal electrification sum up to a whopping USD 3 to 4 billion, spread across the 2022-2030 investment periods, of which USD 0.2-2.0 for mini-grid electrification, USD 0.25-3 million for off-grid solutions, and USD 0.5-1.1 billion for grid extension and densification, depending on modelling and scenario assumptions.

2) the baseline scenario and any associated baseline projects[3],

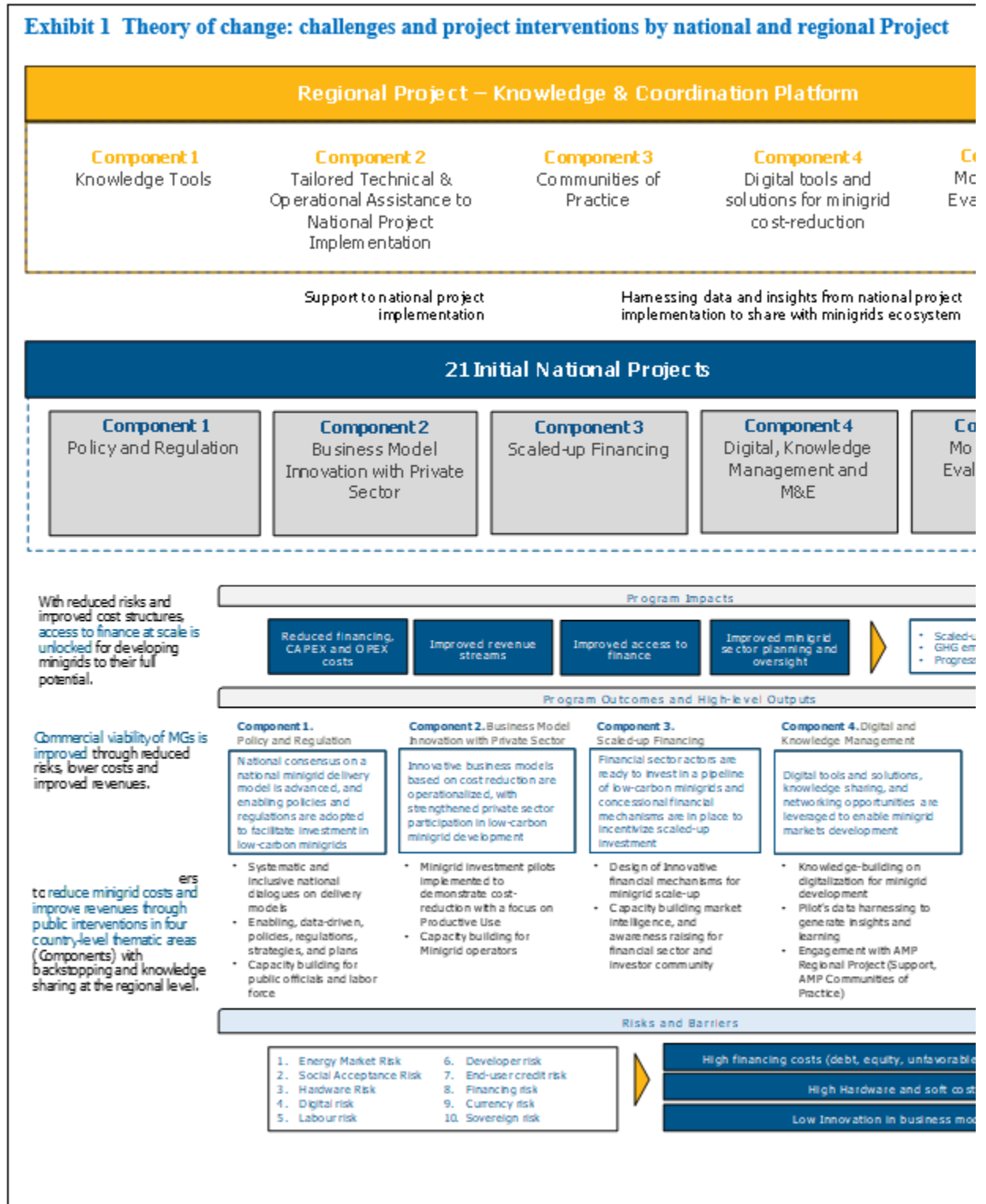
4. In recent decades, electricity access has typically relied on a model of large, centralized power generation and extending publicly-funded grid connections. In some countries, this has proved successful, in other countries the poor financial health of grid-connected power systems has held back progress. Apart from grid extension, there are two types of off-grid electrification:

? *Mini-grids* form a small-scale source of electricity generation (5 kW to a few MW) that serve a localized group of customers (e.g., 100-1000 households) via a distribution grid that can operate in isolation from a national electricity transmission network (or are sometimes or later connected to the main grid). Mini-grids are typically the most economical option for households in dense settlements far from the current grid. A mini-grid will basically include a power generator and a network to distribute the electricity to the accessible consumers, to avoid the high costs of extending the main grid to these isolated areas. . The systems can be powered by diesel or by renewable sources of energy (solar, hydro, wind, biomass) or in a hybrid configuration mixing different sources of power from renewables, battery and diesel to compensate for the fluctuation in availability and supply of the renewable energy source(s) in order to meet the load profile on the energy demand side;

? *Stand-alone systems* are isolated power systems that usually supply one rural customer (household, community infrastructure, battery charging station, multifunctional platforms and solar kiosk, water pumping station) without distribution and range in the size up to 5-10 kW. According to the power dimension, they can be grouped into the following categories: a) portable lights (i.e., rechargeable & solar lanterns), b) mini kits (i.e., pico-hydro, pico-solar systems), c) home systems, supplied by solar home systems (SHS); a wind generator or pico-hydro, with diesel backup or not).

5. Stand-alone off-grid solutions are rapidly penetrating the rural energy market of Zambia. Unlike other off-grid energy solutions, such as most solar home systems currently on the market, minigrids have the added advantage of supporting both residential and institutional energy needs (e.g., lighting and small appliances) and productive energy uses (e.g., milling, irrigation, and light manufacturing). Minigrids can, therefore, have a positive impact on the local economy and contribute to sustainable community development; and, more importantly, they can support future energy demand growth. Minigrids also have the benefit of being able to be deployed fast. In the recent WB-supported geospatial analysis, grid densification is centred around the major cities that are already connected. Solar home systems will be used by 32 % of the population; mini-grids will serve 19% of the population with 35.0 % of the demand. In the modelling, the predominant technology for mini-grids is solar PV with batteries while hydropower mini-grids can be applied in a limited number of sites close to rivers.

Exhibit 1 Theory of change: challenges and project interventions by national and regional Project



6. In Zambia, minigrid development started in the last century by missionaries, using hydropower. ZESCO operates eight diesel-based minigrids, and has done so for many years. ZESCO has little experience in the development and operation of renewable energy mini-grids, so far running one hydro (a 1 MW facility in Shiwangandu, in Muchinga Province). REA developed a number of mini-grids, including the 640 kW Kasanjiku mini-hydro and the 60 kW solar minigrid in Mpanta, to which, more recently, a number of solar minigrids have been or will be added (Chunga, Lunga, etc). Until recently mini-grids were implemented by public sector agencies. The first private sector minigrid was set up in Zengamina in Mwinilunga District, powered by a 705 kW mini-hydro. The mini-grid landscape in Zambia is nascent but rapidly evolving with private minigrid developers expanding their business in Zambia. Several models have been deployed thus far in Zambia, including utility, private sector, community, and hybrid (public-private) models.

7. The recent surge in mini-grid (MG) development has been helped by advances in MG-specific regulatory framework, focusing on licensing, economic and technical requirements. The framework was developed by the Electricity Regulation Board (ERB) and the EU-financed IAREP project, in consultation with various private and public sector stakeholders, in 2018. After the road-testing of the mini-grid regulations in 2019, the ERB finalized and approved the mini-grid regulatory framework in February 2020, which covers the four areas of legal, tariffs, grid encroachment and technical. The new framework allows differentiating regarding permits, technical requirements and tariff-setting between MGs based on size and complexity: a) MGs with size < 100 kW have 'very light-handed' regulation, b) and MGs sized between 100 kW-1 MW will have 'light-handed' regulations.

8. Zambia enjoys an average of 2,000 to 3,000 hours of sunshine per year. The average global horizontal irradiation (GHI) is 5.5 kWh/m²/day. Zambia, therefore, has a solar energy potential that (unlike hydro or wind) does not differ from site to site or region to region. This makes solar an ideal power source for mini-grids and electrification by stand-alone systems, although average daily solar irradiation is not consistent throughout the year, with a noticeable decrease during the rainy season in June and July. This seasonal variation should be taken into account when designing PV systems. The potential for small, mini and micro-hydropower is an estimated 45-60 MW. However off-grid (mini-grid hydro) plants are hampered by the fact that the water resources (with sufficient height and water flow levels) are often located away from the demand centres in this sparsely populated country. This would necessitate the construction of transmission lines over large distances to the demand centres, rendering the mini-grid uneconomic. Approximately 60 potential small hydro sites ranging from 30 kW to 3 MW have been assessed by REA in North-western, Northern and Luapula provinces, of which 78 sites were considered to be potentially viable and sufficiently close to population centres.

9. Despite the significant potential, several risks and barriers exist in Zambia for renewable minigrid development and scaling up. From an investor's perspective, these risks result in higher financing costs (equity and debt) and reduce the competitiveness of minigrids relative to alternative sources of energy

(e.g., diesel generators). All else being equal, the need for higher returns that reflect these risks translates into higher energy prices that, in turn, require larger subsidy requirements for rural electrification programs. Exhibit 2 summarizes the main barriers to minigrid development in Zambia, organized across the project's areas of intervention. For a detailed discussion of the baseline situation and barriers to a more widespread minigrid electrification, the reader is referred to Annex G.2 of the UNDP Project Document.

3) the proposed alternative scenario with a description of outcomes and components of the project^[4]

10. This project is part of the broader Africa Minigrids Programme (AMP). 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 efficiency. This approach (see Exhibit 1) is structured to advance the program objectives of cost-reduction and innovation for minigrids and give effect to the Theory of Change (ToC). This project will follow the AMP ToC and the diagram on the previous page summarizes how the project's outcome and outputs envisage addressing identified barriers and gaps.

11. The **project objective** is to support access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in **renewable energy** mini-grids in Zambia with a focus on cost-reduction levers and innovative business models?. While a number of baseline activities have been undertaken in recent years or are planned to address these, still several barriers and gaps remain. The ZMG Project seeks to address the remaining challenges and the underlying causes by means of **five components of interventions** that are detailed below with the expected outcomes within the broader framework of the AMP ToC, as indicated in Exhibit 2 on the next page.

Exhibit 2 How the ZMG Project's interventions address identified barriers and challenges

Barriers related to:	Remaining barriers	
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<p><i>Policy-regulatory environment for mini-grid development</i></p>	<p>? The existence of clear strategies and policies on the role of minigrids vis-?-vis grid extension and stand-alone options for rural electrification in Zambia is limited ? Solar (and or other renewable energy) systems developers have often difficulties to find skilled people for design, installation and operation and maintenance, while vocational and educational need to be upgraded to provide these relatively new skills</p>	<p>1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification 1.2 Minigrid DREI techno-economic analyses carried out to propose most cost- effective basket of policy and financial derisking instruments 1.3 Programme to develop competitive, skilled labour market in minigrids</p>
<p><i>Business models and private sector involvement</i></p>	<p>? Most rural areas in Zambia have low population densities with low energy demand and servicing these customers may not be financially viable ? Off-grid tariffs in Zambia are subjected to much social pressure, and willingness and ability to pay (WTP/ATP) far lower than cost-reflective rates</p>	<p>2.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids (INV) 2.2 Pre-feasibility studies for pipeline development. 2.3 Productive use pathway study</p>
<p><i>Financing and financial modalities</i></p>	<p>? Mini-grid initiatives financed on a project-by-project basis, rather than as part of a long-term vision part of off-grid electrification plan and without public or private funds to match ? Commercial financing for MGs is non-existent. Market technology, and business models of minigrid companies are rather unknown to local commercial banks. Individual MG investments are often too small and considered high risk ? Public financial support for the viability gap funding of off-grid projects has been limited and does not reach the amounts needed to reach 2030 universal access targets</p>	<p>3.1 Innovative financing solutions for minigrid development are identified and designed with supporting human and institutional capacity building</p>
<p><i>Digitalisation and knowledge management</i></p>	<p>? Government stakeholders often lack specific knowledge or face budgetary and technical capacity constraints to fully utilise the potential of digital solutions to broadly improve sector oversight and planning. In general, the government needs to carry out systematic monitoring and evaluation of electrification activities, feeding back into their planning and decision-making. Awareness and knowledge of minigrid activities in other African countries need to be improved. Adopting regional regulations can encourage an upscaled, regional, market for prospective MG developers.</p>	<p>4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project 4.2 A ?Minigrids Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction 4.2 Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized 4.3 Engage with the regional project, via (i) Communities of Practice and (ii) capturing and sharing lessons learnt</p>

12. There are no major deviations from the PIF's objectives of addressing barriers to the more widespread minigrid development in Zambia. Some changes were introduced as a consequence of the discussions with the project partners and stakeholders in the project design (PPG) phase as well as to reflect recent development such as advances in minigrid-specific regulations. These are summarized in Exhibit 3 on the next page. The outputs of each component and their activities are described in detail in section 4.1 of the UNDP Project Document.

13. A major change is in co-financing. The original PIF sees two major sources of co-financing, the GCF-supported AfDB project, the Zambia Renewable Energy Financing Framework (ZREFF, USD 50 million) and the EU-funded IAREP project (USD 2.8 million). Most of the ZREFF budget cannot qualify as co-financing, because the GCF document specifically mentions that no funding is to go to off-grid and minigrid financing (only the technical assistance grant focusing on non-grid development has been retained as co-financing), while the IAREP programme has already disbursed its funds and will end by the time the UNDP/GEF project starts. Instead, the project implementing agency REA and other partners (DBZ, ZCF) have committed co-financing (detailed further on in the text).

Exhibit 3 Comparison of project design at CEO endorsement and at the concept approval stage

ProDoc / CEO ER	Child project concept (Project Identification Form, PIF)	Rationale for Change in PIF Outputs/Activities in ProDoc
Component 1 ? Policy and regulation		
<p>An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification</p> <p>Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments</p> <p>Programme to develop competitive, skilled labour market in minigrids</p>	<p>1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated</p> <p>1.2 Licensing requirements for building and operating minigrids streamlined, in close coordination with the authorities concerned and other development partners</p> <p>1.3 Minigrid DREI techno-economic analyses carried out to propose the most cost-effective basket of policy and financial derisking instruments</p>	<p>Output 1.2 has been deleted given the fact that the minigrid framework was developed by the Electricity Regulation Board (ERB) and approved in February 2020. Although not all issues in licensing and permits are solved, these will be discussed as part of the stakeholder national dialogue of Output 1.1</p> <p>Based on the stakeholder suggestions (in the PPG phase), the output was replaced with a new output 1.3 to address the issue of the lack of sufficient skilled technical staff needed for the design, construction and monitoring of solar (and hydro) minigrids,</p>
Component 2 - Business model innovation with private sector		

ProDoc / CEO ER	Child project concept (Project Identification Form, PIF)	Rationale for Change in PIF Outputs/Activities in ProDoc
<p>2.1 Pilots developed, including on productive use/ innovative appliances and modular hardware/ system design, leading to cost-reduction in minigrids</p> <p>2.2 Pre-feasibility studies for pipeline development.</p> <p>2.3 Productive use pathway study</p>	<p>2.1 Pilots developed, including on productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids</p> <p>2.2 National report on opportunities to boost economic activities through electricity access and productive use</p>	<p>Apart from renaming Output 2.2 into ?productive use pathway study?, the real change is the addition of ?Pre-feasibility studies for pipeline development?</p>
Component 3 - Scaled-up Financing		
<p>3.1 Innovative financing solutions for minigrid development are identified and designed while supporting financial sector capacity building</p>	<p>3.1 Innovative financing solutions for minigrid development are identified and implemented with supporting human and institutional strengthening</p> <p>3.2 Domestic financial sector capacity- building on business and financing models for minigrids</p>	<p>There are no fundamental changes, except that Outputs 3.1 and 3.2, have been merged, but maintaining the originally envisaged activities of finding ways to attract private sector financiers and investors (commercial banks, pension funds, infrastructure funds) and build capacity in the financial sector. Important additions are that financing is seen in the overall development setting (linking energy with PUE financing, for example) and bringing together financiers and project proponents</p>
Component 4 - Digital and knowledge management		

ProDoc / CEO ER	Child project concept (Project Identification Form, PIF)	Rationale for Change in PIF Outputs/Activities in ProDoc
<p>4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project</p> <p>4.2 A ?Minigrids Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction</p> <p>4.3 Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized</p> <p>4.4 Engage with the regional AMP project, via (i) Communities of Practice and (ii) capturing and sharing lessons learnt</p>	<p>4.1 A digital strategy is developed and implemented, including linkages to (and following guidance from) the regional project</p> <p>4.2 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</p> <p>4.3 Engage with regional project, including, but not limited to, via (i) Communities of Practice and (ii) capturing and sharing lessons learnt</p> <p>4.4 M&E and Reporting</p>	<p>There is no real change, except that the output 4.4 (M&E) of the PIF has been put in its own Component (05) in the final project documentation.</p>

Project Components, Outputs, Activities

The **project's objective** is to ?support access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in **renewable energy** mini-grids in Zambia with a focus on cost-reduction levers and innovative business models?. The ZMG Project seeks to address the remaining barriers and the underlying causes by means of five components with outcomes and outputs summarized below.

Component 1 Policy and regulation

<i>Outcome</i>	<i>Outputs</i>
<p>1. Stakeholder ownership in a national minigrid delivery model is advanced, appropriate policies and regulations are adopted to facilitate investment in renewable energy minigrids.</p>	<p>1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification</p> <p>1.2 Minigrid DREI techno-economic analyses carried out to propose most cost- effective basket of policy and financial derisking instruments</p> <p>1.3 Programme to develop competitive, skilled labour market in minigrids</p>

Component strategy and context

Appropriate delivery models, with associated tariff structures and subsidy mechanisms, are considered an essential prerequisite for financial scale-up in the mini-grid sector. The complex interplay between regulations, financial needs and suitable delivery models remains to be thoroughly assessed. On the regulatory front, a specific minigrids regulatory framework has been developed. The Framework, developed in 2018 was 'road-tested' and approved by ECB in 2020. It includes provisions regarding tariffs applicable to minigrids as well as technical requirements for minigrids in Zambia, disaggregating some of these by minigrid sizes. There is a need, however, to harmonise the mini-grid regulatory framework with the Electricity and Energy Regulation Acts, amended in 2020, while the virtues of a 'one-stop-shop' approach (streamlining the procedures of ERB, accessing land rights, environmental, public funding for PPPs) could be discussed.

As noted in the discussion of the theory of change (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. UNDP's DREI minigrid methodology assesses risks across 10 pre-defined risk categories^[5], identifying the underlying barriers, quantifying the impact on development costs, and suggesting the most appropriate policy and financial derisking instruments to address. The DREI analysis can act as a mechanism to engage national stakeholders in a comprehensive dialogue around the derisking measures necessary to advance the market and also allow for the project team to engage in early adaptive management in project design. National DREI analysis data will feed into a regional flagship AMP knowledge product on DREI and lowering minigrid financing, hard and soft costs. These consolidated knowledge resources and products will in turn be available to national projects for cross-country comparisons and further learning.

Output 1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification

Strategy

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, prioritise policy and financial derisking instruments identified by the DREI analysis building on existing dialogue structures in the countries. Such a dialogue could be adopted under the Off-Grid Task Force. The Off-Grid Taskforce is a government-led platform which brings together representatives of various Government ministries, statutory bodies, the private sector and development partners to coordinate initiatives and activities in the off-grid electrification space. The Taskforce was established with support from the Office of the Vice President^[6]. It is a multi-stakeholder platform that identifies and addresses off-grid market barriers thereby The Task Force has advised on improving import regulations for solar energy products, minigrid regulations, off-grid power affordability and market intelligence^[7]. For example, the

resolution of a subsidy mechanism (e.g., under the Rural Electrification Fund) and policy guidance for its use in various delivery models (public, PPP, private), stimulation of access to finance and skills development in the off-grid market are likely to be an important element for discussion in the Task Force. The ZMG Project can support the Task Force^[8] in its activities, in particular, the awareness and publications and streamlining of procedures and regulations, as well as on the issue of job creation and skills development.

Informed by DREI findings and recommendations, prioritized topics will benefit from consideration at the National Dialogue. If findings of the National Dialogue merit further consideration, given the critical importance of the minigrid delivery model in unlocking private investment, Zambia will have the opportunity under the ZMG Project to analyse and assess the already existing delivery model[s] for their feasibility and prospects of success. Links will also be encouraged with the African Minigrid Developers Association which will be able to offer assistance and guidance on mini-grid issues.

Activities:

1.1.1. Facilitation of national dialogue decision-making on minigrid investments, financing, operations and results

Zambia has a national Off-Grid Energy Task Force, which is embedded in and led by the Ministry of Energy together with the Office of the Vice President. Since its launch in April 2018, this Task Force has facilitated, among other things, the implementation of a VAT exemption for LED lights, the drafting of a new national mini-grid policy and the initiation of discussions to improve the affordability of off-grid energy solutions. The Project will strengthen the Task Force to include a range of relevant stakeholders from the Government, local authorities, civil society, local media, private sector, rural populations, and others, and initiate a national dialogue to identify the optimal minigrid delivery model. The national dialogue will be centred around key issues regarding mini-grid regulation and streamlining licensing procedures, fiscal and non-fiscal incentives (such as duty on imports of minigrid-relevant equipment), gender mainstreaming, digital infrastructure (mobile money and PAYG; minigrid management and tracking systems), capacity strengthening (technical skills, project developers, financiers) and mini-grid planning. The ZMG project will support meetings and events as well as targeted assessments. One issue is the establishment of a 'one-stop-shop' for proponents to get the necessary permits and licenses. Another important challenge is the need for regulations on the handling of electronic and solar system batteries after the end of their life.

The Project will support the Off-grid Task Force with selected operations, such as formulation of a communication and minigrid awareness strategy and realisation of multimedia products (newsletter, brochures, TV and radio, social media) and maintenance and expansion of the current off-grid website (www.offgrid.gov.zm).

1.1.2 Establish a feedback loop between national dialogue and the project

The Project will align the ongoing dialogue with activities implemented in parallel under the other outputs and loop respective (pre-)results back into the discussion. This will shed light on trends and progress regarding minigrid cost reduction (e.g., DREI analyses and tracking of minigrid costs),

needed subsidy levels and consumer affordability). This will also include an assessment of experiences of licensing and permit requirements and processes and technical standards for building and operating minigrids streamlined, in close coordination with the authorities concerned and other development partners with recommendations

Output 1.2 Minigrid DREI techno-economic analyses carried out to propose the most cost-effective basket of policy and financial derisking instruments [and contribute to AMP Flagship Report on Cost Reduction]

Component strategy/Context

UNDP's Derisking Renewable Energy Investment (DREI), introduced in [section 3.1](#) is an innovative, quantitative framework to support policymakers to cost-efficiently promote private investment in renewable energy. In late 2018, UNDP expanded the DREI framework to include solar PV-battery minigrids, releasing open-source analytic and financial modelling tools to track investment risks, and financing costs, and to support the private sector and policymakers in modelling levelized costs, tariffs and subsidies for minigrids.

DREI provides a structure for policymakers to identify and understand investment risks to select public instruments that can de-risk and promote investments in RE minigrids. The DREI derisking table introduces a taxonomy of ten independent investment risks, 17 underlying barriers, and associated stakeholder groups; it then sets out matching policy and financial derisking instruments (see overview in [Box 7](#) in ProDoc). The risk environment and instrument selection stages of DREI deliver quantitative insights into financing costs and the impact of public instruments in lowering these costs. The financial modelling stage captures hardware and soft costs to determine the levelized cost of electricity (LCOE) of the technology being assessed.

UNDP's DREI framework will be applied either qualitatively or quantitatively at various points in the project cycle, both at the national level in each AMP participating country, and then aggregated into regional knowledge products by the AMP Regional Project and disseminated widely. The DREI framework, both at the national and regional level (in aggregate), will act as the program's mechanism to harvest and disseminate data on changes in the financing costs, hard and soft costs, and resulting costs for minigrids.

Activities:

1.2.1. Initial, full quantitative national DREI analysis (Year1)

A full quantitative DREI application will be conducted in the first year of project implementation. The PMU will assemble a task team to perform the national DREI analysis including consultants (international, national), government stakeholders, and members of the PMU. Deliverables will include interviews, completed financial models, and national reports/knowledge products. Initial TORs for these consultants are annexed to the project document (ProDoc [Annex I](#)). 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 (i) finalizing TORs for the country-level; and (ii) sharing 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 (funded by the regional project), on DREI and lowering minigrid costs. This full quantitative analysis can act as a mechanism to engage national stakeholders in a comprehensive dialogue around the derisking measures necessary to advance the market, and also allow for the project team to engage in early adaptive management in project design.

1.2.2 Dissemination of DREI analyses and adaptive management (Year 2)

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, specifically focusing on changes in (i) the risk environment, (ii) financing costs, hard and soft costs, and the Levelized Cost of Electricity (LCOE), reflecting the experience gained during Project implementation. The administrative efficiency, the regional project will fund and execute this update (a 'light quantitative DREI analysis?'), on behalf of the national project.

1.2.3 Coordination with regional project on national DREI analysis update (Year 4)

In the final year, or year 4, of the national project's implementation period, whichever happens first, the original national-level DREI analyses will be refreshed to track evolutions in financing costs as well as in hardware and soft costs. For administrative efficiency, the regional project will fund and execute this update (a 'light quantitative DREI analysis?'), on behalf of the national project. The deliverable will be a brief note of 2-5 pages on the DREI national update. The data from the national refreshed DREI analysis will be fed into an update note to the year 2 AMP flagship regional DREI knowledge product, which will provide an end-of-program overview of the evolution in minigrid costs across AMP countries. The national project's contribution to this activity will be: (i) facilitating the DREI national update (to be funded and executed by the regional project); and (ii) disseminating the findings of the national DREI update note, and the update to the regional flagship DREI product.

Output 1.3 Programme to develop a competitive, skilled labour market in the minigrid sector

1.3.1 Assessment of technical skills needs and job creation

An analysis will be conducted of needs by private (and public) entities of technical, skilled, labour for minigrid assessment, development, construction and operation by means of a survey, while gaps in university and vocational training institutes will be identified, while the landscape of the emerging off-grid job market will be explored. The above-mentioned off-grid website will have a space for linking qualified staff with job opportunities.

1.3.2 Apprenticeships

In cooperation with REA, universities and technical institutes and participating private developers, the Project will support some apprentices to gain practical experience in mini-grid feasibility studies and surveys and construction and O&M of minigrids.

Component 2 *Business model innovation with the private sector*

<i>Outcome</i>	<i>Outputs</i>
2. Innovative business models based on cost reduction are operationalized, with strengthened private sector participation in renewable energy minigrid development.	2.1 Pilots developed, including productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids (INV) 2.2 Pre-feasibility studies for pipeline development. 2.3 Productive use pathway study

Component Strategy/Context

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. For Zambia, the focus under this component will be on using the wealth of experience from within the country, combined with the knowledge resources available from the regional project, to enhance feasibility and business model innovation. The project will also leverage the practical experience gained by minigrid developments in the country to help streamline development processes from conceptualization to commissioning, aiming to reduce the time and costs associated with the minigrid identification, design and implementation. In this respect, pilot beneficiaries (e.g., minigrid operators) receiving support from the project will be required to share minigrid performance data with the national project (see [Box 18](#))

Zambia has gained invaluable experience in the development and operations of minigrids with lessons informing greater innovation in delivery models, tariff designs and productive uses, among others. Mini-grids were initiated by public sector agencies and operated by these or handed over to community-based cooperatives, but over the past decade, the number of private sector or public-private initiatives has grown rapidly, helped by the MG-specific regulatory framework (designed in 2018 and approved by ERB; see [Box 35](#) in Annex G.2).

The private sector is envisaged to play a key role in minigrid development. Despite these learnings and advances in the regulatory environment, a financially independent or self-sufficient minigrid operation has not yet been achieved. 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. The ZMG Project will leverage the practical experience gained by minigrid developments in the country, combined with the knowledge resources available from the AMP programme, to help streamline development processes from conceptualization to commissioning, aiming to reduce the time and costs associated with the minigrid identification, design and implementation.

At the project preparation stage, considerable initial consultations, analysis and planning have been performed to advance the design of the minigrid pilots. This is described in the section directly below (Section IV) and associated annexes. At the beginning of project implementation, as an initial preparatory step, the PMU, in consultation with key stakeholders, and with support from the AMP regional project, will update and finalize the proposed approach to the design of the minigrid pilots, compiling a 'Minigrid Pilot Plan'. Amongst other matters, the project's 'Minigrid Pilot Plan' will

include specifications for the project's pilots that ensure the approach is aligned with key design principles set out in [Box 15](#) of the ProDoc. The project's Minigrid Pilot Plan will then (i) need to be reviewed and cleared by UNDP Zambia and BPPS NCE) and (ii) be shared with the Project Board.

This section describes the objective and main elements of such a plan. Several business models and types of projects may be considered.

Greenfield projects

Greenfield minigrid pilots will be designed to demonstrate (for example) technology options (e.g., solar or hydro-powered MGs), value chain embedded productive uses (e.g., maize milling, irrigation, cold storage), demand stimulation (e.g., microfinance for small PUE), revenue diversification (e.g., selling to the grid, if connected, or serving as energy service hub by selling stand-alone energy technology or for battery charging). There may be different approaches to site identification:

1) Public-private partnerships (PPP); REA-identified sites

In this business model, REA-identified sites will be developed. Likely candidates are sites identified as part of IAREP and other activities. One or more MG sites can be included as a ZMG-supported pilot.

2) Privately-delivered; developer-identified sites

In this modality, developers can present their MG project concept in a Call for Proposals and will operate of which a number will be selected up to a pre-determined total (according to size or budget available)

The GEF contribution (INV) will cover part of the initial investment cost. Several business cases have been analysed on investment and operating cost, levelized cost of energy (LCOE) and tariff definition in view of the clients' ability and willingness to pay. It was concluded that for a developer to be able to set up and run a viable minigrid site support, an investment grant of up to 50% may be needed (see ProDoc [Annex G](#)). For a summary description of model pilot projects, the reader is referred to [Box 19](#) in the ProDoc. In reality, the need for investment support may vary between 30% and 50%, depending on the size of the mini-grid (economics of scale), technology and site (hydropower is very site-specific), the inclusion of productive uses of energy or other forms of demand stimulation, and on the electrification objective (area coverage rate and grid service rate).

In the PPP, REA puts in the distribution assets (and/or some civil works; typically, 35-50% of investment) and the developer supplies the generation assets and the client connections. As the owner, REA will remain responsible for the distribution network, while the developer will operate generation and do the commercialisation. In the business case modelling of ProDoc [Annex G](#), there is no distinction made in terms of cost recovery between PPP and fully private-sector delivered; in both cases, the tariff revenues are used to pay both REA's and the developer's investment back over time.

In the 'developed-identified sites', the developer arranges the funds for the investment. As the GEF INV has a maximum of 45-50% of the initial investment cost (consisting of generation, distribution and metering, plus the cost of transport and installation), the private sector developer may not be able to provide the remaining 50-55% of equity upfront. The developer then has to find other grant support or

seek debt financing. Regarding the latter, the developer will be supported by the project (if needed) to approach one of the banks that implement DBZ's Off-grid Loan Facility. The DBZ has committed to supporting MG development (see [Section 4.3](#)). However, it should be noted that the Project will not interfere in any way with the banks' decision to provide loans or not to prospective developers that will have to meet the requirements of the Fund and apply as any other applicant.

PUE overlay

Working with ZCF's solar maize mill programme, it will be assessed and considered to deploy a minigrid as an overlay of the existing solar system that powers the maize mill. Building on the existing solar mill facility, the GEF contribution (INV) may support the expansion of the solar PV capacity (as needed), putting in battery storage, system reconfiguration and the distribution network.

The implementation modality will be a type of PPP, in which the local cooperative owns the productive use equipment and the developer acquires the power generation and added MG assets. Alternatively, the MG developers acquire the whole system (plus solar mill or other PUE) and lease the equipment to the coop. The exact formula for asset ownership will be discussed and analysed during project implementation.

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Reducing operating cost and demand stimulation

One focus of the MG pilots is on achieving longer-term cost reduction. Private developers are already standardising hardware and reducing operational costs by installing remote monitoring equipment and data analysis software or improving revenue collection using PAYG smart meters. One selection criterion in Call for Proposals will be demonstrating cost-effectiveness by pursuing innovative cost reduction and revenue generation solutions (see [Box 16](#)).

A key lever determining mini-grid viability is stimulating demand, outside the usual peak hours. Apart from linking the minigrid with a large anchor load (such as a communication tower or a large PUE, such as solar mills or water pumping), the stimulation of smaller commercial uses (small retail shops, social meeting places, markets, or small workshops) helps to increase productive loads as businesses add new electrically-powered machinery. The growth of businesses will have a positive socio-economic impact. The Project will approach micro-finance organisations for these small enterprises to purchase electric appliances. Another way of stimulating demand is the introduction of electric cooking within the limits of the system's capacity (see [Box 17](#) in ProDoc).

Hybridization with the main grid and energy kiosks

Given the recent advancements regarding grid encroachment in the ERB 'light-handed' regulatory framework for MGs, an interesting option is to pilot an MG that is designed to provide power to the local community and sell the excess power to the grid. This is a particularly interesting option for hydropower MGs and/or places where the main grid is weak and has interruption issues. Regular sales to the grid can generate additional revenue for the MG.

Another option is having the minigrid facility function as an energy kiosk facilitating energy services, such as charging of appliances, battery charging, energy-related services (such as providing internet access) as well as renting or sales of small solar (pico or solar home systems), to those that are outside the range of the minigrid distribution network) and high-efficiency appliances.

Post-project replication

REA has compiled a list of about 220 sites suitable for MGs, most of them are solar PV with some hydropower sites. To support post-project replication an investment prospectus will be compiled for selected sites. This may include one or more of the following:

? Pre-feasibility assessment with research of socio-economic data for sample mini-grid sites (ability and willingness to pay, consumption of public institutions and productive users), detailed demand assessment, derivation of load profiles, estimation of site-specific development costs (transport cost, taxes/duties, labour cost, etc).

? Preparation of financial models and technical system designs Cost of Service models and calculation of macroeconomic benefit of rural industrialization for sample mini-grids under various grant funding and subsidization scenarios and various delivery models. These studies will take into account the results of the opportunities to boost economic activities through electricity access and productive use and financing opportunities (Output 2.3)

? Compilation of results in a report and presentation of results to government for further debate. Sharing of a report with authorities, industry, civil society, media and the general public, accompanied by the preparation and conduction of various events triggering discussion around the topic.

? **Exhibit 4 Possible Business models applicable in the ZMG project**

Model	Examples	Application in ZMG project
Private-sector delivered	Private sector build, owns, operates (BOO) and arranges financing Depending on MG type and site characteristics, a grant may be needed (by government up to 50% and/or other sources)	The advantage of this model is that it allows the service provider to offer the needed energy services, designed on a case-to-case basis, and the services provided could also be structured in a manner that gives the off-taker an opportunity to subscribe to a preferred service at a cost he can afford. It is also possible to provide other services (such as energy services, battery charging or sales of solar products and internet services), in addition to stimulating access to high-efficiency appliances such as cookstoves.
PPP - split assets	REA finances and owns distribution (and/or some civil works), while developer finances, owns and operates generation and sales (connections). Some small grant portion may still be needed.	With REA providing a substantial part of the assets (distribution network may be 40-50% of costs), this will make it more financially attractive. However, contracts will need to have a clear definition of roles and responsibilities of the partners.

PPP-hybrid	A developer takes over assets already constructed by REA or another private/public entity, for example to refurbish and/or expand an existing generation, mini-grid or PUE facility	<p>In one variant (PUE overlay) the developer will acquire PUE equipment and lease to the end-user (thus investing in the PUE itself and required minigrid investments to accommodate the PUE.</p> <p>In another variant, the developer will be required to rehabilitate/upgrade, operate and maintain an existing mini-grid. The developer will own (ROO: rehabilitate, operate, own) or transfer back after a period of years (franchise period), ROT: rehabilitate, own, transfer). A contract specifies the rights and obligations of the two parties during the term of the PPP contract.</p> <p>The reverse PUE overlay option is a variant in the ROO/ROT scheme, in which a developer acquires the energy generation part (and may well integrate in a bigger local minigrid scheme) and sells power (with guarantees and other transfer conditions) to the end-user. Thus, the end-user can leave rehabilitation and operation to the developer. The model can apply to PUE or social services (schools, clinic).</p>
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Activities:

2.1.1 *Develop a Minigrid Pilot plan (year 1).*

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 minigrid pilot(s). 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 Project Board. This activity should be completed by the end of year 1. Building on the initial design information in this project document and its annexes, including the key principles for minigrid pilot implementation described in [Box 15](#), the project's Minigrid Plan Pilot Plan will determine, among other aspects, the following:

- ? Clear objective for the pilot(s)
- ? The minigrid delivery model(s) which will be demonstrated in the pilot(s), either the private sector-delivered or a PPP model (split assets or hybrid PPP; see ProDoc [Box 14](#).)
- ? The proposed type of pilot(s), which can include: (i) greenfield minigrid pilots (with a demand stimulation focus or productive use, and (ii) brownfield (refurbishing existing minigrids or productive use overlays);
- ? The estimated target number of pilot(s), based on ex-ante estimates of available GEF INV and co-financing
- ? Inputs, as necessary, on-site selection, including based on geo-spatial mapping, for the pilot(s)
- ? 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 competitive tendering, as necessary (see Component 4)
- ? Ongoing data collection from minigrid pilot(s), including data-sharing requirements from minigrid pilot(s) as well as digital hardware requirements (see [Box 18](#))
- ? The project's approach to ensuring minimal concessionality for the level of GEF INV support to the pilot(s) (when there are private sector beneficiaries)
- ? Review of the Implementing Partner's (IP's) modalities for transfer of GEF INV support to the pilot(s), ensuring they are aligned with UNDP's policies and financial rules
- ? Coordination and rationale for any associated project technical assistance activities which may benefit the minigrid pilot(s)
- ? Elaboration of the text of the Call for Proposals

Whether in public-private partnership (REA or ZCF-identified projects) or proponent-identified, the private sector will be involved as minigrid owner (in PPP as split assets, with e.g., REA owning distribution system or some civil works, and ZCF owning the solar mill), and/or as a service provider (O&M, sales). In any case, where there is private sector engagement in the pilot(s), a competitive tender process will be executed and issued in a Call for Proposals using the digital tendering feature of the digital platform procured under Component 4.

2.1.2 Design and launch of Call for Proposals (year 2), using a digital platform (see 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. The terms of reference will consider, among other factors which the PMU will determine with support from the AMP Regional project, the following: (i) establishing a requirement and incentives for pilots to share data with the project; (ii) including incentives for the proposals to be gender-responsive and (iii) including a requirement for environmentally-sound collection, storage and disposal of all electronic and electrical waste, including rechargeable batteries, associated with off-grid renewable energy technologies. 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.

2.1.3 Execution of tender, contracting and payments to the selected pilot proponents

In year 2, the tender will be launched and executed according to the design finalized in activity 2.1.2, resulting in minigrid developers/operators being selected as pilot beneficiaries. Submissions to the tender will be competitively assessed against evaluation criteria (engineering, financial), with the PMU supported by appropriate expertise. Following the 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 the 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 for private sector actors to engage with the competitive tender.

2.1.4 Monitor pilot(s), collect and aggregate data shared by pilot(s)

Data generated by the pilot(s) will be collected using the digital platform, connecting directly to remote monitoring and smart metering equipment. Data that are not amenable to be collected by remote sensing will be collected either by the minigrid operator or some alternative way to be defined by the PMU supported by appropriate expertise. Data collected from the pilot(s) will be used at the project level to: (i) track the performance of the mini-grid systems in real-time; (ii) validate the underlying pilot(s) 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. Also, data collected from pilot(s) will be shared with the AMP Regional Project for aggregating and analysing data across all AMP national child projects. The regional project will use these data to: (i) generate insights and lessons learned; and (ii) inform the development of knowledge products, both to be disseminated across AMP participating countries and the broad minigrid sector.

Exhibit 5 Summary description of pilot minigrid projects

A Minigrid Pilot Plan will be developed in the first year to determine the approach to minigrid pilots, including the number, size, expected energy consumption and type of clients. In order to be able to make an estimate of the expected direct greenhouse gas emission reduction of the pilot minigrids, it is assumed that the pilots minigrids chosen will be grouped in two indicative types:

a) Greenfield minigrid systems (solar PV-battery), including:

1) **Public-private partnerships (PPP); REA-identified sites.** In this business model, REA-identified sites will be developed. Please see Annex G in the project document for more information. Likely candidates are sites identified as part of IAREP and other activities. One or more MG sites can be included as a ZMG-supported pilot.

2) **Privately-delivered; developer-identified site.** In this business model, developers can present their MG project concept in a Call for Proposals and will operate of which a number will be selected up to a pre-determined total (according to size or budget available). REA has compiled a list of about 220 sites suitable for MGs, most of them solar PV (with about five hydropower sites) that vary in size from 20 to 200 kW. Of this list, feasibility studies will have been finalised by the end of 2022 of six sites. Some of these may be included in the Minigrid Pilot plan to be implemented either as public-private partnership or fully by the developer (see Prodoc Box 14).

A number of possible business cases for solar (and hydro) minigrids were developed that are presented in the prodocs [Annex G](#).

b) PUE to minigrid (solar PV-battery).

Working with ZCF's solar maize mill programme, the GEF contribution (INV) may support the expansion of the solar PV capacity (as needed), putting in battery storage, system reconfiguration and the distribution network. The implementation modality will be a type of PPP, in which the local cooperative owns the productive use equipment and the developer acquires the power generation and added MG assets. Alternatively, the MG developers acquire the whole system (plus solar mill or other PUE) and lease the equipment to the coop. The exact formula for asset ownership will be discussed and analysed during project implementation.

To allow comparison between the Zambia pilots and the pilots in other countries participating in the Africa Minigrid Programme, the same set of assumptions are taken as in the regional programme that are somewhat different from the more Zambia-specific assumptions of the business cases of Annex G. The methodology for estimation of the GEF indicators (including greenhouse gas emissions reductions) with the calculated ZMG Project targets are given in [Annex H](#).

the Africa Minigrid Programme, the same set of assumptions are taken as in the regional programme that are somewhat different from the more Zambia-specific assumptions of the business cases of Annex G. The methodology for estimation of the GEF indicators (including greenhouse gas emissions reductions) with the calculated ZMG Project targets are given in [Annex H](#).

Pilot Name		Zambia Greenfield MG Pilot	Zambia PUE overlay Pilot
Type of Pilot		Greenfield MG	PUE overlay
Indicative number of minigrids		3.9	2.3
Minigrid Technology:		Solar PV + Battery	Solar PV + Battery
System sizing assumptions		Custom-sized	PUE Overlay to a Custom-sized MG
Project Budget Allocated to pilot (as	GEF INV (USD)	534,551	115,449
	UNDP (USD)	-	-

CAPEX subsidy)	Total (USD)	534,551	115,449
		650,000	
Estimated Pilot CAPEX needs (USD)		1,062,733	173,116
Estimated co-financing required (USD)		528,182	57,667
Greenhouse Gas Emissions Mitigated (metric tons of CO2e)		12,991 (direct)	784 (direct)
Increase in installed renewable energy capacity per technology (kW ? solar) (kWh - storage)		0.406 (solar PV) 0.983 (storage)	0.044 (solar PV) 0.108 (storage)
Number of direct beneficiaries disaggregated by gender (and customer segment) as co-benefit of GEF investment (number of people)		4,085 people ----- 3,900 people (residential) 80 people (social) 105 people (commercial/PUE)	316 people ----- 290 people (residential) 0 people (social) 21 people (commercial/PUE).

Pilots and the project's Environmental and Social Management Framework

Pilot minigrids funded by GEF INV are required to comply with all the relevant national standards of the country as well as UNDP standards on social and environmental safeguards, gender equity and stakeholder consultation. In support of this, an Environmental and Social Management Framework (ESMF), developed for the program, a Gender Action Plan and Stakeholder Engagement Plan accompany this Project Document. 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 impact assessments and management plans for pilot minigrids. A critical consideration under this ESMF 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 and national requirements.

2.2 Pre-feasibility studies for minigrid development

The Project will support several pre-feasibility assessments of the most promising REA-identified sites to be included as PPP for post-project replication (funding sources to be defined during project implementation)

Activities:

2.2.1 Pre-feasibility analysis of selected prospective MG sites

Research of socio-economic data for sample mini-grid sites (ability and willingness to pay, consumption of public institutions and productive users), detailed demand assessment, derivation of load profiles, estimation of site-specific development costs (transport cost, taxes/duties, labour cost, etc). Financial modelling and technical system designs, cost-of-service models and sample mini-grids under various grant funding, debt financing and subsidization scenarios (focussing on PPP and private-sector delivery models). The activity will be linked with activity 1.3.2 to allow young professionals to

gain practical experience in carrying out technical and socio-economic feasibility and project design activities.

2.2.2 Investment and replication plan

Building on REA's list of identified sites as well as sites suggested by private and public partners, and the results of activity 2.2.1 in combination with targets set in the new NES and the opportunities to boost economic activities through electricity access and productive use and financial support mechanisms (Output 3.3), a plan will be formulated as a basis for scaling up minigrid investments in that will include lessons learned from the implementation of project activities in Zambia as well as across all AMP countries and from GEF-funded minigrid projects worldwide.

Output 2.3 Productive use pathway study

Activities:

2.3.1 Assessment and drafting of a report on the role of MGs in rural development and financing sources and options

Existing GIS information on MG and off-grid energy access (obtained as part of WB ESAP activities) will be analysed from the viewpoint of links with productive uses and value chains. Based on WB/ESMAP Survey for Measuring Energy Access (2019) and the latest GIS information and in coordination with energy statistics activities of ZamStat, the potential opportunities to boost economic activities through electricity access and productive use will be mapped. The report will further build on the assessment in activity 3.1.1 on financing mechanisms focussing on reducing the costs of capital and risks by simultaneously providing finance for energy MG and the identified productive uses. The activity will engage entities such as ZCF, Ministry of Small and Medium Enterprises, Musika and the Ministry of Finance.

Component 3 Scaled-up financing

Outcome	Outputs
3. Financial sector actors are ready to invest in a pipeline of renewable energy minigrids and concessional financial mechanisms are in place to incentivize scaled-up investment.	3.1 Innovative financing solutions for minigrid development are identified and designed while supporting financial sector capacity building

Component Strategy/Context

This component will study and make recommendations on institutionalising (and securing) a 'minigrid funding window' in REA/REF. The funding would make available grant support to (private) minigrid developers (e.g., in solicited proposals in the grant-support tender process, or for unsolicited proposals) for the purchase of MG equipment and selected productive use equipment. A gap analysis will be undertaken to identify the opportunities and challenges associated with different funding mechanisms. Government stakeholders (in particular REA, MoF and DoE staff) will be engaged to ascertain the appetite for the different funding institutional setups and mechanisms proposed.

This project will also seek to enhance the capacity of local financial institutions to scale up their participation in financing models for minigrids and scale up their ability to finance productive uses or other innovative financing solutions for minigrid developers to adopt and leverage, leading to cost reductions. Local and international private sector players will be engaged to determine what they see to be the key financial barriers and how these can be addressed by possible financing mechanisms will be proposed, while training will be provided in workshops, dialogues and conferences will be conducted with representatives from financial institutions as well as beneficiaries (MG developers, NGOs, rural businesses) to create awareness of the opportunities that exist with lending to for MG and linked PUE.

A Multi-Tier Framework Survey for Measuring Energy Access, supported by World Bank/ESMAP was carried out in 2017-2018 and the report with data was published in 2019. There is a need to link the findings on energy access with productive use opportunities and financial support tools and mechanisms.

Grant-funding (from the government, cooperation partners or charities) remain to be a key enabler to financing renewable as well as international finance for the millions of dollars that will be needed annually for minigrid development, according to the financial needs determined in the new NES and future minigrid expansion action plans (see Box 3 in ProDoc). The assessment will cover the assessment of the institutionalising of dedicated 'minigrid financing window' (at Rural Electrification Fund, replenished with revenue from electricity sales, regular budget funding (from the Ministry of Finance) and multilateral and bilateral source of finance with a transparent set of rules for providing capital investment support for MGs.

While enabled with some form of capital subsidy, the MG developers will have to provide equity and may need debt financing. The analysis will assess the status and potential of financial instruments such as loans, debt and partial risk guarantees, and project insurance. It may also pilot new innovative blended finance instruments such as results-based financing and minimum revenue guarantees that help address cash flow risks. Such financing instruments will be developed building on activities of the recent World Bank ESAP and AfDB/GCF, and based especially on the results of the DREI analysis (Output 1.3) to leverage and de-risking private sector financing for renewable minigrid for minigrid developers as well as for productive use. Opportunities and connections will be identified with domestic and international organisations that might provide access to innovative, non-standard finance sources. Microfinance institutions can be involved in appliance lending to stimulate demand in the MG system (often low in the first years of operation) for small domestic appliances and productive uses (such as TV+DVD, refrigerators, high-efficiency, cookers, hair salon equipment, etc.).

Capacity building will take place to create systematic linkages with these sources of finance, where appropriate. The project will deliver training to familiarize commercial banks (and microfinance institutions) with the technical aspects, business models, and financial profiles of renewable minigrids, with the goal of creating a more positive lending attitude among these institutions, among others, by using the results of the DREI assessment (Component 1). At the same time, it is important that developers and promoters are trained so that they can develop bankable proposals.

Much of the agricultural output of rural areas is, as a result of non-existent rural electricity availability, transported to, aggregated and processed in areas connected to the national grid. Mini-grids present an opportunity to boost rural economies by shifting this primary processing into rural areas thereby retaining more value locally. The ZMG Project will support a national report on opportunities to more closely link rural development (agro-processing, water pumping and irrigation, cold storage and other productive use) with minigrids, end-user affordability and financing opportunities. All existing GIS information on market size will be collated (from the before-mentioned WB project-supported NES assessment) as well as data from publications will be collated including academic studies (e.g., on energy access demand and the recent Multi-Tier Framework Survey for Measuring Energy Access 2017-2018). The potential opportunities to boost economic activities through electricity access and productive use will be mapped against the different roles that can be played by:

- ? Developers and operators: investing in productive uses increases customer ability to pay and revenue per user in MGs (see also [Annex G](#) in ProDoc for a quantitative discussion of the effect);
- ? National and local governments planning: linking productive uses in rural development plans with minigrid planning;
- ? Finance institutions and investors: data on how PUE stimulates electricity demand and increases the MG's revenue stream. This is also critical information for due diligence and capital raising.
- ? Consumer ability and willingness to pay.

Output 3.1 Innovative financing solutions for minigrid development are identified and designed while supporting financial sector capacity building

Activities:

3.1.1 Assessment and recommendations for MG financing institutionalisation

A review will be carried out of experiences obtained in IAREP, BGFA, WB, AfDB and the impact of direct capital subsidy (e.g., through a dedicated ?minigrid financing window? within REA/REF), and blended financing and de-risking instruments (venture capital funds, soft loans, debt and partial risk guarantees, minimum revenue guarantees, project insurance) as well as non-traditional instruments (e.g., crowd and blockchain funding). Linked with the DREI analysis of Output 2.2, recommendations on risk mitigation and mobilisation of funds will be formulated, in close cooperation with entities such as the Ministry of Finance, DBZ and pension funds.

3.1.2 Design of a capacity-building plan on stimulation of access to local finance and organisation and delivery of workshops, training and conferences

The activity consists of the development of a capacity-building plan and delivery of a series of training and seminars, specifically for: a) financial institutions (on the characteristics of off-grid projects and issues and options in financing) and b) mini-grid project developers (on the preparation of bankable financial proposals). The clean energy finance/mini-grid finance training will cover various topics, such as characteristics of financing for rural RE projects, financial modelling tools, business planning tools and exercises, customer credit appraisal tools and exercises, as well as loan product structuring tools and exercises, etc. In addition, one or more seminars will be organised to facilitate networking between financial institutions and project proponents, as well as general exchange on public and private financing issues and options between the financial sector and private

developers as well as government staff and micro-finance institutions. The outcome of such exchange helps formulate the recommendations of the study of activity 3.1.1.

Component 4 Digital and knowledge management

Outcome	Outputs
4. Digitalization and data are mainstreamed, across stakeholders, into local minigridd market development. Increased knowledge, awareness and network opportunities in the minigridd market and among stakeholders, including benefitting from linkages to international good practice	4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project 4.2 A ?Minigridds Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigridds scale-up and cost-reductio 4.3 Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized 4.4 Engage with the regional AMP project, via (i) Communities of Practice and (ii) capturing and sharing lessons learnt

Component Strategy/Context

The experience and results of the ZMG Project will feed 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. This fourth component has therefore been structured to link to the knowledge resource of the regional project, both to access available resources and support and to contribute to knowledge sharing. The expectation is that lessons learned, at the national and regional level, will enable the scaling up of rural electrification using RE minigridds, both within the country and in the region. Towards this objective, information will be collated and shared to be available to serve as a knowledge resource to both public and private sector players.

Digitization is proving a key enabler for individual systems and national planning and decision-making. This process starts with compiling GIS and statistical data on-grid and off-grid in cooperation with MoE and ZamStat. The ZMG project will generate data such as metering data from participating projects across the country, analysis of the data and development of 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 MG facilities It can also help identify suitable opportunities for future MG linked with productive uses. In addition to published load profiles and findings, the data can inform further research, technical and policy papers, industry briefs and case studies.

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 minigridds, including GHG emission reductions), which will be operationalized based on standardized guidance from the regional project. Performance tracking of indicators and impact relies on a deliberate approach to identifying data sources, the definition of baseline, collection of data and tracking of progress over time. Surveys, questionnaires, feedback or evaluation forms, and tracking of visits to a website, all serve to assess the reach and scope of the contribution made by different elements of the project. Identifying and implementing these opportunities and monitoring instruments early on will both inform adaptations to the project design during implementation and enable a more accurate assessment of impact.

The digital strategy and QAMF will be supported by a digital platform. This platform will serve as an important integration point between outputs and between the national activities and the 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. 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 digital platform will be procured by the project to serve different purposes including:

- ? Running digital tenders by which minigrid developers will be selected as beneficiaries under the project
- ? Managing all technical and financial data related to minigrid sites.
- ? Provide minigrid developers - selected to implement minigrid pilots with support from the project - access to a set of best-in-industry digital tools for analysing minigrids (e.g., demand forecasting, system optimization, distribution network design, detailed financial modelling at the site and portfolio level)
- ? Source of knowledge and information for minigrid developers and government stakeholders

The Digital, Knowledge Management component intends to actively leverage existing information and knowledge to broaden and refine the understanding of minigrids in the country context, support future planning and decision-making and contribute to the development of minigrids in the region. Activities in this Component serve as a two-way communication channel with the regional project for the aggregation of data and compliance with monitoring, reporting and evaluation requirements (Box 20 in ProDoc). The ready availability of a credible knowledge resource will contribute across all risk categories: facilitating engagement with financial institutions, growing investor confidence, reducing operational and development costs, improving system utilisation and load management, and improving customer acquisition and relationship management. Reliable and detailed information will also support national planning and decision-making, enabling Zambia to optimise the contribution from clean energy minigrids for the country. Also, an active conversation between government and private developers will contribute to establishing a business-friendly environment to attract private sector participation and provide for a feedback mechanism necessary to enable iterative refinements to the policy environment.

The focus of this component is broad, expected to harness the learnings from Component 2 with the experience available at the regional level, to contribute across the majority of risk categories as prioritized during implementation. 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 in Box 16 in ProDoc. 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.

Through the implementation of this digital 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 analysing minigrids (e.g., demand forecasting, system optimization, distribution network design, detailed financial modelling 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.

Through the implementation of this digital 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 analysing minigrids (e.g., demand forecasting, system optimization, distribution network design, detailed financial modelling 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.

Output 4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project

Activities:

Develop and implement a project digital strategy (the ?Project Digital Strategy?)

Similar to all national child projects under the regional AMP programme, the ZMG Project will develop a Project Digital Strategy in year 1 which will be implemented thereafter. The Project Digital Strategy will be updated on an annual basis to reflect learnings from project implementation, the guidance received from the AMP Regional Project on digital/data tools and solutions, and insights gained from minigrid pilot(s) data.

4.1.2 Develop recommendations for a national-level digital strategy for minigrid development.

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.

Output 4.2 A ?Minigrids Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction

Activities:

4.2.1 Develop Terms of Reference (TORs) for procuring a Minigrids Digital Platform

The project will use standardized TOR provided by the AMP Regional Project and tailor them to the specific country/project needs. [Box 20](#) in the ProDoc provides indicative specifications for the Digital Platform which the AMP regional project will develop further into standardized TOR and the project PMU will tailor to the specific country/project needs.

4.2.2 Procure MG digital platform

The project will procure a country-level mini-grids digital platform and set it up to enable (i) convening and capacity building for key stakeholders (public/private), (ii) collecting and managing technical and financial data related to minigrid pilot(s) based on the project?s Quality Assurance and Monitoring Framework (QAMF), including links to the AMP Regional Project, and (iii) acting as the mechanism for running digital tenders for minigrid developers/sites.

However, the exact functionality will depend on being tailored to the specific country/project needs. In Zambia?s case, compatibility with the REA intranet and website and needs from projects supported by other development partners need to be accommodated. A system used already in Zambia is the Edison platform, which was introduced in 2016 as part of the BGFA programme as a market intelligence generation tool for its projects. Edison is connected to the companies? internal systems and provides live information on energy service subscriptions sold, payments, upgrades and warranty events, among other data points, which allows for real-time verification. More details can be found at <https://edisondata.io/services>.

Output 4.3 A Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized [for sustainable development impacts of all minigrids pilots supported, including GHG emission reductions]

Activities:

4.3.1 Provide inputs and feedback to the AMP Regional Project on the development of a standardized Quality Assurance and Monitoring Framework for application across AMP national projects (AMP-QAMF)

A standardized Quality Assurance and Monitoring Framework for application in all minigrid pilots supported under AMP national projects (AMP-QAMF) will be developed in year 1 of the AMP Regional Project and disseminated to all national project staff. This AMP-QAMF will build upon the minigrid Quality Assurance Framework (QAF), which is a set of technical and financial performance monitoring indicators, developed by NREL, and others, as well as the considerable data gathering, pooling and analysis work ongoing by AMP partners such as RMI, SE4All and AMDA. It is expected that national project staff will provide both inputs and feedback on the development of this framework as well as on how best to operationalize the committing to its adoption by the minigrid operators receiving support from the national project. Concerns around data privacy or sensitive data on the part of minigrid operators will be considered and addressed in each case.

4.3.2 Operationalize the AMP-QAMF

The adoption and utilization of this framework and associated data reporting protocols will be a mandatory requirement for all minigrid pilots supported under AMP (e.g., applicable to all national projects) and each minigrid operator/sponsor who is the beneficiary of investment subsidies and technical support by the project will be required to formally commit to using the QAF as a condition of assistance. The adoption of the QAF by all minigrid operators/sponsors supported under AMP national projects will ensure that the regional project can aggregate common data metrics and track a standardized set of key performance indicators across all minigrid pilots supported by AMP across all partner countries and report this data to the donor on a programmatic level.

Output 4.4 Engage with the regional project (AMP) via (i) Communities of Practice and (ii) capturing and sharing lessons learnt

Activities:

4.4.1 Communities of Practice (CoPs)

One of the primary ways national project staff will interface with the AMP Regional Project is via the ?Communities of Practice? (CoPs) and associated activities/platforms. While it is expected that many of the activities under the Regional Project Component #3 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^[9].

4.4.2 Sharing of research and lessons learned with and by the AMP regional project.

Research and lessons learned will be systematically shared with the regional project based on guidelines that will be defined by the regional project and shared at the project's Inception Workshop. Capacity building will be provided to the national project PMU to compile lessons learned and share knowledge effectively. 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. One activity will be the organisation (with AMP support) of a regional minigrids seminar in Zambia.

4.4.3 Collaborate with the regional project on an ?Insight Brief?

Every AMP national project is expected (in the course of the four-year implementation cycle) to collaborate with regional project staff on the development of at least 1 'insight brief' capturing (in an accessible format) selected key highlights from a successful national project activity. The 'insight brief' can cover any activity of the project and take the form of a written brief or video brief. The regional project has budgeted resources for the production of 'insight briefs' (under its Component #1 Knowledge Tools), but the success of regional staff in producing insight briefs highlighting national project activities will be dependent on content and data provided by the national project team and stakeholders^[10].

Component 5 Monitoring and evaluation

Outcome	Outputs
5. Compliance with all mandatory monitoring and reporting UNDP/GEF requirements	5.1 M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation

This Component will ensure compliance with all mandatory monitoring and reporting requirements of the GEF, including the following specific outputs (described in more detail in Section 6):

Output 5.1 M&E and Reporting, including (i) Conducting inception workshop and preparing report, (ii) Ongoing M&E, (iii) Mid Term Evaluation and (iv) Terminal Evaluation

This Component will ensure compliance with all mandatory monitoring and reporting requirements of the GEF, including the following specific outputs (described in more detail in Section 6):

Activities:

5.1.1 Conducting inception workshop and preparing the report

A project inception workshop will be held to officially launch the project and, among other aims, familiarize key stakeholders with the detailed project strategy, roles and responsibilities of the project team, and project planning instruments such as the Total Budget and Work Plan (Section 9), multi-year work plan (Annex D), Monitoring Plan (Annex E), and the Procurement Plan (Annex L), among others. The workshop will be organized by the PMU with support from the Implementing Partner (REA), and planned with support from the UNDP Country Office and the AMP Regional Project staff. Staff from the AMP Regional Project PMU will participate either remotely or in person in the Inception Workshop and will provide support to the project PMU to plan the workshop, and develop materials and content that will facilitate project planning activities including the template for the Inception Workshop Report. The Inception workshop report will be prepared by the PMU and submitted to UNDP within 60 days of signing the UNDP Project Document of this project.

5.1.2 Ongoing project monitoring of Results Framework indicators

As set out in the Monitoring and Evaluation Plan (Section 6), data on Results Framework Indicators will be systematically collected and analysed to provide decision-makers, managers, and project stakeholders with: (i) information on progress in the achievement of agreed objectives and the use of allocated resources, and (ii) regular feedback on the performance of projects and programs taking into account the external environment. Information from systematic monitoring serves as a critical input to ongoing PMU management decisions (adaptive management), evaluation, and learning.

The GEF Core indicators (see [Box 21](#) in ProDoc) included in the Results Framework (Section 5) as per this Project Document (ProDoc Annex G) will be used to monitor global environmental benefits and will be updated for reporting to the GEF before the project's evaluations, that is, the mid-term review (MTR) and terminal evaluation (TE) described under Activity 5.1.5 and Activity 5.1.6 below.

5.1.3 Ongoing project monitoring of key project plans

The project is accompanied by various plans including Stakeholder Engagement Plan (ProDoc Annex J), a mitigation plan for project risks (Risk Register in Annex F), and Gender Action Plan (ProDoc Annex I). These plans will be reviewed according to the monitoring and evaluation requirements. According to the project's social and environmental risk rating, there is a need to carry out continuous monitoring of the social and environmental safeguards as proposed in the Environmental Social Management Framework (ESMF) and other SES frameworks/plans (ProDoc Annexes K and N). The environmental and social management plan (ESMP) that will emanate from the application of the ESMF will also be monitored under this activity.

5.1.4 Annual progress reporting

Data collected by monitoring GEF Core indicators, Results Framework indicators, project plans and social and environmental safeguards will be used to prepare the annual Progress Implementation Report (PIR) to report back to UNDP and/or GEF.

5.1.5 Conduct a Mid-term review (MTR) of the project

An independent mid-term review (MTR) will take place at the halfway mark of project implementation and will be conducted according to guidance, rules and procedures for such evaluations established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects. The MTR will be made widely available to all project stakeholders in the relevant language (English).

5.1.6 Conduct a Terminal Evaluation (TE) of the project

An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The project's terminal GEF PIR along with the 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 lessons learned and opportunities for scaling up.

4) alignment with GEF focal area and/or impact program strategies;

14. The program is aligned with Objective 1 of the Climate Change Focal Area to "Promote innovation and technology transfer for sustainable energy breakthroughs", through CCM 1-1 - Promote innovation and technology transfer for sustainable energy breakthroughs for de-centralized renewable power with energy storage. It also contributes to GEF-7 Programming Directions to accelerate "the speed and scale of sustainable energy investment in developing countries", to develop "innovative business models that go beyond business as usual" and to foster innovation.

5) incremental cost reasoning

15. A number of development partners have been working in the area of minigrids in Zambia. Call for proposals have been organized by the Swedish-initiated Beyond the Grid for Africa (BGFA; about USD 20 million), USTDA[11]¹¹ and the EU-IAREP project (USD 23 million) have organized for developers to submit their minigrid proposals have been awarded that are now in various stages of implementation. Aided by such grant support, an increasing number of companies have been active in the area of minigrid development in Africa. The World Bank has been assisting REA with the Electricity Service Access Project (ESAP), which geospatial master planning and formulation of the National Electrification Strategy (NES), currently in preparation. ESAP has made available USD 3.0 million for partial subsidies for private sector mini-grid and off-grid development through REA and USD 2 million for an off-grid loan facility at the Development Bank of Zambia, that can make working capital or loans available through participating commercial banks to certain types of solar equipment suppliers, mini-grid developers and end-users of solar equipment.

16. This means that Zambia is still at an early stage in minigrid development but is not starting from scratch. On the regulatory front, a specific minigrids regulatory framework has been developed by ERB, supported by the EU IAREP project. However, the framework remains to be thoroughly assessed, especially from the perspective of potential developers. In terms of the delivery model for minigrids, a range of models has been deployed thus far that more and more seem to gravitate towards private sector-led identification and development and public-private partnerships in which private developers provide part of the assets (generation and connections) with REA (distribution network). Thanks to the very active ecosystem of donors in Zambia, a coordination and dialogue forum, Off-grid Task Force, has been set up, through which government, public and private sector and development partner representatives can meet on a regular basis.

17. While the baseline projects and initiatives will address some of the barriers and needs outlined in Exhibit 2, the gap analysis process of the PPG phase has identified a number of interventions, from which Zambia would benefit through this project. First, the Off-Grid Task Force will be supported in enhancing the national dialogue aimed at taking stock of various experiments in delivery models and establishing a way forward that would lead to a more coherent, predictable, and streamlined regulatory and public financing pathway. The cost of minigrid electrification in terms of USD per kWh delivered per customer connected remains high, especially in Zambia where the rural population density is often very low. Cost-reduction, across hardware costs, soft costs and financing costs, can be achieved by employing innovative business models for minigrids that integrate productive uses of energy (PUE). Innovation and advances in digitalization and demand stimulation (through the availability of efficient appliances for a variety of income-generation activities and of high-efficiency cookers for electric cooking) provide new levers to drive down the costs of minigrids through increased load demand. Mobilizing local financing (alongside public funding) to support private investment is an important condition to achieve scaled-up commercial

investment in renewable energy minigrids. Thus, the Project seeks to enhance the capacity of local financial institutions to scale up their participation in financing models for minigrids and scale up their ability to finance productive uses or other innovative financing solutions for minigrid developers to adopt and leverage, leading to cost reductions.

18. The proposed Project will complement the baseline situation to address the key challenges as summarized in Exhibit 2. It should be further observed that Component 4 of the Zambia Minigrid project will serve as a knowledge management bridge between the Project and the regional programme, and between this child project and other AMP national projects.

19. The total cost of the project is USD 14,963,947. This is financed through a GEF grant of USD 1,363,947 administered by UNDP and a UNDP cash contribution of USD 100,000 and USD 13,400,000 grant and in-kind co-financing by project partners and USD 100,000 UNDP in-kind support.

6) global environmental benefits (GEFTF) and GEF indicators

20. Regarding, global environmental benefits, the project contributes 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. Mitigation benefits include:

o *Direct emissions reductions* attributable to the investments made in the GEF-supported minigrid pilots during the project's supervised implementation period, totalled over the respective lifetime of the investments (20 years), assuming two types of pilots, a) greenfield minigrid systems (solar PV-battery), and b) PUE to minigrid overlay (solar PV-battery).

o *Indirect emissions reductions* that could result from a broader adoption of the outcomes of a GEF project plus longer-term emission reductions from behavioural change in the post-project period. Broader adoption of a GEF project proceeds through several processes including sustaining, mainstreaming, replication, scaling-up and market change.

? *Sub-indicator 6.4: Increase in installed renewable energy capacity per technology* captures the increase in solar capacity and battery 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 from the pilot project.

Exhibit 4 Project results and GEF indicators

Pilot Name	Zambia Greenfield MG Pilot	Zambia PUE overlay Pilot	TOTAL
Type of Pilot	Greenfield MG	PUE overlay	
Minigrid Technology:	Solar PV + Battery	Solar PV + Battery	
Project Budget Allocated to pilot (about 45% of CAPEX as subsidy) - GEF INV (USD)	534,551	115,449	650,000
Estimated Pilot CAPEX needs (USD)	1,062,733	173,116	1,235,849
Estimated co-financing required (USD)	528,182	57,667	585,849
Greenhouse gas emissions mitigated (tons of CO ₂)	12,991 (direct)	784 (direct)	13,775 (direct) 643,423 (indirect)
Increase in installed renewable energy capacity per technology (kW ? solar) (kWh - storage)	406 (solar PV) 983 (storage)	44 (solar PV) 108 (storage)	450 (solar) 1,091 (kWh)
Number of direct beneficiaries disaggregated by gender (and customer segment) as co-benefit of GEF investment (number of people)	4,085 people ----- 3,900 people (residential) 80 people (social) 105 people (commercial/PUE)	326 people ----- 290 people (residential) 0 people (social) 36 people (commercial/PUE).	4,396 people ----- 4,190 (residential) 80 (social) 126 (comm./PUE)

Note: Of the 4,396 beneficiaries, 51% will be women, through 905 connections (838 residential, 20 social services, 47 commercial and PUE). For details on assumptions and calculation methods, the reader is referred to Annex H of the UNDP Project document.

7) innovativeness, sustainability and potential for scaling up. ?

Sustainability

21. Several factors will be relevant to contribute to the overall sustainability of the ZMG Project.

(a) Technical sustainability: From a technical perspective, minigrids for rural electrification have been demonstrated or are being constructed consisting of a number of solar PV and hydro minigrids. With ZABS the Off-Grid Task Force has adopted technical standards, while various private developers have standardized their products (such as the 15 kW and 50 kW solar PV minigrid products offered by Standard Microgrid and EngiePower, respectively). One aspect the Project will look into with the Off-Grid Task Force and private developers is the issue of having a pool of technically skilled people to develop, install and service minigrids. An important challenge is to address a value chain approach to technology transfer that will systemize technology supply and integrate local industries and service providers in the development of solar PV-battery minigrids.

(b) Enabling environment and planning: Several private developers operate in Zambia and are organized in associations, while a regular interaction and national dialogue take place in the Off-Grid Task Force with representatives from associations, and government (such as DoE, REA, ERB) and development partners. The Project will further strengthen the operations of the Task Force on an as-needed basis. Regulations with light-handed procedures for small mini-grids were recently approved by ERB, but issues remain regarding its legal status with the amended Energy Regulation and Electricity Acts as well as the coordination of licenses and permit procedures between the various entities involved by looking at setting up a 'one-stop-shop' approach for small MG developments. Component 1 is intended to enhance the policy and regulatory environment, using the findings of the DREI analysis to inform further policy and regulatory refinements that will continue to progress the enabling environment for minigrids in the country. With the focus on identifying perceived risks that translate into higher system costs, findings from the DREI analysis will inform the most pertinent policy interventions needed to mitigate investment risks and achieve cost reductions, benefitting all future developments beyond the AMP implementation period.

(c) Financial sustainability and business models: The Project aims to demonstrate through its pilot and design of de-risking instruments a reduction in the levelized cost of energy through cost reduction (hardware, non-hardware, and financing costs) in order to increase the affordability of renewable electricity to rural communities.

- o To achieve this objective, the Project will assess and recommend de-risking measures designed to reduce the costs of hardware, non-hardware (site selection, system design, customer acquisition, operations and maintenance, etc.) and finance (debt and equity).
- o Secondly, the Program will operationalize further the most common business model for the design, implementation, operation, maintenance and management of minigrids, the splits assets (public-private partnership) and the private sector-delivered model and role of public investment support in these models. The experiences with the pilot as well as other experiences, such as the ones supported by IAREP and BGFA) can be compiled to inform 'blueprint' business model(s) that can be used to shape future system design, development and operations and influence their costs per kW (or cost per client) and sources of financing needed (grant, equity, debt). The pilot projects also link to Component 4, where (i) metering data will contribute, alongside other local minigrid projects, to building a central database for the country, and (ii) monitoring of a range of indicators, including metered data, will contribute to grow the understanding of the impact and potential of minigrids, build knowledge resources and lessons learned and from where learnings from the pilot can be disseminated to inform both the policy and regulatory environment as well technical capacity building. The Project will focus on converting data, findings, lessons and case studies into useful resources for the benefit of future developments, both nationally and in the region
- o A third element of the Program design is demand stimulation (outside the main power demand peak hour, such as productive uses as well as experimenting with electric cooking) that will have the twin benefit of generating more revenues while contributing to the socio-economic development of the

targeted communities. A by-product of this development will be the increased capacity of local communities to pay for electricity, which will ensure the financial viability of proposed minigrids. This will be achieved by providing targeted support to rural households and/or associations willing to engage in demand stimulation and income-generating activities using electricity, where possible by linking with (micro-)finance institutions for financing schemes for the target groups to acquire the necessary high-efficiency appliances and equipment. Staff.

- o With regard to the financial support given to project promoters, the key to sustainability is to ensure that **renewable energy** minigrids are viable investments. The Project will explore, with financial institutions (such as DBZ and pension funds) as well as commercial banks, how to set up loan facilities for MG-related debt financing. It is important to involve the private sector by making promoters aware of investment opportunities in minigrids and **renewable energy** technologies, educating financial institutions about the particularities of investments in the off-grid sector, as well as strengthening the role of government and development partners as facilitators. The activities proposed under Component 3 of the Program will serve this purpose.

(c) Socio-economic sustainability: The ZMG Project will fully support the human rights-based approach and will not have any negative impact on the enjoyment of human rights (civil, political, economic, environmental, social or cultural) of key potential stakeholders, targeted communities or the population as a whole. In particular, a gender-transformative approach will be used as described in the GAP (see Annex J). One element of the pilots (Component 2) and the Project's interventions, in general, is to demonstrate the benefits that sustainable technology can bring to improved livelihoods in rural areas, including a healthier environment for the rural population, better access to social services (schools, health) and opportunities for income-generating activities. Particular attention will be given to strengthening the role of women as actors in the energy sector rather. First, this is in the role of beneficiaries by looking at the issues and options in introducing electric cooking. Second, women entrepreneurs will be encouraged to be engaged in the administration and operation of the MG facilities. Similarly, women's cooperatives can be involved in the processing and packaging of agricultural products. In addition, on-the-job capacity building - especially for the installation and maintenance of minigrids, will be gender-sensitive. These combined activities will help reduce the gender gaps that traditionally exist in the energy sector.

(d) Environmental sustainability: The Project, accompanied by investments in (solar PV-battery) minigrids will result in an The project will result into direct lifetime emission reduction of 13.78 ktCO₂ and indirect emission reduction of 643.33 MtCO₂.The project demonstration and "soft" assistance activities will cover off-grid electrification and will facilitate decision-making on energy infrastructure and sustainable service delivery options to account for the uncertainty associated with climate change predictions and to assess the climate resilience of different options. For example, decisions to invest in minigrids should take into account current and future climate changes and variability. The project will ensure that the country's climate change entities are actively involved in the project's management arrangements to promote an integrated approach. The Project will also promote the uptake of energy-

efficient appliances for residential and commercial purposes, thereby further supporting environmental sustainability.

As the project Social and Environmental risk category has been rated as Substantial, an Environmental and Social Management Framework (ESMF) has been prepared and annexed to the ProDoc. The ESMF requires that the pre-feasibility and replication plan for minigrid development (Output 2.2) undergo a Strategic Environmental and Social Assessment (SESA) that would take several social and environmental risks into consideration in the decision-making process. In particular, operators, contractors and owners of sites shall be required to abide by the ESMP's requirements on safety measures and minimum qualifications for the handling of hazardous materials *and disposal of batteries and e-waste*. Similarly, those responsible for connecting households should ensure the provision of qualified electrician services to do so. Consumer awareness campaigns should also be performed, including through local workshops, clear signage (pictograms and local language indications) and awareness-raising activities in schools and public spaces to inform communities of risks associated with installations (e.g., prevention of trespassing and/or makeshift connections attempts, etc.) and of the safe usage of electricity domestically. Through Output 1.1, the Off-Grid Task Force and ZEMA (the environmental authority in Zambia) will be supported in developing further the regulations for handling e-waste and batteries.

Innovativeness

22. While grid extension and densification will remain in the domain of public funding, a large role in the forthcoming National Electrification Strategy will be in off-grid electrification (through minigrids and stand-alone PV solutions). Various companies serve the stand-alone market, while public funding and development aid support PV electrification of schools and clinics. Regarding minigrids, Zambia has been involving private sector participation in off-grid electrification using PV minigrids.

23. Although often a least-cost solution (compared to grid extension), minigrids are by no means a low-cost solution and the high investment cost (per client) remains one of the main barriers. The ZMG Project's primary innovation is its extensive focus on cost-reduction and business model innovation to reduce minigrid costs. Emphasis will be given to hardware and soft cost reductions, for example, through standardisation of equipment and utilisation of digital fintech solutions, all of which will act in synergy to decrease the cost of renewable electricity in rural settings. In addition, the Program will operationalize innovative interventions centred on demand stimulation (with the introduction of HE cooking and stimulation of productive uses of energy). Such interventions will be linked with appropriate derisking instruments to reduce, eliminate or transfer the investor's risks, thereby reducing the investor's cost of capital (equity and debt).

Access to debt financing will be stimulated by cooperation with the Development Bank of Zambia in formulating financing solutions. One aspect here will be to break the usual silo approach in which (grant and debt) financing is provided to the applicant institution separately for productive use, while support has to be sought from another financing source for the energy infrastructure. One pilot contemplated may involve extending minigrid electrification from an existing large load (in this case a maize mill). This may provide insights into how future electrification can be better coordinated with rural development interventions (productive or social, such as for health and schools). The combined effects of decreasing electricity costs and improved economic conditions will be the increased affordability and capacity to pay for renewable electricity by end-users. In a de-risked investment environment, the increasing demand driven by the low cost of electricity will catalyse further investments in renewable minigrids thereby creating a virtuous circle for scaling up investments and contributing to higher levels of rural electrification.

Potential for scaling-up

24. The replication and scaling of the ZMG Project's impact are embedded within the program design and pertinently stated in the targeted long-term impact. The Project has a deliberate focus on lowering risks and costs, intended to unlock the flow of public and private sector investment in renewable energy minigrids. The results of the minigrid DREI analyses that will be carried out in each of the national projects (including Zambia) of the regional AMG programme will provide a picture of the state of risk profiles in Sub-Saharan Africa that will enable identifying the most effective basket of policy and financial derisking instruments for reducing financing costs and catalysing a combination of public and private investments in renewable minigrids in order to promote multi-tier electricity access. This combined knowledge will be used to design a comprehensive approach, specific to Zambia's situation, of instruments to reduce the financing, hardware and soft costs and further strengthen the enabling environment to attract public and private investments. These will be taken into account, together with the experiences of the pilots, to formulate an investment plan for replication in selected sites that can then be offered for investment in PPP (split assets) or private-sector delivery (as appropriate).

[1] See also Section 2 in the UNDP Project Document

[2] Zambia, Energy Access Diagnostic Report based on the Multi-Tier Framework (2019); World Bank

[3] See also Section 3 in the UNDP Project Document

[4] See also the Section 3 on strategy and theory of change in the UNDP Project Document and the detailed description of outcomes and outputs in Section 4.1

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

[6] In cooperation with major developing partners in Zambia's off-grid space in 2018, including European Union, World Bank, IFC, Swedish Embassy, DFID, AfDB and USAID

[7] Consisting of government representatives (MoE, DoE, ERB, REA, MoF, MNDP, OVP), cooperating partners (AfDB, UK-DFID, EU, SIDA, IFC, World Bank, USAID) and private sector (ZARENA, SIAZ, companies)

[8] In its 2022 work plan, the Off-Grid Task Force mentions the following main activities: 1. Meetings and coordination, 2. Minigrids and regulation; 3. Fiscal aspects (incentives and import duties), 4. Bioenergy and cookstoves, 5. Off-grid awareness campaign, 6. Access to finance, 7. Digital aspects (mobile money, PAYG; tracking system), 8. Job creation and skills, 9. Solar for health, 10. Gender mainstreaming, as well as 11. Communication and publications

[9] 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, working groups will be established to focus on major challenges identified by the CoP members. The working groups 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.

[10] In order to facilitate such collaboration, the project will hire a consultant or local firm to gather data and audio-visual content (video footage, photos, etc.) on the subject for the 'insight brief'. The information and data collected at the national level will be provided to the regional project staff who will utilize this content and produce an 'insight brief' according to a standardized communications format for all AMP knowledge products for external audiences. The 'insight brief' will be produced in both the local/national language of the relevant national project as well as English for dissemination by the regional project to regional stakeholders and publishing on the AMP website.

[11] USTDA: US Trade and Development Agency (through the Power Africa initiative). EU: European Union; IAREP: Increased Access to Electricity and Renewable Energy Production

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

See Annex 1

1c. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

1. The current project is hosted under the 'Africa Mini-grid Programme (AMP)', as summarized in Exhibit 1.

2. The Project will 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 ZMG Project, and vice versa, and between the ZMG Project and other national projects within the Program. 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 while providing technical and operational support for national projects' on-the-ground implementation. A full detailed elaboration of these offerings and the protocols attached to each service will be communicated to the project at the ZMG Project's inception workshop. The areas of support, the listing of available firms/individual consultants under contract by the regional project and the 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.

2. Stakeholders

Please provide the Stakeholder Engagement Plan or equivalent assessment.

1. Stakeholder engagement is described in Section 4.2 of the UNDP Project Document with a Stakeholder Engagement Plan attached as Annex K to the ProDoc. The table below specifies in detail how stakeholders are planned to be engaged in which project outcome or output throughout the project period. **The table in Exhibit 8 portrays the Stakeholder Engagement during Project Preparation**

Exhibit 7 Stakeholder table

Stakeholder	Mandate and/or business	Role in project outcome
<i>Government and public sector</i>		

Stakeholder	Mandate and/or business	Role in project outcome
Ministry of Energy (MoE)	<p>(MoE) is responsible for the development and management of energy resources in a sustainable energy policy, strategies, plans and programmes and the coordination of stakeholders in the sector.</p> <ul style="list-style-type: none"> - Department of Energy (DoE) focuses on programs and projects relating to renewable energy, energy efficiency, electricity and power development. - Department of Planning and Information (DPI) policies and legislation and monitors and evaluates the Ministry's programs and projects. - The Office for Promoting Private Power Investment (OPPPPI) is mandated to promote private investment in the electricity sector 	<p>Output 1.1 (national dialogue on minigrids; energy legislation, regulations and PPPs) Output 1.2 (DREI analysis) Output 3.1 (government budget for MG development) Output 4.1 (digital strategy) and 4.3 (QA and monitoring framework) Outcome 5 (M&E)</p>
Rural Electrification Authority (REA)	Under MoE, REA carries out public activities in connection with rural electrification, including management of the Rural Electrification Fund and the development and implementation of rural on-grid and off-grid electrification planning	Project management and servicing all outputs and outcomes
Energy Regulation Board (ERB) and other agencies	ERB is responsible for, among others: electricity licensing (among others, of Independent Power Producers (IPPs), determination of electricity tariffs, development of standards (in collaboration with the Zambian Bureau of Standards), investigation of customer complaints and arbitration of conflicts among sector stakeholders. A number of other agencies are involved in licensing and permits of minigrid operations (Box 34, including ZEMA Zambia Environmental Management Agency), NHCC (National Heritage Conservation Commission), WARMA (Water Resources Management Authority),	<p>Output 1.1 (national dialogue; regulatory framework) as well as Output 4.2 (QA and monitoring framework) Output 1.2 (DREI)</p>
ZESCO Limited	ZESCO is fully owned by the Industrial Development Corporation, a state-owned investment holding company. ZESCO operates the electricity grid (transmission and distribution) and is responsible for much of the country's power generation	<p>Output 1.1 (national dialogue) Output 3.2 (rural development and electrification)</p>

Stakeholder	Mandate and/or business	Role in project outcome
Off-Grid Task Force	The Off-Grid Taskforce is a government-led platform which brings together representatives of various Government ministries, statutory bodies, the private sector and development partners to coordinate initiatives and activities in the off-grid electrification space.	All outputs of Component 1; All outputs of Component 3 (financing and financing sources) and Component 4 (digital, fintech, QA and monitoring)
<i>Multilateral and bilateral development partners</i>		
World Bank	The World Bank is implementing a number of projects for electricity access in Zambia. Relevant to the off-grid topics, is the 'Electricity Service Access Project' with activities on or last-mile connections, private sector support, off-grid electrification and national electrification planning. WB has carried out a national multi-tier household energy access survey in Zambia and supported (as part of ESAP) REA with the Off-Grid Smart Subsidy Program (OGESSP) and DZ with setting up a Off-Grid Loan Facility.	Output 1.1 (national dialogue)
Power Africa, USAID	Power Africa and USAID Zambia have provided USD 2 million (EUR 1.7 million) supporting the IFC's Scaling Solar programme (Power Africa, 2017). Through the Scaling Off-Grid Energy Grand Challenge, USAID provided selected companies (with financing to scale solar home solutions in the country	Output 1.1 (national dialogue)
Sweden, BGFA	The Swedish SIDA has financed the 'Beyond the Grid Fund for Zambia' that aims to bring clean energy access to one million Zambians and accelerate private-sector growth in energy generation and distribution in the country. Operated by REEEP, the fund operated from 2016-220, with a maximum funding level of EUR 20 million that supported the minigrid, solar PV and clean stoves companies	Output 1.1 (national dialogue)
European Union	The European Union (EU) finances the programme 'Support to the Zambia Energy Sector: Increased Access to Electricity and Renewable Energy Production' (IAEREP) with an overall budget of EUR 40 million and the objective to increase access to clean, reliable and affordable energy and promote renewable energy production and energy efficiency in Zambia. This has been achieved through the following lines of action (activities) running in parallel: (1) Support to public institutions to develop and/or revise the legal and regulatory framework for RE and EE in Zambia, and build the capacity of both public and private organisations; and (2) support to demonstration projects for RE and EE in Zambia through a Call for Proposal (CfP) that benefitted solar minigrid projects in PPP with REA and MG to be developed by the private sector at several sites.	Output 1.1 (national dialogue)

Stakeholder	Mandate and/or business	Role in project outcome
KfW (Germany) African Development Bank (AfDB)	The new AfDB Zambia Renewable Energy Financing Framework is a USD 154 million programme (of which USD 52.5 million provided by GCF) building on the KfW-supported GETFiT (Global Energy Transfer Feed-in-Tariff) Zambia programme that aims to assist the Government in the implementation of its Renewable Energy Feed-in-Tariff (REFiT) Strategy. The AfDB-GCF framework targets to mobilize a financing package for upcoming solar and hydropower grid-connected IPP projects in Zambia. The programme also has a technical assistance package (USD 4 million grants) aiming at a) aims at enhancing local financial institutions' RE and project financing capabilities, and b) promoting the expansion of off-grid and mini-grid RE systems in rural areas through targeted capacity building and institutional strengthening	AfDB is partner of ZMG's parent AMP)
Development Bank of Zambia, Pension Fund and commercial banks	DBZ has a private-sector project finance facility that allows for loans up to 10 years in ZMW or foreign currency. A two-year grace period may be available. The minimum loan size is USD 200,000 or its equivalent in ZMW. As part of the World Bank ESAP, a USD 2.5 million fund for the off-grid sector developers and companies will be made available via DBZ to commercial banks as part of the ESAP project. The idea is to entice selected commercial banks to enter in the off-grid market Some banks have expressed interest (e.g., Stanbic and Zanaco) provided there is minimum portfolio size, Another stakeholder is the Zambian National Pension Scheme Authority (participating in the AfDB-GCF project)	DBZ will be involved in all outputs of Component 3. Developers of minigrids may apply for debt financing facilitated by DBZ's off-grid loan window (Output 2.1)
<i>NGOs, universities, other</i>		
ZARENA (Zambia Renewable Energy Association)	ZARENA is to promote and advocate for the increased use of renewable Energy by developing an effective network of members and stakeholders, emphasising the need for quality and best practices throughout the sector.	Output 1.1 (national dialogue) Output 3.1 (financial capacity building)
SIAZ (Solar Industry Association of Zambia (SIAZ)	SIAZ is a platform for the private sector within the rapidly growing off-grid solar industry (solar home systems and mini/micro grids)	Output 1.1 (national dialogue) Outputs 1.3 and 3.1 (technical and financial capacity building developers and promoters) Output 1.2 (DREI analysis)

Stakeholder	Mandate and/or business	Role in project outcome
AMDA (Africa Mini-Grid Developers Associations)	The regional industry association representing private utilities developing small, renewable, localized power grids. AMDA currently has 41 members across 17 African countries and has chapters in Zambia, Nigeria, Kenya and Tanzania	Output 1.1 (national dialogue) and 1.2 (DREI) Outputs 1.3 and 3.1 (technical and financial capacity building developers and promoters)
NGOs, universities	? The Centre for Energy, Environment and Engineering Zambia (CEEEZ) is a non-governmental research organization whose activities involve analysis, policy recommendations, and the provision of training in energy and the environment. ? The Impact Assessment Association of Zambia (IAAZ) is an association formed in Zambia to provide a forum for advancing innovation and communication of best practices in environmental impact assessments ? At the University of Zambia (UNZA), the Department of Physics of the School of Natural Sciences is involved in energy and environment as related to consultancy, capacity-building and research in energy and the environment	Output 1.1 (national dialogue) Output 1.3 (technical capacity building)
<i>Private sector and private sector organisations</i>		
Private sector	Active mini-grid developers, include Standard MG, Zengamira, Engie, Solera, Muhanya. ? Solar companies, include: Videre, Sunny Money, SunTech, ID Solutions, Muhanya, Sunray, Davis & Shirtliff, Fenix Int'l/Engie, Azuri	Outputs 1.2 (provide inputs for DREI analysis) Output 1.3 (private sector will need and employ skilled labour for MG development) Output 2.1 (developers will submit proposals for pilots in PPP or as private sector-identified)

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated,

and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

Exhibit 8: Stakeholder Engagement during Project Preparation					
ORGANISATION	ACRONYM	MEETING DATES	NAME	POSITION	EMAIL
1. World Bank	WB	Thursday, 16th June, 2022	Chris Saunders	Senior Energy Advisor	csaunders@worldbank.org
2. Department Of Energy	DOE	Monday, 20th June, 2022	Arnold Simwaba	Director ? Department of Energy	arnmils.simwaba806@gmail.com
			Harriet Zulu	ESAP Coordinator	luzuhat@yahoo.co.uk
			Elijah Chibwe	Senior Power Development Officer	ELIJAH.CHIBWE@moe.gov.zm
3. Rural Electrification Authority	REA	Monday, 11th July, 2022	Linus Chanda	Chief Executive Officer	lchanda@rea.org.zm
			Dr Kakoma	Project Manager	nckakoma@rea.org.zm
4. Rural Electrification Authority REA	REA	Thursday, 21st July, 2022	Mrs. Jacqueline Musonda	Director Strategy and Planning	jmusonda@rea.org.zm
5. REA - ESAP Project Implementing Unit	REA ? ESAP	Friday, 24th June, 2022	Nason Musonda	Project Manager	nmusonda@rea.org.zm
6. Development Bank of Zambia	DBZ	Tuesday, 21st June, 2022	Maybin Muyawala	Acting Director General	muyawalam@dbz.co.zm
			Samantha Okpara	Investment Officer	smokpara@dbz.co.zm
			Mutale Mubanga	Chief Investment Officer	mutalem@dbz.co.zm

Exhibit 8: Stakeholder Engagement during Project Preparation

ORGANISATION	ACRONYM	MEETING DATES	NAME	POSITION	EMAIL
7. Off Grid Task Force	OGTF	Thursday, 23rd June, 2022	Winford Simwanza	Principle Power Development Officer	engineersimwanza@gmail.com
8. Zambia Cooperative Federation	ZCF		James Chirwa	Executive Director	lumbear@yahoo.com
			Munyoro	Operations Director	mgmunyoro@gmail.com
9. African Development Bank	AFDB	Wednesday, 2nd June, 2022	Liezl Harmse	Head ? Energy Advisor Southern Africa	LHARMSE@afdb.org
			Simainga Mundia	Energy Advisor	m.simainga@afdb.org
10. Eu Delegation	EU	Thursday, 23rd June, 2022	Roman Iranzo	Senior Energy Advisor	roman.iranzo-gonzalez-cruz@ec.europa.eu
11. Increased Access to Electricity and Renewable Energy Production Technical Assistance 1	IAERP TA1	Tuesday, 28th June, 2022	Alexander Filippov	Team Leader	directfilippov@gmail.com
12. Increased Access to Electricity and Renewable Energy Production Technical Assistance 2	IAERP TA2	Thursday, 30th June, 2022	Suzyo Silavwe	IAERP REA Project Manager	ssilavwe@rea.org.zm
			Kalo Mubanga	IAERP NTU Admin Assistant	kn@ntu.eu
13. Standard Microgrid	SMG	Thursday, 30th June, 2022	Lawrence Viljoen	Business Development / Project Manager	lviljoen@standardmicrogrid.co.za

Exhibit 8: Stakeholder Engagement during Project Preparation					
ORGANISATION	ACRONYM	MEETING DATES	NAME	POSITION	EMAIL
			Mathew Alock	Chief Investment Officer	malcock@standardmicrogrid.com
14. Africa Mini Grid Association	AMDA	Friday, 01st July,2022	Chiluba Mumba	Chair-person	cmumba@africamda.org
15. Engie Power Corner	EPC	Friday, 01st July,2022	Mukabanji Mutanuka	Business Development ? Southern Africa	mukabanji.mutanuka@engie.com
			Zia ? Christie	Marketing and Customer Service Officer	zia-christie.kayawe@engie.com
			Chifunda Sikazwe	Head ? Mini-grids Development	chifunda.sikazwe@engie.com

Select what role civil society will play in the project:

Consulted only; Yes

Member of Advisory Body; Contractor; Yes

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain)

3. Gender Equality and Women's Empowerment

Provide the gender analysis or equivalent socio-economic assesment.

The Annexed **Gender Analysis** for Zambia details that equality between women and men is a constitutionally recognized and protected right in Zambia, which is reflected in laws, regulations, ratified international conventions, national policies and strategies. Although equality between men and women is enshrined in the Zambian constitution, many forms of discrimination, inequalities and inequities persist. They are observed in all sectors of economic, professional, religious and socio-cultural life, particularly with regard to access to productive and financial resources, education, employment, health care, participation in the decision-making process and public freedoms. This gap between regulation and current practices is explained mostly by cultural factors.

Efforts will be made to make every part of the Zambia Mini-grid Program gender-aware, inclusive, and equitable, recognizing that doing so is not just the ethical course of action but also the one most likelihood to ensure that program outcomes are achieved. Gender mainstreaming in this program falls along two main axes: 1) making sure that men and women are included at all phases of consultation, design, and implementation, and 2) promoting equitable benefit incidence between men and women.

An e-cooking pilot will seek to create a field-based learning laboratory to answer fundamental questions about the uptake of e-cooking technology in a mini-grid setting in Zambia. High-efficiency e-pressure cookers are already popular in the country, especially in urban areas, and have the potential to solve major environmental and public health challenges while relieving households of significant drudgery.

The associated **Gender Action Plan** has been developed based on the practical needs and strategic interests that have been identified with regard to gender, as well as on the difficulties encountered by women in the energy sector and women in rural areas in particular. Gender actions are proposed according to the key components of the AMP/Minigrids program:

On the first component, the GAP suggests ?Gender diversity and balance in national dialogue, with women?s and men?s concerns addressed in equal measure, leading to gender-aware policies and regulations (i.e., not gender-blind or gender-neutral)?.

On the second component, the GAP suggests ?A) Business models developed with participatory input succeed in addressing the energy needs of both women and men achieve an equitable benefit distribution B) Women and men equally implicated in electricity supply via mini-grid (and related) businesses?.

On the third component, the GAP suggests ?Financing channels tailored for women and men resulting in equitable access to financing products and services?.

On the fourth component, the GAP suggests to ?Ensure digital capabilities don?t unintentionally discriminate, violate user privacy, or serve as tools of coercive control?.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes

Closing gender gaps in access to and control over natural resources;

Improving women's participation and decision making

Generating socio-economic benefits or services or women Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Elaborate on private sector engagement in the project, if any

1. The mini-grid landscape in Zambia is nascent but rapidly evolving. A range of delivery models for minigrid electricity exists. Several models have been deployed thus far in Zambia, including utility, private sector, community, and hybrid (public-private) models. Until recently mini-grids were implemented by public sector agencies. But helped by a new minigrid regulatory framework and supported with grant funding from several donor agencies, the number of private-led minigrid developments is increasing rapidly. Standard Microgrid is planning to install up to 150 microgrids (after having set up a 28 kW solar MG in Chitandika, Eastern Prov), while Engie PowerCorner is planning to set up 60 minigrids with EU-IAREP support. Other entrants in the market include Muhanya Solar (with a 30 kW solar MG in Sinda), Entiba Energy, Solera, and ID Solar Solutions. With EU-IAREP support, private companies also participate in public-private partnership with REA to implement minigrids in Lunga and other sites.

2. Thus, the private sector is essential in the minigrid electrification programme of Zambia and will be engaged directly through the Call for Proposals for the ZMG-supported pilots (of Output 2.1) as well as providing suggestions for the location of pre-feasibility studies (Output 2.2) and the productive pathway study (Output 2.3). The private sector will be a recipient of the Project's support services, such as the technical and financial skills enhancement activities of Outputs 1.3 and 3.1. Private sector associations (such as ZARENA, SIAZ, AMDA) will participate in these capacity-building activities and will be engaged through their participation in the deliberations of the Off-Grid Task Force and the Project's Technical Advisory Committee

Particular attention will be given to active consultation using mechanisms such as workshops with country-specific stakeholders such as minigrid developers and minigrid industry associations. UNDP's DREI analysis, which actively sources quantitative data on investment risks from the private sector, may also be used. Building off this, during project implementation, private sector engagement will be central to the project, whether with industry groups, financiers, or specific minigrid developers, in order to solicit ongoing feedback and inputs, and ultimately to catalyze private sector investment. These stakeholders will also be invited to participate in the regional AMP program's Community of practice and working groups

5. Risks to Achieving Project Objectives

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.(table format acceptable):

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation (table format acceptable):

Description	Level	Mitigation Measures
<i>Social and environmental risks (see also Annex L on SESP)</i>		
1: Discrimination or marginalization of vulnerable communities through the investment selection in the replication plan	Moderate	An Environmental and Social Management Framework (ESMF) has been prepared and annexed (see Annex O). In addition, a Stakeholder Engagement Plan (SEP) has been prepared to ensure that stakeholders have an opportunity to provide feedback on decisions that may affect them. The project will also put in place a project-level and/or site-level GRM to provide (Annex K). meaningful means for local communities and affected populations
2: Risk on lack of ability for people to claim their rights within the areas served by the pilot minigrids	Moderate	Through the Stakeholder Engagement Plan, the Project shall give priority to community engagement to ensure that No-on is Left Behind (Annex K)
3: Marginalization of vulnerable groups when selecting the pilot minigrids	Moderate	Through the Stakeholder Engagement Plan, the Project shall give priority to community engagement to ensure that No-on is Left Behind (Annex K)
4: Reproducing existing discriminations against women through excluding them from decision-making on project activities, benefiting from project outputs and capacity building initiatives	Substantial	Measures have been established through the Gender Analysis and Action Plan established at the PPG phase, to manage and reduce the risks identified on women. In addition, this risk will be further assessed in the SESAs and Environmental and Social Impact Assessments (ESIAs) that will be undertaken during project implementation as described in the ESMF.
5: Damage to biodiversity, natural resources and cultural heritage sites due to installation and operation of pilot minigrids or planned minigrids in the investment plan	Substantial	Pilot minigrids (Output 2.1) will incorporate SES criteria during the site selection process and adopt the list of exclusion criteria that is found in the ESMF. After selection and before commencement of the pilot activity each pilot minigrid will undergo a scoped ESIA that will analyze this risk. Pilots in any case have to comply with national environmental regulations (Box 7 in the UNDP ProDoc). Regarding the minigrids planned under the investment plan (Output 2.2), this will be subjected to a SESA that will address this risk and incorporate the site-selection criteria included in the ESMF.

Description	Level	Mitigation Measures
6: Exposure to electrocution risks for humans and any fauna (ex. animals or birds) using the minigrid area	Moderate	Pilot minigrids (Output 2.1) will incorporate SES criteria during the site selection process and adopt the list of exclusion criteria that is found in the ESMF. After selection and before commencement of the pilot activity each pilot minigrid will undergo a scoped ESIA that will analyze this risk. Details of this process can be found in the ESMF
7: Climate events and disasters (including floods) on new and existing infrastructure	Substantial	Pilot minigrids (Output 2.1) will each undergo a scoped ESIA that will analyze this risk. Mitigation measures will then be adopted as described in the pursuant site-specific ESMP. Details of this process can be found in the ESMF. Regarding the minigrids planned under the investment plan (Output 2.2), this will be subjected to a SESA that will address this risk and incorporate the site-selection criteria included in the ESMF.
8: Risk on the community due to domestic connections and electricity usage and presence of hazardous materials (mainly batteries, e-waste).	Substantial	Pilot minigrids (Output 2.1) will each undergo a scoped ESIA that will analyze this risk. Mitigation measures will then be adopted as described in the pursuant site-specific ESMP. Details of this process can be found in the ESMF. In particular, operators, contractors and owners of sites shall be required to abide by the ESMP's requirements on safety measures and minimum qualifications for the handling of hazardous materials and disposal of used batteries and e-waste. Similarly, those responsible for connecting households should ensure the provision of qualified electrician services to do so and they take into account the type of construction of roofs (thatched or not) and walls. Consumer awareness campaigns should also be performed, including through local workshops, clear signage (pictograms and local language indications) and awareness-raising activities in schools and public spaces to inform communities of risks associated with installations. Battery recycling is handled by the minigrid developer and put in as a condition for licensing. Through Output 1.1, the Off-Grid Task Force and ZEMA (the environmental authority in Zambia) will be supported in developing further the regulations for handling e-waste and batteries in off-grid and mini-grid systems

Description	Level	Mitigation Measures
9: Community health and safety risks due to construction of the pilot minigrids and relevant infrastructure and new economic activities subsequent from productive use of the energy	Moderate	Pilot minigrids (Output 2.1) will incorporate SES criteria during the site selection process and adopt the list of exclusion criteria that is found in the ESMF. After selection and before commencement of the pilot activity each pilot minigrid will undergo a scoped ESIA that will analyze this risk. Mitigation measures will then be adopted as described in the pursuant site-specific Environmental and Social Management Plan (ESMP). Electricity access will improve the functioning of existing health centre or clinics
10: Risk on community health, safety and/or security due to the influx of people, mainly project workers and other newcomers subsequent to the new economic activities resulting from the productive use of the energy	Moderate	Pilot minigrids (Output 2.1) will each undergo a scoped ESIA that will analyze this risk. Mitigation measures will then be adopted as described in the pursuant site-specific ESMP. Details of this process can be found in the ESMF. Contractors including any security personnel shall abide to UNDP's Standards of Conduct and apply best practices at all times. The project GRM will provide a means for affected community to report on any incidents that may occur as a result of this risk
11: Physical or economic displacement and loss of livelihood due to eviction from land on which pilot minigrids may be installed	Moderate	Land needs of solar PV (the bulk of the minigrids) re usually and allocated in close communication with the local Chjef and community After selection and before commencement of the pilot activity, each pilot minigrid will undergo a scoped ESIA that will analyze these risks. Mitigation measures will then be adopted as described in the pursuant site-specific Environmental and Social Management Plan (ESMP), which may include a Livelihoods Restoration Plan. Details of this process can be found in the ESMF.
12: Loss of income for fuel sellers once pilot minigrids are operational.	Low	The effect is small as traditional fuels are seldom bought, while kerosene or diesel use is minimal to have a big impact on sales in the region. Pilot minigrids (Output 2.1) will each undergo a scoped ESIA that will analyze this risk. Mitigation measures will then be adopted as described in the pursuant site-specific ESMP
13: Working conditions not in line with national and international standards (by contractor or other entities involved in the project)	Substantial	As part of the ESIA/ESMP for each pilot minigrid (Output 2.1), Labour Management Procedures and an Occupational Health and Safety Plan will be prepared and applied for the project to ensure labour standards and rights are upheld for project workers. In addition, the ESIA will assess the likelihood of this risk and prevalence of child labour

Description	Level	Mitigation Measures
14: Generation of hazardous waste (specifically e-waste) from the pilot minigrids that have been installed	Moderate	This risk will be assessed in the ESIA that will be undertaken for each pilot minigrid (Output 2.1), such that the ESMP will include a Waste Management Plan detailing the procedures for disposal of all types of waste associated with construction and operation of the pilot minigrids.
<i>Political and economic; COVID</i>		
15: After the COVID pandemic (2020-present) and recently the invasion of Russia in Ukraine, the macro-economic situation Zambia has been marked by little or even negative economic growth, fluctuating prices of export commodities high price of import (material, fuel), leading to a persistent budget deficit. The threat of debt default remains around the corner which could limit multilateral lending programs in the country. This leaves Zambia highly dependent on international grants to see this energy access objective through, at least for the upcoming period targeted by this intervention.	Moderate	<p>The risk falls outside the control of the project. A deal to restructure the foreign debt is likely, helped by the recovery in international demand and copper prices are positive developments, while the expected reduction in COVID-19 cases worldwide will boost activity both in manufacturing and tourism. The current government assumed power recently and likely to stay in place until 2026 which will give some political-economic stability</p> <p>Even then, new variants may come up leading to new waves of COVID-19 infections. In such cases, a contingency plan will be made by bringing some activities forward as possible, and with online meetings. The COVID-19 pandemic can impact project implementation. The COVID-19 pandemic limits social interaction and restricts community activities. This situation may hinder proposed project activities, such as beneficiary needs and impact surveys, the design and installation of the project-supported minigrid pilots as well as the organization of stakeholder and capacity-building promotional events. The economic impact of COVID-19 may shift investment priorities of the individual, government, and companies towards preventing uncertainties.</p>

Description	Level	Mitigation Measures
16: Resurgence of COVID or new pandemic may cause supply chain delays or disruptions	Moderate	New Covid-19 variants may come up leading to new waves of COVID-19 infections. In such cases, a contingency plan will be made by bringing some activities forward as possible, and with online meetings. The COVID-19 pandemic can impact project implementation. The COVID-19 pandemic limits social interaction and restricts community activities. This situation may hinder proposed project activities, such as beneficiary needs and impact surveys, the design and installation of the project-supported minigrid pilots as well as the organization of stakeholder and capacity-building promotional events. The economic impact of COVID-19 may shift investment priorities of the individual, government, and companies towards preventing uncertainties. In Zambia, a strong reform program was introduced to restore macroeconomic stability and promote a private sector-led economic recovery from the COVID-19 crisis. The AMP project may be able to benefit from the support programme in access to finance by private sector developers for minigrid development.
17: Decision-making on new electrification planning (NES, currently in preparation) with corresponding public budget allocations will be delayed causing uncertainty on government's role regarding role of MGs (and electrification in general).	Moderate	The risk is related to the previous risk regarding Zambia's fiscal and macro-economic situation. It is likely that Zambia will pursue the goal as, for example, committed to in the UN Energy Compact. The national dialogue (Output 1.1) between government, private sector and other stakeholders will positively influence the government to stay on course. There is a very active ecosystem of donors in Zambia that is well-coordinated through the Off-grid Task Force.
18: If co-financing is not realized as anticipated, it will significantly limit the realization of (post-project) replication.	Moderate	Commitment letters have been provided by co-financing partners. These commitments will be tracked and reported on during implementation. The realisation is not directly linked with committed co-financing but equity-financing organised by the developer. The project will benefit from additional support and interest from stakeholders that may arise during project implementation, given the fact the Zambia has an active donor community working on off-grid energy.

Description	Level	Mitigation Measures
19: Failure to achieve a financially viable business model for small-scale minigrids (finding a balance between financing availability, investment cost, O&M cost and ATP/WTP-reflective tariffs). Thus, encouraging private sector participation (investors, debt financing) and accelerating minigrid uptake will not be achieved.	Substantial	Before establishing a pilot, a detailed energy demand and supply survey should shed light on the ATP/WTP The pilots may be implemented in PPP modality of full private-sector developed and the pros and cons will be tested. Another aim of the pilots is to experiment with demand stimulation (HE cooking; PUE) to lower the levelized cost of energy. To fill the gap between investment grants (about 50%) and actually investment needed, debt financing may be needed. Local financial institutions have not been active partners of the private sector thus far, although there are promising signs that this could change and this will be further helped by Component 3 of the Project seeking to expand private sector investment with innovative financing mechanisms.
20: Capacity constraints and delays in permits/licenses will present a challenge for project delivery. A delayed start to the ZMG in general and pilots in particular will impact the opportunity for synergies with parallel projects and financing	Moderate	Current issues regarding the regulations and approvals will be discussed in the Off-Grid Task Force (Output 1.1).

6. Institutional Arrangement and Coordination

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

1. General roles and responsibilities in the projects? governance mechanism

Implementing Partner: The Project will be implemented under the Full National Implementation Modality (Full NIM). The Implementing Partner for this project is the Rural Electrification Authority. 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 of the Implementing Partner 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 work plan;
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.

Responsible Parties:

No Responsible Parties have been identified during project design.

Project stakeholders and target groups:

An overview of the main stakeholders and target groups is given in section 4.4, while Annex J provides details on their involvement in the Project.

UNDP is accountable to the GEF for the implementation of this project. This includes overseeing project execution undertaken by the Implementing Partner to ensure that the project is being carried out in accordance with UNDP and GEF policies and procedures, including compliance with the risk management and social and environmental standards of UNDP.

2. **Project governance structure**

The UNDP Resident Representative assumes full responsibility and accountability for oversight and quality assurance of this Project and ensures its timely implementation in compliance with the GEF-specific requirements and UNDP's Programme and Operations Policies and Procedures (POPP), its Financial Regulations and Rules and Internal Control Framework. A representative of the UNDP Country Office will assume the assurance role and will present assurance findings to the Project Board, and therefore attends Project Board meetings as a non-voting member.

The Implementing Partner will designate a high-ranking official as the **National Project Director**. He/She will assume responsibility for the Project on behalf of the National Government.

3. **Segregation of duties and firewalls vis-?-vis UNDP representation on the project board**

As noted in the [Minimum Fiduciary Standards for GEF Partner Agencies](#), in cases where a GEF Partner Agency (i.e. UNDP) carries out both implementation oversight and execution of a project, the GEF Partner Agency (i.e. UNDP) must separate its project implementation oversight and execution duties, and describe in the relevant project document a: 1) Satisfactory institutional arrangement for the separation of implementation oversight and executing functions in different departments of the GEF Partner Agency; and 2) Clear lines of responsibility, reporting and accountability within the GEF Partner Agency between the project implementation oversight and execution functions.

In this case, UNDP is only performing an implementation oversight role in the project vis-?-vis our role in the project board and in the project assurance function and therefore a full separation of project implementation oversight and execution duties has been assured.

Roles and Responsibilities of the Project Organization Structure:

a) Project Board: All UNDP projects must be governed by a multi-stakeholder board or committee established to review performance based on monitoring and evaluation, and implementation issues to ensure quality delivery of results. The Project Board (also called the Project Steering Committee) is the most senior, dedicated oversight body for a project.

The two main (mandatory) roles of the project board are as follows:

- 1) **High-level oversight of the execution of the project by the Implementing Partner** (as explained in the [?Provide Oversight?](#) section of the POPP). This is the primary function of the project board and includes annual (and as-needed) assessments of any major risks to the project, and decisions/agreements on any management actions or remedial measures to address them effectively. The Project Board reviews evidence of project performance based on monitoring, evaluation and reporting, including progress reports, evaluations, risk logs and the combined delivery report. The Project Board is responsible for taking corrective action as needed to ensure the project achieves the desired results.
- 2) **Approval of strategic project execution decisions of the Implementing Partner** with a view to assess and manage risks, monitor and ensure the overall achievement of projected results and impacts and ensure long term sustainability of project execution decisions of the Implementing Partner (as explained in the [?Manage Change?](#) section of the POPP).

Requirements to serve on the Project Board:

- ? Agree to the Terms of Reference of the Board and the rules on protocols, quorum and minuting.
- ? Meet annually; at least once.
- ? Disclose any conflict of interest in performing the functions of a Project Board member and take all measures to avoid any real or perceived conflicts of interest. This disclosure must be documented and kept on record by UNDP.
- ? Discharge the functions of the Project Board in accordance with UNDP policies and procedures.
- ? Ensure highest levels of transparency and ensure Project Board meeting minutes are recorded and shared with project stakeholders.

Responsibilities of the Project Board:

- Consensus decision making:
 - o The project board provides overall guidance and direction to the project, ensuring it remains within any specified constraints, and providing overall oversight of the project implementation.
 - o Review project performance based on monitoring, evaluation and reporting, including progress reports, risk logs and the combined delivery report;
 - o The project board is responsible for making management decisions by consensus.
 - o 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.

o In case consensus cannot be reached within the Board, the UNDP representative on the board will mediate to find consensus and, if this cannot be found, will take the final decision to ensure project implementation is not unduly delayed.

- Oversee project execution:

o Agree on project manager's tolerances as required, within the parameters outlined in the project document, and provide direction and advice for exceptional situations when the project manager's tolerances are exceeded.

o Appraise annual work plans prepared by the Implementing Partner for the Project; review combined delivery reports prior to certification by the implementing partner.

o Address any high-level project issues as raised by the project manager and project assurance;

o Advise on major and minor amendments to the project within the parameters set by UNDP and the donor and refer such proposed major and minor amendments to the UNDP BPPS Nature, Climate and Energy Executive Coordinator (and the GEF, as required by GEF policies);

o Provide high-level direction and recommendations to the project management unit to ensure that the agreed deliverables are produced satisfactorily and according to plans.

o Track and monitor co-financed activities and realisation of co-financing amounts of this project.

o Approve the Inception Report, GEF annual project implementation reports, mid-term review and terminal evaluation reports.

o Ensure commitment of human resources to support project implementation, arbitrating any issues within the project.

- Risk Management:

o Provide guidance on evolving or materialized project risks and agree on possible mitigation and management actions to address specific risks.

o Review and update the project risk register and associated management plans based on the information prepared by the Implementing Partner. This includes risks related that can be directly managed by this project, as well as contextual risks that may affect project delivery or continued UNDP compliance and reputation but are outside of the control of the project. For example, social and environmental risks associated with co-financed activities or activities taking place in the project's area of influence that have implications for the project.

o Address project-level grievances.

- Coordination:

o Ensure coordination between various donor and government-funded projects and programmes.

o Ensure coordination with various government agencies and their participation in project activities.

Composition of the Project Board: The composition of the Project Board must include individuals assigned to the following three roles:

1. Project Executive: This is an individual who represents ownership of the project and chairs (or co-chairs) the Project Board. The Executive usually is the senior national counterpart for nationally implemented projects (typically from the same entity as the Implementing Partner), and it must be UNDP for projects that are direct implementation (DIM). In exceptional cases, two individuals from different entities can co-share this role and/or co-chair the Project Board. If the project executive co-chairs the project board with representatives of another category, it typically does so with a development partner representative. The Project Executive is: *Chief Executive Officer, Rural Electrification Authority (REA)*

2. Beneficiary Representative(s): Individuals or groups representing the interests of those groups of stakeholders 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 representatives from civil society, industry associations, or other government entities benefiting from the project can fulfil this role. There can be multiple beneficiary representatives in a Project Board.

3. Development Partner(s): Individuals or groups representing the interests of the parties concerned that provide funding, strategic guidance and/or technical expertise to the project. The Development Partner(s) are: *UNDP Resident Representative or Deputy Resident Representative.*

b) **Project Assurance:** Project assurance is the responsibility of each project board member; however, UNDP has a distinct assurance role for all UNDP projects in carrying out objective and independent project

oversight and monitoring functions. UNDP performs quality assurance and supports the Project Board (and Project Management Unit) by carrying out objective and independent project oversight and monitoring functions, including compliance with the risk management and social and environmental standards of UNDP. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. Project assurance is totally independent of project execution.

A designated representative of UNDP playing the project assurance role is expected to attend all board meetings and support board processes as a non-voting representative. It should be noted that while in certain cases UNDP's project assurance role across the project may encompass activities happening at several levels (e.g. global, regional), at least one UNDP representative playing that function must, as part of their duties, specifically attend board meeting and provide board members with the required documentation required to perform their duties. The UNDP representative playing the main project assurance function is an official of the UNDP Country Office, Zambia

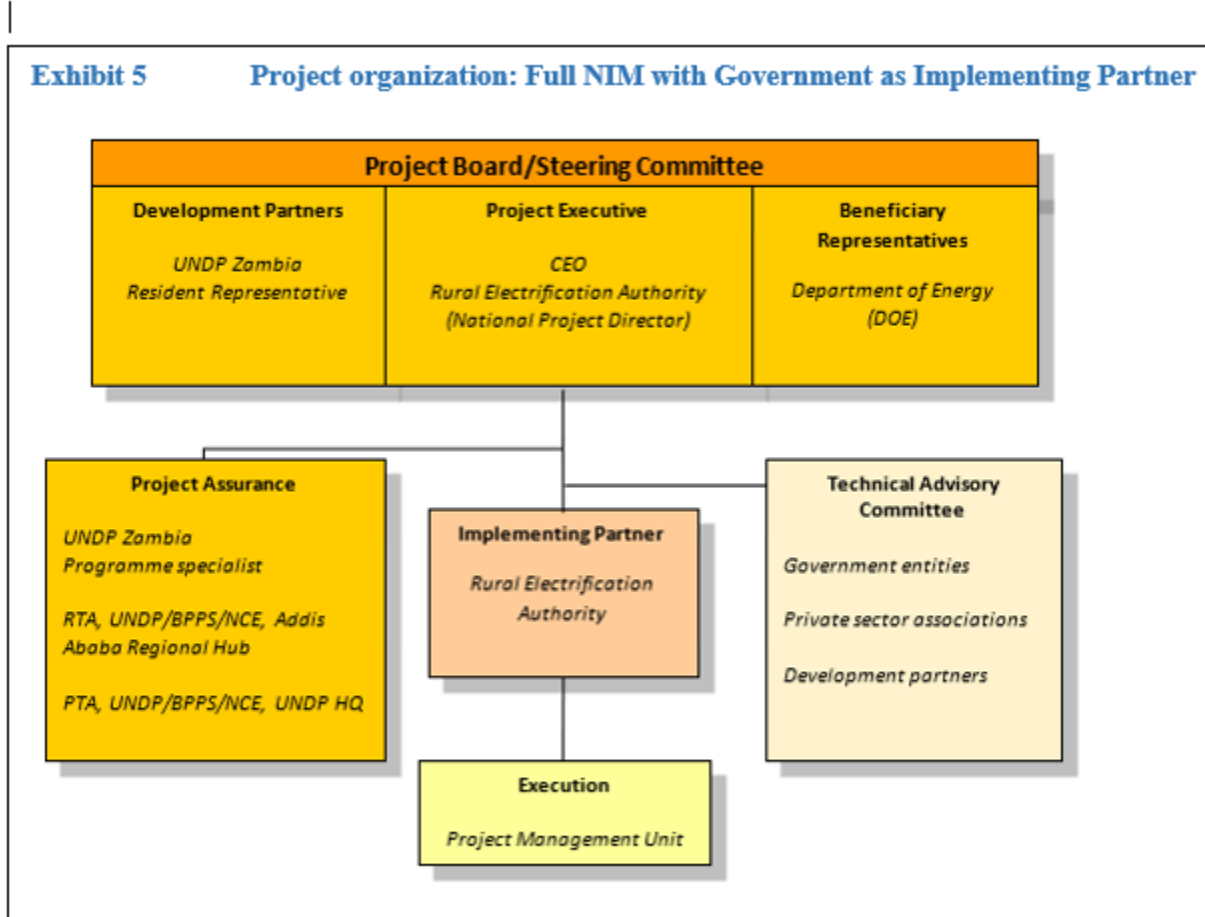
c) **Project Management ? Execution of the Project:** The Project Manager (PM) is the senior most representative of the Project Management Unit (PMU) and is responsible for the overall day-to-day management of the project on behalf of the Implementing Partner, including the mobilization of all project inputs, supervision over project staff, responsible parties, consultants and sub-contractors. The project manager typically presents key deliverables and documents to the board for their review and approval, including progress reports, annual work plans, adjustments to tolerance levels and risk registers.

-
A designated representative of the PMU is expected to attend all board meetings and support board processes as a non-voting representative. The primary PMU representative attending board meetings is the *Project Manager (PM)*. Efforts shall be made to mobilise the project team for the full project tenure to ensure the availability of experts and consultants until the end of the Project. Apart from the PM, the structure of PMU will include a *Pilot Project and Monitoring Coordinator* as well as a *Financial-Administrative Officer*. Detailed job descriptions are provided in Annex G. On an as-needed basis, short-term experts and contracted companies will be hired to work in assignments in the research, policy development, communications and outreach, technical assistance of activities in the various project components. A *Lead Advisor (LA)* will be hired at the start of the project at the same time as the Project Manager (with a specialization in rural and renewable energy) on an intermittent basis to support the PMU to recommend actions that focus work plans on achieving key milestones in a timely manner; recommend special expertise to be deployed on the Project to assist in its achievement of key milestones; and provide the interface between Project team and key specialist consultants, both domestic and international when appropriate.

d) **Technical Advisory Committee:** This Committee will advise the project team on technical issues, thematic aspects or more operational issues. At project inception, it may be decided that the Off-Grid Task Force acts or provides the core for as such a "technical advisory committee?". The Task Force has representatives from government entities (MoE, DoE, MoF, REA, MNDB, Office of the Vice-President), cooperating partners (WB, AfDB, EU, DFID, SIDA, IFC, USAID), private sector associations (Zarena, SIAZ) to which other representatives from financial, productive and cooperatives sector could be added (DBZ, ZCF, Musika) as well as specially nominated representatives from the private sector.

Project organization: Full NIM with Government as Implementing Partner:

Exhibit 5 Project organization: Full NIM with Government as Implementing Partner



Apart from managerial tasks, the Project manager will also conduct activities of a technical nature in the four components, including technical review of studies (design, advice and comments) in the various components and provide technical backstopping to all activities in the four Components of the Project for technical matters related to minigrids and techno-economic analysis

5. Given the wide range of institutions and organizations involved and thematic and technical issues covered by the Project, and to ensure more agile decision-making regarding output-level implementation, the Project governance structure is complemented by a Technical Advisory Committee (PIC). This Committee will advise the project team on technical issues, thematic aspects or more operational issues. At project inception, it may be decided that the Off-Grid Task Force acts or provides the core for as such a ?technical advisory committee?. The Task Force has representatives from government entities (MoE, DoE, MoF, REA, MNDB, Office of the Vice-President), cooperating partners (WB, AfDB, EU, DFID, SIDA, IFC, USAID), private sector associations (Zarena, SIAZ) to which other representatives from financial, productive and cooperatives sector could be added (DBZ, ZCF, Musika) as well as specially nominated representatives from the private sector.

6. The National Project Director will be nominated by REA and will be responsible for the overall direction, strategic guidance and timely delivery of project outputs. The Project Management Unit (PMU), hosted by REA, will manage the day-to-day activities of the Project. It will consist of the following full-time staff of which the Project Manager, Pilot projects and M&E Coordinator, and Financial-Administrative Officer are hired with GEF funds^[1], supplemented by the part-time services of an international Technical Advisor.

[1] In addition to the GEF funding, it is proposed that UNDP hires from its own funds a Chief Technical Advisor (CTA) to support the PMU on an intermediary basis, for example: recommend actions that focus work plans on achieving key milestones in a timely manner; recommend special expertise to be deployed on the Project to assist in its achievement of key milestones; and provide the interface between Project team and key specialist consultants, both domestic and international when appropriate.

7. Consistency with National Priorities

Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

1. Under the framework of the Nationally Determined Contributions (NDC) to the 2015 Climate Change Agreement, Zambia intends to reduce its CO₂eq emissions by 25% by 2030 compared to the baseline scenario through domestic efforts with limited international support, and by 47% with substantial international support. This is equal to a total emissions reduction of 38 MtCO₂eq in 2030 compared to the baseline. This can be achieved by implementing three streams of programs (sustainable forest management, sustainable agriculture, and renewable energy and energy efficiency, driven by the country's Climate Response Strategy and interlinked with sectoral development policies for energy, forestry, agriculture, water, town and country planning, sanitation, and transport. For the renewable energy and energy efficiency sector interventions, Zambia aims to promote the switching from conventional and traditional energy sources to sustainable and renewable energy sources and practices and foster the use of off-grid renewable energy technologies for rural electrification as decentralized systems

Exhibit 10 [Zambian policy and plans related to off-grid electrification](#)

Policy / planning document	Relevance
Vision 2030 and National Development Plans	The National Long-term Vision 2030 (Vision 2030) expresses Zambia's aspirations for the year 2030. The vision will be operationalised through the five-year development plans, starting with the 5th National Development Plan. The 7th National Development Plan 2017 to 2021 (NDP) sets out the strategy to improve energy production and distribution for sustainable development by enhancing the generation, transmission and distribution of electricity, promoting renewable and alternative energy, and improving electricity access to rural and peri-urban areas
National Energy Policy (1994, revised 2008, 2019)	The NEP2008 set the scene for the liberalisation of the electricity sector and specifies measures to improve electricity access through a) enacting legislation for the public and private sector, b) investment and participation, and c) applying viability gap funding mechanisms, d) enabling isolated grid systems with cost-reflective tariffs. The 2019 update further mentions that The Government will also establish the Energy Fund. This Fund will facilitate the development of the entire energy sector.
Electricity Act and Energy Regulation Act (1995, amended 2003, and again in 2019/20)	The Acts provide the overarching legal framework for the generation, transmission, distribution and supply of electricity in Zambia, including the Electricity (Licensing) Regulations and the Electricity (Supply) Regulations. The Energy Regulation Act formally established the Energy Regulation Board (ERB) and defined its functions and powers.
Rural Electrification Act (2003)	The Act established the Rural Electrification Authority (REA), specified its functions and equipped it with a Rural Electrification Fund (REF)
Zambia Distribution Grid Code (2016)	The Code provides the basic rules, procedures, requirements and standards for the operation, maintenance, and development of electricity distribution systems in Zambia.
Renewable Energy Feed-in Tariff Strategy ²³ (2017)	REFit, established by the Ministry of Energy aims to increase national generation output through private sector investment in small and medium-sized renewable energy plants of up to 20 MW. The scheme allocated 200MW of electricity capacity supply from renewable sources (of small to medium scale) to be connected with the grid.
The Power System Development Master Plan	Comprehensive sector planning document for the period up to 2030, developed in 2010
Rural Electrification Master Plan (REMP)	In 2008 REA developed REMP for the term 2009-2030. The plan identifies 1,217 un-electrified Rural Growth Centres (RGCs) to be electrified through grid extension, standalone solar systems and mini-grids by 2030 to achieve 51% rural electricity access. Largely outdated, the Plan is being updated with World Bank support (ESAP project) into a National Electrification Strategy (NES)
Minigrid Regulations	First developed in 2018 and approved by ERB in 2020, introduces very light-handed? regulations (regarding licensing, tariffs, technical; requirements, grid encroachment, power distribution) for minigrids below 100kW and ?light-handed? regulations for mini-grids between 100kW-1MW;
Environmental Management Act (2011)	This Act makes provision for integrated environmental management, the protection and conservation of the environment, and the sustainable management and use of natural resources and related matters. Part I sets out the principles governing environmental management.
Nationally Determined Contributions (NDC)	This document outlines Zambia's Intended Nationally Determined Contributions (INDCs), which aim for a reduction of between 20,000 GgCO ₂ e and 38,000 GgCO ₂ e or 25% and 47% against 2010 baseline conditions.

8. Knowledge Management

Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.

1. The project will effectively engage the stakeholders involved in the project to get their support and guide the project implementation to achieve higher results.

? Project outreach proposed includes project website, media (print/audiovisual), workshops, training, etc.

? The PMU and the Project Board will ensure that the Gender Action Plan and Stakeholder Engagement Plan recommended by the project are pursued and implemented. The various groups especially women will be engaged during the consultation meetings and be included in the different capacity-building programs. The project will also ensure that it is closely coordinated with other initiatives supported by development partners on electric mobility

? Meetings, monitoring visits, surveys, and written communications will be used to receive feedback to continue the ongoing dialogue as well as during implementation.

? The project will follow a participatory approach in decision-making by engaging all the relevant stakeholders. Government agencies, NGOs, CSOs, and the private sector actors will be actively involved during the project implementation.

2. The Project will also emphasize strong communications with a broader range of stakeholders. Key elements of the project's communication strategy are outlined in the table below:

Key element	Relevant group	Means	Timeframe
1. Project governance meetings; PSC meetings and its Working Group meetings	All stakeholders that are members of the PSC or its Working Groups or are invited to attend	Meetings	Periodically, depending on PSC and Advisory Committee frequency of meetings
2. Seminars/workshops and training events, including the Inception workshop, and final project workshop	National and sub-national government officials Private sector; NGOs and CSOs	Workshop, meeting, seminar, training On-the-job training Budget:	Typically, workshops will be held to start up an activity and/or at the end to present results. The timeline of each activity is given in Annex D of the UNDP ProDoc
3. Project documents, thematic reports and publications; Technical and other reports	Government departments and decision-makers at the national and subnational level; Development partners	Direct dissemination (e.g., email or hard copy/ USB-drive)	Technical reports will typically be published at the end of an assignment (see Annex D of the ProDoc).

	Research institutes and academia; individual experts; NGOs	Access via website to reports and documents and database and info systems	
4. Project knowledge capturing and info dissemination and two-way KM and info exchange with regional AMP project	Government officials Financial and private sector Development partners; NGOs and CSOs	Online access; Printed materials Media	Thematic reports and knowledge products are published at the end of one or more outputs to provide a summary of findings, results, and lessons learnt

The budget for workshops, training and information dissemination (printed materials, etc.), including engagement with the regional AMP is about USD 101,000 (not including consultancy or contracted services which are in separate budget lines).

9. Monitoring and Evaluation

Describe the budgeted M and E plan

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](#). The costed M&E plan included below, and the Monitoring plan in Annex 5, 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.

Key Project-specific M&E and Responsibilities

The Project Manager will play a key role in regularly monitoring the outcomes and activities of this project. In particular, REA will support day-to-day monitoring of the project's activities. The Project Manager is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks (outlined in SESP) as well as gender action plan outcomes (outlined in Gender Assessment and Action Plan). The Project Manager will ensure that all project staff maintain a high level of transparency, responsibility and accountability in M&E and reporting of project results. The Project Manager will inform the Project Board, the UNDP Country Office and the UNDP-GEF RTA of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted.

Further, the Project Manager is responsible to initiate and manage primary data collection for indicators in the Project Results Framework. The following key M&E activities and reports are proposed to be produced during the implementation of this project, and required to be collected, monitored and evaluated under the oversight of the Project Manager:

- ? M&E for Project Objective, Outcomes and GEF Core Indicators:

- ? M&E for Project Component-level Outcome Indicators

The Project Manager will develop annual work plans based on the multi-year work plan included in the Annex of UNDP Project Document, including annual output targets to support the efficient implementation of the project. The Project Manager will ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the GEF PIR, and that the monitoring of risks and the various plans/strategies developed to support project implementation occur on a regular basis.

Project Board (PB): The Project Board will take corrective action as needed to ensure the project achieves the desired outcomes and results. The PB will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the PB will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to disseminate results and lessons learned with relevant project stakeholders. This final review meeting will also discuss the findings outlined in the project terminal evaluation report and the management response.

Project Implementing Partner: With support from the project, REA will develop and deploy a monitoring, evaluation, reporting, and verification system to track the implementation of master planning, policy and regulatory frameworks, feasibility studies, training, and associated investments. REA will use this system to supply all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data. REA will strive to ensure that project-level M&E is

undertaken by project stakeholders in both the public and private sector, and that results of M&E are aligned with national systems so that the data used by and generated by the project supports national systems.

UNDP Country Office: The UNDP Country Office will support the Project Manager as needed, and available to support REA as needed. Project progress meetings will take place according to the schedule outlined in the annual work plan. Notes of the Project Progress meetings will be taken by the project team and circulated to the Project Board. The UNDP Country Office will support key GEF M&E activities including the annual GEF PIR, the independent mid-term review and the independent terminal evaluation. The UNDP Country Office will also ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality.

The UNDP Country Office is responsible for complying with all UNDP project-level M&E requirements as outlined in the [UNDP POPP](#). This includes ensuring the UNDP Quality Assurance Assessment during implementation is undertaken annually; that annual targets at the output level are developed and monitored and reported using UNDP corporate systems; the regular updating of the ATLAS risk log; and updating of UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the GEF PIR and UNDP ROAR. Any quality concerns flagged during these M&E activities (such as annual GEF PIR quality assessment ratings) must be addressed by the UNDP Country Office and the Project Manager.

The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GEF Independent Evaluation Office (IEO).

UNDP-NCE Unit: Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP-NCE Regional Technical Advisor and the UNDP-NCE Unit as needed.

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.
- h. Formally launch the Project.

GEF Project Implementation Report (PIR):

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.

Lessons learned and knowledge sharing: Results from the project will be disseminated to all key project stakeholders via M&E and Knowledge Dissemination workshops. The project will also closely coordinate and participate in UN Environment's Global E-Mobility Program (GEF-funded) activities and workshops, to share lessons learned and potentially use tools and systems developed by the Global Program.

GEF Core Indicators:

The GEF Core indicators will be used to monitor global environmental benefits and will be updated for reporting to the GEF prior to MTR and TE. Note that the project team is responsible for updating the indicator status. The updated monitoring data should be shared with MTR/TE consultants prior to required evaluation missions, so these can be used for subsequent ground-truthing. The methodologies to be used in data collection have been defined by the GEF and are available on the GEF [website](#).

Independent Mid-term Review (MTR):

The terms of reference, the review process and the final MTR report will follow the standard templates and guidance for GEF-financed projects available on the [UNDP Evaluation Resource Center \(ERC\)](#). 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 under review. The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the evaluation process. Additional quality assurance support is available from the BPPS/GEF Directorate. The final MTR report and MTR TOR will be publicly available in English. The MTR process will begin after the second PIR has been submitted to the GEF, and the MTR report will be submitted to the GEF in the same year as the 3rd PIR. A management response to MTR recommendations will be posted in the ERC within six weeks of the MTR report's completion. The MTR findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration.

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. The terminal evaluation process will begin three months before operational closure of the project allowing the evaluation mission to proceed while the project team is still in place, yet ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability. The Project Manager will remain on contract until the TE report and management response have been finalized. A management response to the TE recommendations will be posted to the ERC within six weeks of the TE report's completion. The final TE report will be cleared by

the UNDP Country Office and the UNDP-GEF Regional Technical Advisor and will be approved by the Project Board.

The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan and will upload the final terminal evaluation report in English and the corresponding management response to the UNDP Evaluation Resource Centre (ERC). Once uploaded to the ERC, the UNDP IEO will undertake a quality assessment and validate the findings and ratings in the TE report and rate the quality of the TE report. The UNDP IEO assessment report will be sent to the GEF IEO along with the project terminal evaluation report.

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 lessons learned and opportunities for scaling up.

Exhibit 11 Monitoring and evaluation plan and budget

GEF M&E requirements	Responsible Parties	Indicative costs (USD)	Time frame
Inception Workshop	MEMR Project Manager (PM)	3,500	Within 60 days of CEO endorsement of this project.
Inception Report	PM	None	Within 90 days of CEO endorsement of this project.
Monitoring of indicators in the project results framework	PM Subcontract	8,000	Annually before GEF PIR and/or by contracted party before TE
GEF Project Implementation Report (PIR)	UNDP RTA ?CO PM	None	Annually typically between June-August
Monitoring all risks (UNDP risk register)	UNDP CO PM	None	On-going.
Supervision and oversight missions	UNDP CO, RTA and BPPS/GEF	None	Annually, troubleshooting and oversight as needed
Final project workshop	MEMR, UNDP CO	3,500	Before project closure
Independent Mid-Term Review (MTR)	Independent evaluators	24,450	See cover page
Independent Terminal Evaluation (TE)	Independent evaluators	24,450	See cover page
TOTAL indicative COST (4.7% of total cost)		USD 63,900	

10. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCE/SCCF)?

1. Clean energy access through minigrids has the potential to bring multiple benefits to off-grid communities as shown in the table below

Potential direct minigrid benefits	
Household	Food preparation; Study after sunset; Information and communication technologies; Increased comfort; Leisure and learning; Food conservation and better nutrition;
Productive use	Reduced physical effort; Faster processing; Cheaper price; Greater range of services; Business after dark; Trade without travelling; Market information; Cool and frozen products; Irrigation
Community	Medical & education services after dark; Safe communities; Clean and reliable water supply; Less time spent, less distance travelled; Local new services; Digital government services

2. In addition, the Project will provide direct employment, which is estimated at 10 per minigrid on average (about 50 people in total; (of which 20 women), not including temporary workers. Regarding **indirect supply chain** effects, the expansion of the minigrid sector will boost new employment opportunities. The project includes actions to facilitate access to minigrid-related jobs through training, and a revision of recruitment strategies, taking advantage of the appeal of the new technologies for potential workers (Output 1.3).

3. Socioeconomic development and climate change are intricately linked, with social and economic activities climate forcing and climate change determining climate impacts which in turn affect socio-economic developments. For example, the realization of minigrid electrification will have both environmental and socio-economic impacts. Seeing both the direct environmental (cleaner development) and socioeconomic benefits (new skilled jobs and better services; electrification at a lower cost than conventional grid extension) will attract private and public developers and eventually transform the market into self-sustained growth.

11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification *

PIF	CEO Endorsement/Approva I	MTR	TE
High or Substantial			

Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
Annex 9_ESMF for 3 UNDP AMP National Projects Aug 25 2022 (1)	CEO Endorsement ESS	
Annex 5_Zambia_SESP-12 08 2022	CEO Endorsement ESS	

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

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2025)	End of Project (EoP) target (2027)
Project objective Support access to clean energy by increasing the financial viability, and promoting scaled-up commercial investment, in renewable energy mini-grids in Zambia with a focus on cost-reduction levers and innovative business models	1) Greenhouse gas emissions mitigated (tCO ₂ e lifetime reduction) [GEF Core Indicator 6]	Zero by default	Zero, since the project pilot(s) have not yet been commissioned	Direct lifetime emission reduction (ER) of 13.78 ktCO ₂ (of the ZMG-linked pilots, Indirect ER = 643.33 MtCO ₂).
	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 * [GEF Core Indicator 11]	Zero, since the project has not yet started	Zero, since the project pilot(s) have not yet been commissioned	Total of 4,396 beneficiaries (2242 women) based on (4,190 residential, 80 social services, 126 people (commercial/PUE)
	3) Increase in installed solar PV capacity and battery storage [kW - solar ? MWh battery]	Zero, since the project has not yet started	Zero, since the project pilot(s) have not yet been commissioned	Minigrid pilots, installed solar capacity of 450 kW with 1.091 MWh of storage capacity
	4) Number of direct primary jobs created in the minigrids sector, disaggregated by gender *	Zero, since the project has not yet started	Zero, since the project pilot(s) have not yet been commissioned	Job creation MG (employment): 10 per MG):50 (of which 20 women), not including temporary workers or indirect supply chain effects
Component 1 Policy and regulations				

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2025)	End of Project (EoP) target (2027)
Outcome 1 Stakeholder ownership in a national minigrid delivery model is advanced, and appropriate policies and regulations are adopted to facilitate investment in renewable energy minigrid	5) Number of policy derisking instruments for minigrid investments - whose development has been supported by the project - are endorsed/adopted by the national government	Regulatory framework for minigrids approved by ERB in 219/20 but not fully compatible yet with a) 2019/20 amended energy and electricity acts, while b) procedures with different entities cause delays	Policy de-risking environment proposed: a) MG regulation aligned with amended Energy and Electricity Act and b) streamlined ?one-stop-shop?-like procedures	Policy de-risking environment approved (a: aligned MG regulation b: ?one-stop-shop?, c. RE system waste management) and endorsed by the government and mainstreamed through the work of the multi-stakeholder platform and dialogue
Outputs, Outcome 1	<p>1.1 An inclusive national dialogue to identify minigrid delivery models is facilitated, clarifying priority interventions for an integrated approach to off-grid electrification</p> <p>1.2 Minigrid DREI techno-economic analyses carried out to propose most cost-effective basket of policy and financial derisking instruments</p> <p>1.3 Programme to develop competitive, skilled labour market in minigrids</p>			
Component 2 Innovative business models with private sector				
Outcome 2 Innovative business models based on cost reduction are operationalized, with strengthened private sector participation in renewable energy minigrid development.	5) Minigrid pilots implemented that demonstrate a delivery model, cost-reduction measure(s) and/or productive use of electricity	Project pilots zero by default (for an overview of current experiences with MGs,)	The project?s detailed design plan (the ?Minigrid Pilot Plan?) for advancing the minigrid pilots is developed and cleared by UNDP and the Project Board.) Any project tendering process (Call for Proposals), as applicable, for minigrid pilots has been launched.	100% of the planned minigrid pilots, as identified in the project?s Minigrid Pilot Plan, are commissioned.
	6) Number of MG developers in Zambia operating minigrids	Described in baseline analysis. About 5-8 MG in operation by 5 developers	Five developers operating minigrids	Ten developers operating minigrids at 100 sites in Zambia, including the pilot sites ^[1]
Outputs, Outcome 2	<p>2.1 Pilots developed, including productive use/innovative appliances and modular hardware/system design, leading to cost-reduction in minigrids (INV)</p> <p>2.2 Pre-feasibility studies for pipeline development.</p> <p>2.3 Productive use pathway study</p>			
Component 3 Scaled-up financing				

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2025)	End of Project (EoP) target (2027)
Outcome 3 Financial sector actors are ready to invest in a pipeline of renewable energy minigrids and concessional financial mechanisms are in place to incentivize scaled-up investment.	7) Capacity of financial institutions and developers/proponents enhanced through training, knowledge sharing, and/or awareness-raising events aimed at increasing the financial sector's capacity to evaluate investments in minigrids and of developers/proponents to present bankable proposals	No financial structuring or mechanisms capacity building tailored for MG sector	Planned capacity-building activities for year 1 and 2 are implemented. The capacity of targeted recipients is assessed by survey towards the end of year 2, an average score of at least 2 is achieved.	Planned capacity-building activities for year 3 and 4 are implemented with workshops/seminars and one larger training event (80 participants in total). The capacity of targeted recipients is assessed by survey towards the end of the project, an average score of at least 4 is achieved
	8) Number of government- or impact investor-supported financing mechanisms offering concessional finance for renewable energy minigrids	DBZ's Off-grid loan facility is operational	At least one complementary funding instrument is designed and operational:	At least two complementary funding instruments are designed and operational: a) MG window in government funding, and b) a private sector funding instrument
Outputs, Outcome 3	3.1 Innovative financing solutions for minigrid development are identified and designed with supporting human and institutional capacity building			
Component 4	Digital, knowledge management			
Outcome 4 Digitalization and data are mainstreamed, across stakeholders, into local minigrid market development. Increased knowledge,	6) Project digital strategy is prepared and implemented by REA to contribute to project implementation and local minigrid market development	n/a	The project digital strategy is developed and being implemented.	The project digital strategy is implemented. Recommendations for rolling out digital solutions for minigrids at national level have been shared with key national stakeholders.

	Objective and Outcome Indicators	Baseline (2023)	Mid-term project (2025)	End of Project (EoP) target (2027)
awareness and network opportunities in the minigrid market and among stakeholders, including benefiting from linkages to international good practice	7) Number of minigrid pilots sharing data on minigrid performance with the regional project and other stakeholders following best practices and received from the AMP Regional Project.	n/a	The project's ?Minigrids Digital and Data Management Platform? is procured and operational[2]	100% of the planned minigrid pilots, as identified in the project's Minigrid Pilot Plan, are collecting and sharing data with the project's digital platform
Outputs, Outcome 4	4.1 A project digital strategy is developed and implemented, including linkages to and following guidance from the AMP Regional Project 4.2 A ?Minigrids Digital and Data Management Platform? implemented to run tenders and manage data from pilots, and to support minigrids scale-up and cost-reduction 4.3 Quality Assurance and Monitoring Framework for measuring, reporting and verification is adopted and operationalized 4.4 Engage with the regional project (AMP), via (i) Communities of Practice and (ii) capturing and sharing lessons learnt			
Component 5	Monitoring and evaluation (M&E)			
Output, Outcome 5	5.1 M&E and reporting			

[1] Includes the 5 pilots activities support by ZMG project, as well as the 60 MGs planned by EngiePower and 15 by StandardMG (with EU-IAREP, BGFA and other funding)

[2] Ready for data collection from the project's mini-grid pilot(s), and for data sharing with the AMP regional project's digital platform.

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Council Member Comment	Response
France	

<p>This program targets the same topic and the same geographical areas as some AFD projects in Burkina Faso, Madagascar, Mali, and Niger.</p> <p>? Coordination with AFD would be necessary in the countries where AFD has projects on this theme (with links to the EU and other donors): Mali, Niger, Burkina Faso (Madagascar: project under preparation).</p> <p>There are some interesting points on data collection and on the capitalization of lessons learnt and practical experience</p>	<p>A key objective of AMP is to align and complement with the support of existing development actors in minigrids. AFD's activities in minigrids are well-noted, and AMP national projects will benefit from lessons learnt in countries where AFD has provided support.</p> <p>In Zambia, coordination with AFD at the design stage is included - in addition to the desk review and data collection exercise ? identification of key stakeholders and engagement with them in a series of in-person and online meetings. This coordination will continue as the project moves into implementation. Activity 1.1.1 will thereby facilitate a national dialogue as a national coordination mechanisms for decision-making on minigrid investments, financing, operations and results.</p>
<p>The proposal covers countries in very different contexts, without an analysis of the specific situation and needs of each country. It is therefore a very wide range of subjects that are proposed to be tackled:</p> <p>? Technical assistance on regulations, tariffs, risk analysis, geospatial planning, techno-eco modeling, prefeasibility, formulation of rural electricity strategies, issues with subsidies of fossil fuel, derisking instruments, institutional reform, capacity building, quality standards, customs procedures, waste management, digitalization, professional training, design support, market intelligence, etc.</p> <p>? Investments: Development of pilots (especially on productive uses)</p> <p>Even if these different points are indeed subjects which require technical assistance and grant financing, the formulation of the project raises some questions: there does not seem to be any will. It would be relevant to analyze the successes and gaps of certain countries, for example the successes of Kenya on its regulations, in order to replicate the approach. It would also be necessary to identify relevant public actors in each country (utility vs rural electricity agency) as the approaches to recommend will be very different depending on the case.</p>	<p>The AMP's PFD includes a menu representing a wide-range of possible outputs that AMP national projects may select from. The early-stage concepts included in the PFD Addendum in turn reflected an initial selection of these outputs.</p> <p>Now at the CEO ER stage, the outputs selected in Zambia, reflect further detailed consultations and stakeholder engagement, and are expressly tailored to national objectives, country context and a baseline analysis of the specific barriers and risks in Zambia. 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 share information about the ZMG Project, to seek first-hand information on baseline conditions and needs, and to scope out potential project activities and partnerships. The discussions also aimed to identify the gaps that the ZMG can work to fill, especially in the presence of several projects targeting energy access and renewable energy development financed by development partners besides UNDP and the GEF. A stakeholder validation was organised in Lusaka (with offline and online attendance).</p>

<p>The funding is focused on a few countries: Benin with MCC and SE4All (total \$ 58M), Zambia (GCF and EU, \$ 53M), Mali (UNDP, SIDA: \$ 2.6M). Elsewhere, funding seems too small to induce the structural changes envisaged.</p> <p>? It seems difficult to imagine that such a program will be effective outside of the 3 countries with the most funding..</p>	<p>In Zambia, the total cost of the project is USD 14,913,947. This is financed through a GEF grant of US 1,363,947 administered by UNDP and USD 200,000 in-kind and cash co-financing from UNDP with USD 9,350,000 of cash and in-kind co-financing from Zambian project partners as well as a technical assistance grant of USD 4,000,000 from AfDB. UNDP, as the GEF Implementing Agency, is responsible for the oversight of the GEF resources. The project will thereby facilitate access to funding from the Development Bank of Zambia (DBZ) which has a private-sector project finance facility that allows for loans up to 10 years in ZMW or foreign currency and a two-year grace period. This will allow the ZMG project to be effective in leveraging funding while creating the enabling conditions for structural change in the country.</p>
<p>Finally, the added value of UNDP on access to energy in rural areas, through mini-grids, should have been made more explicit in the selection of implementing agency</p>	<p>Each agency's selection as implementation agency is decided by the GEF OFF's. UNDP has a considerable historical track-record in supporting off-grid electrification, and through the AMP is currently GEF implementation agency to 19 countries on solar-battery mini-grids.</p>
<p>Germany</p>	
<p>Germany approves the following PIF in the work program but asks that the following comments are taken into account:</p> <p>Suggestions for improvements to be made during the drafting of the final project proposal:</p> <p>? In order to avoid duplication of efforts and leverage synergies, Germany strongly recommends (to continue) coordinating with the following local country offices of GIZ during project preparation as well as implementation: Benin, Mali and Zambia.</p>	<p>A key objective of AMP is to align and complement with the support of existing development actors in minigrids.</p> <p>In Zambia, coordination with GIZ at the design stage is included - in addition to the desk review and data collection exercise ? identification of key stakeholders and engagement with them in a series of in-person and online meetings. This coordination will continue as the project moves into implementation. Activity 1.1.1 will thereby facilitate a national dialogue as a national coordination mechanisms for decision-making on minigrid investments, financing, operations and results.</p>
<p>STAP</p>	

1. The proposal presents an adequate list of stakeholders. However, the diesel generator industry is quite widespread in Africa and the project proponents need to consider how to ensure that they do not hinder project success. The project also need to consider incentives for alternative livelihoods for people involved in diesel generator industry.

2. What are the backups to prevent diesel generators from still being frequently used?

1. As explained in the ProDoc Annex G on the baseline situation, in Zambia only a few diesel minigrids were developed in the past with currently only 2 diesel powered minigrids still in operation. These 2 diesel minigrids, operated by ZESCO, are being phased out. Diesel generators may be used as back-up power supply by households that are connected to the grid (about 3% of grid-connected households) and companies in the existing national grid but on-grid technologies are not the subject of this report, which focusses on off-grid only. The lack of diesel in off-grid contexts I primarily because of the simple but severe logistical challenges associated with supplying remote communities with diesel. Therefore, the baseline situation in Zambia is considered to have negligible spread of diesel minigrids and is not considered a factor that can hinder project success.

2. Diesel generators are not used for minigrid electrification in Zambia, in fact, these are not used for village- or town-level electrification on a noticeable scale.

**ANNEX C: Status of Utilization of Project Preparation Grant (PPG).
(Provide detailed funding amount of the PPG activities financing status
in the table below:**

PPG Grant Approved at PIF: 50,000			
Project Preparation Activities Implemented	GEF/LDCF/SCCF Amount (\$)		
	Budgeted Amount	Amount Spent To date	Amount Committed
- International consultants	28,000.00	16,200.00	11,800.00
- National consultants	8,000.00	4,639.99	3,360.01
- Training, workshops and conference (Validation Workshop and Report and completion of final document)	9,500.00	0	9,500.00
- Misc Expenditures (HACT assessment of the Implementing partner)	4,000.00	0	4,000.00
- Travel	500.00	0	500.00
	50,000.00	20,839.88	29,160.01

Equipment	PMU office equipment and furniture								10,000	10,000	Rural Electrification Authority (REA)
Equipment	Equipment for measurements and surveys for prospective MG sites		5,000				5,000			5,000	Rural Electrification Authority (REA)
Equipment	Off-Grid Task Force website maintenance and support (USD 3,750)	5,000					5,000			5,000	Rural Electrification Authority (REA)
Equipment	Rental/maintenance of info-tech equipment (incl. licensing/maintenance platform software), USD 6,583					6,582	6,582			6,582	Rural Electrification Authority (REA)
Contractual services - Individual	Tasks of project staff (See Note *): Project manager, Fin-Admin officer, Monitoring+Pilot Coord, (USD 50,625) as well as Lead Advisor, USD 9000) related to tasks of Component 1	59,625					59,625			59,625	Rural Electrification Authority (REA)
Contractual services - Individual	Tasks of project staff (See Note *): Project manager, Fin-Admin officer, Monitoring+Pilot Coord, (USD 50,625) as well as Lead Advisor, USD 9000) related to tasks of Component 2		59,625				59,625			59,625	Rural Electrification Authority (REA)

Contractual services - Individual	Tasks of project staff (See Note *): Project manager, Fin-Admin officer, Monitoring+Pilot Coord, (USD 50,625) as well as Lead Advisor, USD 9000) related to tasks of Component 3			59,625			59,625	59,625	Rural Electrification Authority (REA)	
Contractual services - Individual	Tasks of project staff (See Note *): Project manager, Fin-Admin officer, Monitoring+Pilot Coord, (USD 50,625) as well as Lead Advisor, USD 9000) related to tasks of Component 4			59,625			59,625	59,625	Rural Electrification Authority (REA)	
Contractual services - Individual	Tasks of project staff (See Note *): Project manager, Fin-Admin officer, related to project management (USD 92,500)						-	92,500	92,500	Rural Electrification Authority (REA)
Contractual services - Company	Company contract for digital platform/website/portal development (USD 10,000; part of total contract of USD 13,750, of which USD 3,750 linked with Component 1 (see 5.))			10,000			10,000	10,000	Rural Electrification Authority (REA)	

Contractual services - Company	Company contract for innovative financing solutions for MGs, financial sector engagement and links with productive value chains. Advice on capacity building and participation in events (USD 15,000)			15,000			15,000	15,000	Rural Electrification Authority (REA)
Contractual services - Company	Company contracts for local support of DREI analysis (USD 7080),	10,830					10,830	10,830	Rural Electrification Authority (REA)
Contractual services - Company	Contract for measurement of progress indicators for M&E (USD 8000)				8,000	8,000		8,000	Rural Electrification Authority (REA)
Contractual services - Company	Contracts to developers for design and installation and first years of operation of pilot minigrids (supported with GEF INV, USD 650,000 in total)		650,000				650,000	650,000	Rural Electrification Authority (REA)

International Consultants	International consultancy (4 weeks @ 3750/week, incl. internat. travel) for design of the project QA, RMV and digital strategy (experts provided as needed from regional AMP pool of experts)								15,000	15,000	Rural Electrification Authority (REA)
International Consultants	International consultancy (6 days @ USD 750/day, incl. internat. travel) for feasibility study design		4,500						4,500	4,500	Rural Electrification Authority (REA)
International Consultants	International consultancy (6 weeks @ 3750/week, incl. internat. travel) for the design of innovative financing subcontract (see 16.), participation in workshops and design and lead financial training course								22,500	22,500	Rural Electrification Authority (REA)
International Consultants	International consultancy (8 weeks @ 3750/week, incl. internat. travel) for DREI-analysis and workshop participation	30,000							30,000	30,000	Rural Electrification Authority (REA)

International Consultants	International consultancy for mid-term review and terminal evaluation (about 4-5 weeks each). Budget for consultancy and travel for M&E (final, MTR) is USD 37,900						37,500	37,500	37,500	Rural Electrification Authority (REA)
Local Consultants	Local consultancy (14 weeks @ USD 1300/week) for stakeholder engagement, support of MG design and modelling and related gender/SES consultancy		18,200					18,200	18,200	Rural Electrification Authority (REA)
Local Consultants	Local consultancy (16 weeks @ USD 1300/week) for stakeholder engagement, support DREI analysis and for gender/SES consultancy	20,800						20,800	20,800	Rural Electrification Authority (REA)
Local Consultants	Local consultancy for mid-term review and terminal evaluation (about 4-5 weeks each). Budget for consultancy and travel for M&E (final, MTR) is USD 10,400						10,400	10,400	10,400	Rural Electrification Authority (REA)

Local Consultants	Local consultancy on stakeholder engagement, gender and SES related to Component 4 activities and events (4 weeks @ USD 1300/week)					5,200		5,200		5,200	Rural Electrification Authority (REA)
Local Consultants	National consultancy to support international consultant (14.) and assessment of MG-agro value chain and financing issues and options (12 weeks @ USD 1300/week)				15,600			15,600		15,600	Rural Electrification Authority (REA)
Training, Workshops, Meetings	Inception and final project workshops (USD 3500 each)						7,000	7,000		7,000	Rural Electrification Authority (REA)
Training, Workshops, Meetings	Workshops (02 @ USD 3500/day) and training course (USD 15000/week) on finance-relevant subjects				22,000			22,000		22,000	Rural Electrification Authority (REA)
Training, Workshops, Meetings	Workshops (USD 10,000 for workshops and a regional event in Zambia; note that travel is in separate budget line)				10,000			10,000		10,000	Rural Electrification Authority (REA)

Trainin g, Works hops, Meeting s	Workshops and seminars (02 events @ USD 3500/day) related to Component 2 activities										Rural Electrifi cation Authorit y (REA)	
			7,000						7,000		7,000	
Trainin g, Worksh ops, Meeting s	Workshops and seminars (04 events @ USD 3500/day)	14,000							14,000		14,000	Rural Electrifi cation Authorit y (REA)
Travel	Travel for consultants (and staff; excl. internat. ticket of internat. experts that are included in BuLi 71200), Comp. 1	4,040							4,040		4,040	Rural Electrifi cation Authorit y (REA)
Travel	Travel for consultants (and staff; excl. internat. ticket of internat. Experts that are included in BuLi 71200), Comp. 2		4,510						4,510		4,510	Rural Electrifi cation Authorit y (REA)
Travel	Travel for consultants (and staff; excl. internat. ticket of internat. experts that are included in BuLi 71200), Comp. 3			1,790					1,790		1,790	Rural Electrifi cation Authorit y (REA)

Travel	Travel for consultants (and staff; excl. internat. ticket of internat. experts that are included in BuLi 71200), Comp. 4, as well as o facilitate participation in events linked with the UNEP-managed Global E-mobility programme)											29,500	29,500	29,500	Rural Electrification Authority (REA)		
Travel	Travel of project staff (Manager and Monitoring+Pilot Coordinator) within Zambia												-	5,000	5,000	Rural Electrification Authority (REA)	
Travel	Travel within Zambia of evaluation consultants												1,000	1,000	1,000	Rural Electrification Authority (REA)	
Office Supplies	Project management cost: office supplies													6,495	6,495	Rural Electrification Authority (REA)	
Other Operating Costs	Professional hired services for project auditing (USD 10,000)													10,000	10,000	Rural Electrification Authority (REA)	
Other Operating Costs	Cost of AV, printing production (for workshops and a regional event): USD 3000													3,000	3,000	3,000	Rural Electrification Authority (REA)

Other Operating Costs	Support to Off-Grid Task Force with AV and printing production cost (newsletter, etc.) of USD 7,500 and information technology equipment and software (USD 5,000)	7,500					7,500		7,500	Rural Electrification Authority (REA)
		151,795	748,835	136,515	138,907	63,900	1,239,952	123,995	1,363,947	

ANNEX F: (For NGI only) Termsheet

Instructions. Please submit a finalized termsheet in this section. The NGI Program Call for Proposals provided a template in Annex A of the Call for Proposals that can be used by the Agency. Agencies can use their own termsheets but must add sections on Currency Risk, Co-financing Ratio and Financial Additionality as defined in the template provided in Annex A of the Call for proposals. Termsheets submitted at CEO endorsement stage should include final terms and conditions of the financing.

ANNEX G: (For NGI only) Reflows

Instructions. Please submit a reflows table as provided in Annex B of the NGI Program Call for Proposals and the Trustee excel sheet for reflows (as provided by the Secretariat or the Trustee) in the Document Section of the CEO endorsement. The Agency is required to quantify any expected financial return/gains/interests earned on non-grant instruments that will be transferred to the GEF Trust Fund as noted in the Guidelines on the Project and Program Cycle Policy. Partner Agencies will be required to comply with the reflows procedures established in their respective Financial Procedures Agreement with the GEF Trustee. Agencies are welcomed to provide assumptions that explain expected financial reflow schedules.

ANNEX H: (For NGI only) Agency Capacity to generate reflows

Instructions. The GEF Agency submitting the CEO endorsement request is required to respond to any questions raised as part of the PIF review process that required clarifications on the Agency Capacity to manage reflows. This Annex seeks to demonstrate Agencies' capacity and eligibility to administer NGI resources as established in the Guidelines on the Project and Program Cycle Policy, GEF/C.52/Inf.06/Rev.01, June 9, 2017 (Annex 5).