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Report No: PAD00037

INTERNATIONAL DEVELOPMENT ASSOCIATION  
PROJECT APPRAISAL DOCUMENT  
ON  
PROPOSED CREDITS  
IN THE AMOUNT OF US\$750 MILLION  
(Of WHICH US\$350 MILLION FROM IDA SCALE UP WINDOW)  
TO THE  
FEDERAL REPUBLIC OF NIGERIA  
FOR A  
DISTRIBUTED ACCESS THROUGH RENEWABLE ENERGY SCALE-UP PROJECT  
NOVEMBER 21, 2023

Energy and Extractives Global Practice  
Western and Central Africa Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective October 31, 2023)

Unit = NAIRA (₦)

US\$1 = ₦780.50

## FISCAL YEAR

January 1 – December 31

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## ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AM	Accountability Mechanism
BAU	Business as Usual
CAPEX	Capital Expenditure
C&I	Commercial and Industrial
CBN	Central Bank of Nigeria
CPF	Country Partnership Framework
CRI	Corporate Results Indicator
DA	Designated Account
DARES	Distributed Access through Renewable Energy Scale-up
DER	Distributed Energy Resource
DISCO	Distribution Company
DISREP	Distribution Sector Recovery Program
DPV	Distributed Photovoltaic
DRE	Distributed Renewable Energy
EAAS	Energy As A Service
E&S	Environmental and Social
EDMS	Electronic Document Management System
EIRR	Economic Internal Rate of Return
ESCP	Environment and Social Commitment Plan
EPC	Engineering Procurement and Construction
ESF	Environmental and Social Framework
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
ETP	Energy Transition Plan
FHH	Female-Headed Household
FGN	Federal Government of Nigeria
FIF	Financial Intermediary Financing
FM	Financial Management
FMoE	Federal Ministry of Environment
FMoF	Federal Ministry of Finance
FMoP	Federal Ministry of Power
FPFMD	Federal Project Financial Management Division
FX	Foreign Exchange
GA	Grant Agreement
GBV	Gender Based Violence
GDP	Gross Domestic Product
GEAPP	Global Energy Alliance for People and Planet
GENCO	Generation Company
GHG	Green House Gas
GIFMIS	Government Integrated Financial Management Information System
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i> (German Development Agency)
GOGLA	Global Off-Grid Lighting Association

GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
GW	Gigawatt
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
I&E	Investors and Exporters
IFC	International Finance Cooperation
IFR	Interim Financial Report
IPF	Investment Project Financing
IVA	Independent Verification Agent
JICA	Japan International Cooperation Agency
KPI	Key Performance Indicator
kW	kilowatt
kWh	Kilowatt Hour
LMP	Labor Management Plan
LSEB	Lagos State Electricity Board
M&E	Monitoring and Evaluation
MFD	Maximizing Finance for Development
MHH	Male Headed Household
MSME	Micro, Small, and Medium-sized Enterprise
MST	Minimum Subsidy Tender
MTF	Multi-tier Framework
MW	Megawatt
NDC	Nationally Determined Contribution
NEMSA	Nigerian Electricity Management Services Agency
NEP	Nigeria Electrification Project
NERC	Nigerian Electricity Regulatory Commission
NESIP	National Electrification Strategy and Implementation Plan
NPV	Net Present Value
OP/BP	Operational Policy and Bank Policy
OPEX	Operational Expenditure
PAYGo	Pay-As-You-Go
PCM	Private Capital Mobilized
PDO	Project Development Objective
PBG	Performance Based Grant
PFI	Participating Financial Institution
PDO	Project Development Objective
PFI	Participating Financial Institution
PIM	Project Implementation Manual
PMS	Premium Motor Spirit
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPSD	Project Procurement Strategy Document
PUE	Productive Use of Electricity
PV	Photovoltaic
RAP	Resettlement Action Plan
RBF	Results-Based Financing
REA	Rural Electrification Agency
RESIP	Rural Electrification Strategy and Implementation Plan

RMI	Rocky Mountain Institute
RPF	Resettlement Policy Framework
SAS	Standalone Solar
SEforALL	Sustainable Energy for All
SEP	Stakeholder Engagement Plan
SPD	Standard Procurement Document
SHS	Solar Home System
SPFMD	State Project Financial Management Division
STEP	Systematic Tracking and Exchanges in Procurement
TCN	Transmission Company of Nigeria
ToR	Terms of Reference
USAID	United States Agency for International Development
USc	US Dollar Cents
US\$	United States Dollar
Wp	Watt Peak



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**DATASHEET**

**BASIC INFORMATION**

Project Beneficiary(ies) Nigeria	Operation Name Nigeria Distributed Access through Renewable Energy Scale-up Project		
Operation ID P179687	Financing Instrument Investment Project Financing (IPF)	Environmental and Social Risk Classification Moderate	

**Financing & Implementation Modalities**

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input checked="" type="checkbox"/> Fragile State(s)
<input checked="" type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternative Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Expanded Implementation Support (HEIS)

Expected Approval Date 14-Dec-2023	Expected Closing Date 31-Dec-2028
Bank/IFC Collaboration Yes	Joint Level Complementary or Interdependent project requiring active coordination

**Proposed Development Objective(s)**

The project development objective (PDO) is to increase access to electricity services for households and MSMEs with private sector led distributed renewable energy generation.

**Components**

Component Name	Cost (US\$)
Component 1. Solar Hybrid Mini Grids for Economic Development	1,023,000,000.00
Component 2. Stand-alone Solar Systems for Households, MSMEs and Agribusinesses	715,000,000.00
Component 3. Technical Assistance	80,000,000.00

**Organizations**

Borrower: Federal Republic of Nigeria  
 Implementing Agency: Rural Electrification Agency, Lagos State Electricity Board

**PROJECT FINANCING DATA (US\$, Millions)****Maximizing Finance for Development**

Is this an MFD-Enabling Project (MFD-EP)? Yes  
 Is this project Private Capital Enabling (PCE)? No

**SUMMARY**

<b>Total Operation Cost</b>	<b>1,818.00</b>
<b>Total Financing</b>	<b>1,818.00</b>
<b>of which IBRD/IDA</b>	<b>750.00</b>
<b>Financing Gap</b>	<b>0.00</b>

**DETAILS****World Bank Group Financing**

International Development Association (IDA)	750.00
IDA Credit	150.00
IDA Shorter Maturity Loan (SML)	600.00





**Non-World Bank Group Financing**

Other Sources	40.00
Foundation/s (identified)	40.00
Commercial Financing	1,028.00
Unguaranteed Commercial Financing	1,028.00

**IDA Resources (US\$, Millions)**

	Credit Amount	Grant Amount	SML Amount	Guarantee Amount	Total Amount
Scale-Up Window (SUW)	0.00	0.00	350.00	0.00	350.00
National Performance-Based Allocations (PBA)	150.00	0.00	250.00	0.00	400.00
<b>Total</b>	<b>150.00</b>	<b>0.00</b>	<b>600.00</b>	<b>0.00</b>	<b>750.00</b>

**Expected Disbursements (US\$, Millions)**

WB Fiscal Year	2024	2025	2026	2027	2028	2029
Annual	112.50	112.50	187.50	187.50	100.00	50.00
Cumulative	112.50	225.00	412.50	600.00	700.00	750.00

**PRACTICE AREA(S)**

**Practice Area (Lead)**

Energy & Extractives

**Contributing Practice Areas**

Finance, Competitiveness and Innovation; Infrastructure, PPP's & Guarantees; Social Protection & Jobs



**CLIMATE**

**Climate Change and Disaster Screening**

Yes, it has been screened and the results are discussed in the Operation Document

**SYSTEMATIC OPERATIONS RISK- RATING TOOL (SORT)**

Risk Category	Rating
1. Political and Governance	● High
2. Macroeconomic	● High
3. Sector Strategies and Policies	● Substantial
4. Technical Design of Project or Program	● Moderate
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● Moderate
8. Stakeholders	● Moderate
9. Other	
10. Overall	● Substantial

**POLICY COMPLIANCE**

**Policy**

Does the project depart from the CPF in content or in other significant respects?

Yes  No

Does the project require any waivers of Bank policies?

Yes  No

**ENVIRONMENTAL AND SOCIAL**



**Environmental and Social Standards Relevance Given its Context at the Time of Appraisal**

E & S Standards	Relevance
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Relevant
ESS 10: Stakeholder Engagement and Information Disclosure	Relevant
ESS 2: Labor and Working Conditions	Relevant
ESS 3: Resource Efficiency and Pollution Prevention and Management	Relevant
ESS 4: Community Health and Safety	Relevant
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
ESS 8: Cultural Heritage	Relevant
ESS 9: Financial Intermediaries	Relevant

NOTE: For further information regarding the World Bank’s due diligence assessment of the Project’s potential environmental and social risks and impacts, please refer to the Project’s Appraisal Environmental and Social Review Summary (ESRS).

**LEGAL**

**Legal Covenants**

**Sections and Description**

**Conditions**

Type	Citation	Description	Financing Source
Effectiveness	Financing Agreement, Article 4.01 (a)	The REA Subsidiary Agreement has been executed between the Recipient and REA in accordance with the provisions of Section I.B of Schedule 2 to this Agreement, and is legally	IBRD/IDA



		binding upon the Recipient and REA in accordance with its terms.	
Disbursement	Financing Agreement, Schedule 2, Section III. B.1 (b)	Notwithstanding the provisions of Part A of this Section, no withdrawal shall be made for payments to Lagos State under Categories (1), (2), and (3) until and unless the Recipient and Lagos State have executed the Lagos State Subsidiary Agreement in accordance with the provisions of paragraph 2 of Section I.B of Schedule 2 to this Agreement.	IBRD/IDA
Effectiveness	Financing Agreement, Article 4.01 (b)	REA has adopted the Project Implementation Manual in accordance with the provisions of Section I.C of Schedule 2 to this Agreement.	IBRD/IDA



## I. STRATEGIC CONTEXT

### A. Country Context

- 1. Nigeria is the most populous country and the largest economy in Sub-Saharan Africa. However, its development has slowed down since 2015.** With more than 200 million people, an estimated Gross Domestic Product (GDP) of US\$471 billion in 2022, and about 80 million people living in poverty, Nigeria is central to the World Bank’s mission of eliminating poverty in Sub-Saharan Africa and globally. Between 2001 and 2014, Nigeria was a rising growth star in West Africa, with an average GDP growth rate of seven percent per year - it was among the top 15 fastest-growing economies in the world.<sup>1</sup> This rising tide began to slow down in 2015 - declining to an average of 0.7 percent by 2020 – due to: (i) a decline in oil prices; (ii) increased insecurity; (iii) a reversal of macroeconomic reforms and heightened unpredictability of economic policies; exacerbated more recently by (iv) the adverse effects of the COVID-19 pandemic; and (v) Russia’s invasion of Ukraine. The subdued economic growth, coupled with a rapid increase in population at 2.6 percent per year, one of the highest in the region, has widened the gap in real GDP per capita between Nigeria and its peers.<sup>2</sup>
- 2. In 2021-2022, the economy recovered from the recession induced by the COVID-19 pandemic and lower oil prices, but welfare has continued to deteriorate.** Following a contraction of 1.8 percent in 2020, the Nigerian economy grew by 3.6 percent in 2021 and by 3.3 percent in 2022, exceeding population growth for the first time since 2015. However, this recovery was insufficient to cover the previous six years’ per capita income losses. By the end of 2022, an average Nigerian had the same income per capita as in 2011, and it will take about a decade to return to the same level of GDP per capita as in 2014. Moreover, high inflation since 2020 has pushed an estimated 12 million Nigerians into poverty.<sup>3</sup>
- 3. The new administration, which took office in late May 2023, has initiated critical reforms to address some of the macroeconomic imbalances.** In particular, the government eliminated the petrol subsidy, which represented forgone fiscal revenues of ₦4.5 trillion or 2.2 percent of GDP in 2022 - almost half the fiscal deficit - and implemented foreign exchange (FX) market reforms, notably allowing market-reflective pricing in the official FX market and eliminating the multiple FX windows. With the removal of the petrol subsidy and the implementation of FX reforms, the government is projected to achieve estimated fiscal gains of about ₦3.9 trillion in 2023, equivalent to 1.6 percent of GDP<sup>4</sup>. In addition, there appears to be scope for Nigeria to shift its economic trajectory and achieve inclusive, sustainable growth, if it sustains and deepens these reforms while protecting the poor and vulnerable. Despite those policy measures, the country still faces considerable financing gap challenges (₦10.7 trillion at the Federal Government level in 2023, equivalent to 4.4 percent of GDP).
- 4. The outlook for Nigeria’s growth is uncertain and dependent on external factors and the government’s policy response to longstanding issues.** Nigeria’s growth is expected to remain above population growth in 2023-2024, averaging 3.5 percent. The country’s economic outlook also remains uncertain. The projected recovery is threatened by (i) heightened global uncertainty, tightening global capital market funding conditions, higher prices of imported food and inputs for fertilizers, lower global growth, and volatile oil prices; (ii) lower-than-expected oil production due to technical inefficiencies; and (iii) increased insecurity.

<sup>1</sup> World Bank. 2022. Nigeria Country Economic Memorandum: Charting a New Course. Synthesis Report. Report No. AUS0002837

<sup>2</sup> Ibid.

<sup>3</sup> World Bank. 2022. The Continuing Urgency of Business Unusual. Nigeria Development Update.

<sup>4</sup> World Bank. 2023. Seizing the opportunity. Nigeria Development Update



## B. Sectoral and Institutional Context

5. **Nigeria has the most significant electricity access deficit in absolute terms of any country in the world, and the trend is worsening.** As of 2021, 60 percent of Nigeria’s population had access to electricity, leaving more than 85 million people without access.<sup>5</sup> Large disparities exist in access geographically, with 89 percent in urban areas and 26 percent in rural areas. These disparities in access also exist by income, and only 31 percent of the lowest income segment of the population<sup>6</sup> have access to electricity nationwide. The net access deficit has increased by over 13 million people over the last decade, as the population growth rate has outpaced electrification efforts, making Nigeria an outlier even in Sub-Saharan Africa. Access to electricity has impacted households and presented a challenge for the effective delivery of essential public services such as health and education.

6. **Even Nigerians connected to the grid face frequent outages and do not receive adequate or reliable supply, making them dependent on fossil-fueled generator sets to meet their demand.** The grid, which has approximately five Gigawatt (GW) of available capacity, is ten percent of the capacity of the South African grid and serves four times the population, making it inadequate to serve Nigeria’s growing population and economy. Economic losses from unreliable electricity supply primarily impact micro, small, and medium enterprises (MSMEs) and are estimated to be about ₦ 7-10 trillion (an estimated US\$25 billion) annually or 5-7 percent of the country’s GDP<sup>7</sup>. Faced with unreliable and insufficient supply, businesses and households fill the gap with power from mostly small petrol and diesel-run generator sets that cost more than four times the current average grid tariff of US\$0.12/kWh and are highly polluting.

7. **Nigeria’s largely private and unbundled power sector has failed to deliver grid-based access.** The Nigerian power sector consists of six privately owned generation companies (GENCOs), eleven privately owned distribution companies (DISCOs), and the state-owned Transmission Company of Nigeria (TCN). The Federal Ministry of Power (FMoP) is responsible for setting the policy and long-term vision, including electrification planning in conjunction with the Nigeria Electricity Regulatory Commission (NERC). The DISCOs are responsible for increasing grid-based access in their franchise areas. Between 2015 and 2020, they added 3.4 million ‘legal’ connections, mostly attributed to new metering than actual new connections. However, during that time, the population in the country increased by 24 million, leading to an increase in the access gap. In addition, neither a central coordination body nor an electrification strategy/plan guides access expansion. In the current arrangement, under FMoP’s guidance, the Rural Electrification Agency (REA) has the strongest awareness of the country’s political economy, with a focus on socioeconomic development needs, a high level of stakeholder engagement and a mandate for implementing electrification in unserved and underserved areas.

8. **Recognizing the need to expand access for unserved and underserved populations, the Federal Government of Nigeria (FGN) approved power sector reforms with a specific focus on electrification.** In 2016, the FGN approved the Rural Electrification Strategy<sup>8</sup> and Implementation Plan (RESIP) to facilitate private investment in expanding off-grid access to electricity rapidly in a cost-effective manner. Nigeria also adopted one of the region’s most progressive and comprehensive sets of mini grid regulations, covering issues regarding licensing, retail tariff setting, and eventual grid connection. In 2017, the FGN’s Federal Executive Council approved the Power Sector Recovery Program to create an enabling environment for private investment in the power sector and support grid-based electrification. This also included financial, operational, governance, and policy actions to turn around the

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<sup>5</sup> <https://trackingsdg7.esmap.org/>

<sup>6</sup> National Bureau of Statistics survey data

<sup>7</sup> World Bank. 2021. Resilience through Reforms. Nigeria Development Update

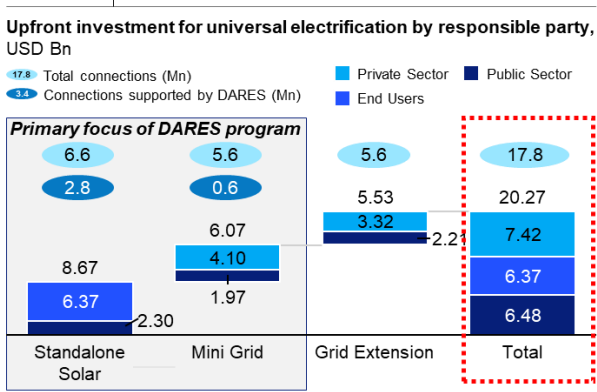
<sup>8</sup> Through the Electric Power Sector Reform Act of 2005, FGN established the REA with a mandate to increase rural access.



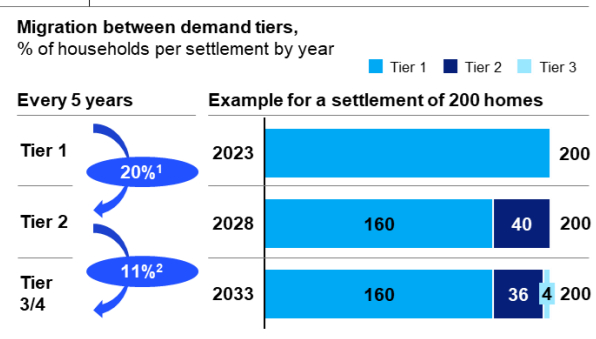
distribution sector to increase electricity access.

**Box 1: Achieving least-cost universal access involves multiple technologies and iterative steps and hinges upon substantial public and private financing combined with growth in consumption (and incomes) described below**

- 1 Support for basic electrification of new households and communities**  
Most unconnected households will have lower electricity demand initially – usually around Tier 1 (>4.5 kWh annual demand) or Tier 2 (>73 kWh annual demand)<sup>1</sup>. **Public funds are critical in supporting new connections** to:
  - Ensure private sector investments in new energy systems are economically feasible
  - Electrify communities not attractive for private sector investment
- 2 Enabling growth in electricity usage and demand**  
**Connected households are likely to increase their energy demand over time.** Our modelling and household surveys show that around 20% of Tier 1 households migrate to Tier 2 demand levels and around 10% of Tier 2 households migrate to Tiers 3 or 4 (>1,250 kWh annually). As households migrate Tiers, systems will need to be replaced and sometimes technologies adjusted to ensure sufficient capacity to meet growing demand.
- 3 Sustainable universal electrification**  
**Economic development, in some cases enabled by new access to electricity, will make additional investments in new connections more affordable – reducing the affordability gap.** Continuous investment will be required to keep new connections operational. Upfront investments in these systems help ensure the sustainability of this new capex and maintenance.



1. Based on ESMAP's Multitier Framework for Measuring Energy Access



1. Based on WBG team discussions with SHS providers  
2. Survey of appliance use (2017) used in Nigeria IEP in 2021

9. **The FGN's Nigeria Electrification Project (NEP, P161885) was launched in 2018 as a private sector-led initiative. It has directly benefited<sup>9</sup> more than seven million people and deployed over 50 MW of decentralized renewable energy (DRE) capacity.** The NEP is the FGN's flagship off-grid access program and leverages US\$550 million of public financing comprising US\$350 million in credit from the World Bank and a US\$200 million loan from the African Development Bank. It also crowds in private sector financing and expertise with the initial aim to connect more than 3.5 million people, 90,000 MSMEs, and public institutions (15 universities, two teaching hospitals, and 100 COVID-19 isolation centers). At a time when the expansion of electricity access through grid extension has been severely curtailed, NEP has been able to deliver clean, reliable electricity to more than seven million people<sup>10</sup>. This has been done through private-sector financed and owned distributed renewable energy solutions supported by catalytic public sector subsidies administered as results-based financing (RBF). However, despite rapid access provision through the private sector, universal electrification still has a long way to go.

**Nigeria's Pathway to Universal Access**

10. **Nigeria's ambition is to reach universal electricity access by 2030, but a lot needs to be done from a policy,**

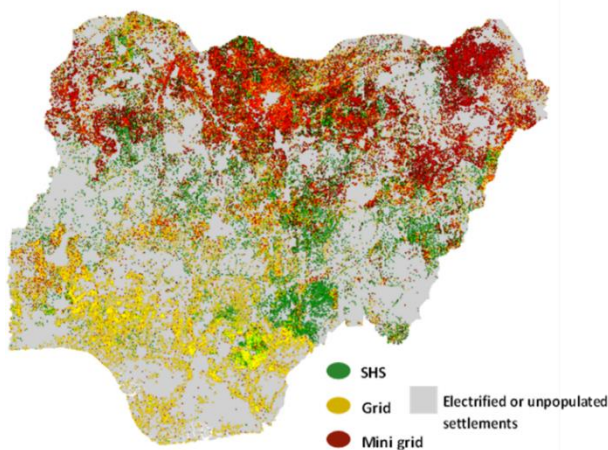
<sup>9</sup> Either resulted in the provision of new or improved access through mini grids or standalone solar systems (SAS)  
<sup>10</sup> This includes connecting more than 1.4 million households and around 6,000 MSMEs through SAS and over 45,000 households and more than 1,700 MSMEs through 103 solar hybrid mini grids.



**financing, and institutional perspective to meet this target.** The Energy Transition Plan (ETP), approved in 2022, is a bold statement of ambition from the FGN to achieve universal electricity access in the near term and a carbon-neutral energy system by 2060. With multiple technological pathways toward universal electrification, the FGN needs to adopt a least-cost electrification program to provide policy direction for financing and implementing electrification efforts. Without such a roadmap, multiple conflicting approaches for expanding access, driven by individual stakeholder interests, have emerged. Long-term policy certainty and institutional architecture (key agencies, processes, technologies) can guide stakeholders (public and private) to work towards universal electrification collaboratively. Committed, capable institutions with political ownership at the highest level are needed to implement this vision on the ground through private sector participation.

11. **Universal access will require an investment of at least US\$20 billion, including contributions from the public and private sectors as well as from end-users of electricity themselves.<sup>11</sup> Nigeria’s capacity to unlock and sustain almost US\$7.5 billion in private financing requires critical market enabling conditions currently unavailable.** The key factors for the enabling conditions include (i) a stable and predictable macroeconomic environment; (ii) sustainable public debt; and (iii) no sudden shifts in policies or widespread market imperfections in the financial sector. These foundational conditions, which are currently absent in Nigeria (see Annex 7 for an assessment) affect the capacity and willingness of financial institutions and the private sector to take on long-term risks and to make long-term decisions on investments and business expansion respectively. The industry faces several financing issues that severely inhibit its ability to grow at the pace necessary to make a serious dent in the electricity access deficit. However, crucial steps were recently taken with the unification of multiple exchange rates and the shift to a market-driven exchange rate for the Nigerian Naira. In time, these policies would help overcome the rationed access to FX, which, in addition to being a constraint in accessing financing from international investors, is also a key limiting factor for both mini grid and standalone solar (SAS) companies that import most of their hardware. Regardless of the recent record of private sector financing attracted by SAS and mini grid companies, which demonstrates the sector’s ability to attract much-needed additional funds, overall investments still fall short of the required amounts that would allow companies to meet demand. Local currency finance has been especially difficult to unlock, with local commercial banks still skeptical of the viability of the DRE sector and typically seeking collateral valued at more than 100 percent of the loan amount. Inflation is becoming entrenched at elevated levels, posing a further challenge.

Figure 1: Distribution of least-cost electrification results



12. **Reliable and affordable grid power remains a logical end-state for universal access. Still, with the inability of DISCOs to rapidly extend the grid, DRE offers an immediate pathway to electrification for more than 60 million Nigerians.** While a national electrification planning effort is underway, an analysis conducted by the FGN, Sustainable Energy for All (SEforALL), and the World Bank shows that about 64 million people (68 percent of the predicted total of 94 million unelectrified people in 2030) could be connected using distributed access solutions on a least-cost basis to achieve universal access by 2030. 31.4 million people (5.6 million households) located predominantly in dense urban areas further from existing

<sup>11</sup> Based on FGN-SEforALL-World Bank Nigeria Integrated Energy Planning model





grid infrastructure could be best connected via mini grids, which are often the least-cost solution in the North of the country (see Figure 1). Meanwhile, 32.7 million people (6.6 million households) in mostly sparse rural and remote areas could best be connected via SAS. Tier 1<sup>12</sup> access through SAS systems, while bringing much-needed immediate and basic electrification, should not be the end goal but an intermediate transition to higher incomes and hence consumption at Tier 3 and 4, justifying migrations to a mini grid/grid and requiring further investments over time.

13. **Linking distributed access solutions with the productive uses of electricity (PUE) can enable sustainable electricity service provision.** Beyond the socioeconomic impact of electrification, adopting PUE catalyzes income generation activities that consume more electricity than households would, improving the financial viability of the energy service provider and the community. Adopting PUE in Nigeria’s mini grid ecosystem could decrease the electricity price required to recoup the mini grid investment by up to 19 percent<sup>13</sup>. Currently, 99 percent of Nigeria’s agricultural land lacks access to irrigation, while approximately one million hectares of land is suitable for the adoption of small-scale irrigation. Inadequate cold storage options have led to a loss of about half of fresh fruits and vegetables during and after harvesting. As an example of the vast market potential for PUE, it is estimated that the market opportunity for just the cold chain infrastructure in Nigeria could be up to US\$5.9 billion by 2030. Areas with high potential for the PUE could also be suitable DRE sites for mini grids. However, the matchmaking of PUE and DRE sites is still at a nascent stage and requires support.

14. **The private sector is well positioned to provide these DRE-led access solutions but will require targeted public funding for these solutions to be affordable and financially viable.** Between 2018 and mid-2022, more than two million solar home systems (SHS) were sold in Nigeria by over 50 international and local companies actively operating in the market. The number of operating private sector mini grids in Sub-Saharan Africa grew from 288 to 400 between 2020 and 2022. In Nigeria under NEP, 74 mini grid developers have qualified to participate, and more than 100 privately financed, owned, and operational mini grids have been developed, with an active pipeline of another 200+ projects. However, in most cases, mini grids are not viable on a purely commercial basis in Nigeria. Most rural and peri-urban customers could not afford the cost-reflective tariffs that mini grid operators would have to charge without some capital expenditure (CAPEX) subsidy (public financing). Similarly, without a viability gap subsidy, SAS companies may not set up distribution channels in rural and remote areas and target remote customers. These targeted subsidies also help firms to carry out upstream market intelligence, environmental and social impact assessments, and other preparation and pre-investment activities.

15. **Subsidies will decline over time with economies of scale and the increasing affordability of consumers. However, there is still some way to go before the DRE sector is viable on a fully commercial basis in Nigeria.** Tier 1 (basic electrification) SHS are currently unaffordable to virtually all cash-paying off-grid households but become affordable for 84 percent of unconnected Nigerian households on “pay as you go” (PAYGo) contracts, where affordability is defined by spending 5 percent of income or less for solar. Tier 2 systems are unaffordable if paying cash or if sold on PAYGo. For Tier 1 PAYGo systems, a 10 percent subsidy reduces the affordability gap by 31 percent. A 20 percent subsidy reduces the gap by 56 percent, and a 30 percent subsidy reduces the affordability gap by 72

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<sup>12</sup> Energy access is measured across six tiers with varying minimum requirements. Tier 0 refers to no access or less than four hours; Tier 1 refers to four hours of electricity with capacity to run a few lightbulbs and charge a phone; Tier 2 enables operations of lighting, television and fans; Tier 3 allows usage of domestic appliances such as washing machine, blender etc.; Tier 4 provides for 16 hours of electricity to power high load appliances while Tier 5 provides for at least 23 hours of electricity to power high load appliances. See more at Energy Sector Management Assistance Program ([ESMAP Multi-Tier Framework \(MTF\) website](#)).

<sup>13</sup> Estimate from Rocky Mountain Institute (RMI), 2021 - <https://rmi.org/electrifying-nigerian-agriculture-with-clean-minigrids-to-improve-livelihoods/>



percent.<sup>14</sup> Projecting affordability is more difficult for mini grids. However, based on cost projections, the cost of solar modules will decline by 42 percent by 2030. The price of batteries will decrease by 54 percent.<sup>15</sup> Such reductions will come alongside declining costs for distribution and operations as well as growth in consumer demand.<sup>16</sup> Combined, these forces will contribute to a narrowing affordability gap for mini grids.

16. **Beyond DRE, long-term public financing remains critical to achieving universal electrification.** Globally, countries that have recently achieved significant scale-up in access (India, Kenya, Ethiopia, etc.) have done so through a publicly funded grid expansion with some last-mile support from distributed access solutions. Nigerian utilities are all privately owned but expanding the grid to reach up to 34 million Nigerians (according to the Integrated Energy Plan) will require an investment of about US\$8.5 billion, more than half of which is expected to come from the public sector. Similarly, while the private sector is poised for a massive expansion of mini grids and SAS, experience from the NEP shows that reaching the most remote and fragile parts of the country is not viable today without significant and sustained public funding. This is because those areas would either be economically unattractive or require disproportionate private sector subsidies, sometimes in perpetuity. A National Electrification Plan, developed, adopted, and updated will determine the path the government wants to pursue and help quantify the public financing needed.

17. **The FGN is reforming the REA as the apex agency to help Nigeria achieve its vision of achieving universal access, but there are capacity gaps.** The REA would require a revision of its mandate, capacity, and processes to realize this vision, and reform is underway through the FGN and development partner support to realize it. The agency will need substantial support in acquiring the necessary technical knowledge, staffing, and building a business plan to lead the push for electrification. For the REA to be the central body coordinating the electrification efforts, it will need to develop a mechanism to engage technical experts, development partners, investors, and representatives of civil society, consumer groups, and other industry stakeholders to facilitate cooperation and drive implementation towards achieving universal access.

**Box 2. Summary of Lessons Learned from the NEP Implementation** (detailed lessons learned presented in Annex 4)

1) **Untargeted subsidies allowed a fast scale-up to kickstart the market, but better-calibrated, differentiated subsidies are necessary to reach targeted populations sustainably.** While the SAS market scaled up rapidly under the NEP, results leaned towards easier-to-serve urban areas. Mini grid rollout was concentrated in relatively easier-to-reach/operate areas rather than the whole country, especially the FCV portions. A Minimum Subsidy Tender (MST), which aggregated and tendered “harder-to-reach” sites to the private sector to build, operate, and maintain mini grids based on a reverse auction of the subsidy required, could not be concluded successfully under the NEP due to procurement delays and insufficient responsive bids. In the future, a more effective way could be to direct end-user subsidies under the SAS through the FGN’s National and State Social Registry to ensure that they are directed towards the poorest households and to develop subsidy tiers to better align the level of subsidy with the viability gap applicable to different geographies and populations. For the MST, a more streamlined procurement approach and selecting robust, economically viable sites should be considered for implementation success.

2) **Productive use of electricity (PUE) is key to sustainability and requires a specific focus.** The NEP had ambitious targets for electricity access to be extended to MSMEs, but the interventions were not geared explicitly towards serving these customers. Consequently, almost all electricity connections delivered through the NEP have been to households. Improving the electrification of MSMEs is essential for enhancing consumption, creating jobs, and sustaining mini grids. In the future, specific emphasis on site selection incentivizing commercial or productive customers should be introduced for mini grid while

<sup>14</sup> Global Off-Grid Lighting Association (GOGLA) 2022, Off-Grid Solar Market Trends Report 2022. Calculations consider the proportion of unconnected households who could pay for a PAYGo system using 5 percent or less of their income under different subsidy levels. Prices are based on prices provided in the GOGLA 2022 report.

<sup>15</sup> ESMAP (2022), *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers*

<sup>16</sup> Africa Minigrid Developers Association (2022), *Benchmarking Africa’s Minigrids Report 2022*



RBF (Performance Based Grants) for standalone solar should be extended to PUE equipment that will target MSMEs. Enforcing PUE and higher utilization will promote responsible private sector firms interested in building and operating sustainable mini grids in the long run and eliminate opportunistic firms incentivized by a US\$ per connection grant.

3) **Under-served urban populations reliant on expensive and polluting generator sets cannot be ignored.** The NEP, by design excluded urban access activities from consideration to avoid conflict with the DISCOs so soon after privatization. In the intervening years, the quality and reliability of electricity access in urban areas have worsened, increasing the use of generator sets. In addition, there have been some new developments, such as using interconnected mini grids, DRE solutions for Commercial and Industrial (C&I) customers, sub-franchising arrangements, and interest at the state level to scale up rooftop solar photovoltaic (PV). This suggests that there is space for engagement there in a way that is mutually beneficial for consumers, private sector and DISCOs and consistent with FGN's ambitious energy transition plans.

4) **Direct disbursement of grants in US\$ for mini grids and standalone solar allows for greater leverage of private capital.** Results-based grants for both mini grids and standalone solar were increased under the NEP due to (i) losses incurred by participating companies when receiving the grants in Nigerian Naira at the official exchange rate and converting the proceeds to foreign currency at the parallel market rate combined with the depreciating Nigerian Naira, and (ii) longer wait times to access US\$ from the Central Bank of Nigeria. While the FX unification addresses some of these issues, the structural problem persists. With direct disbursement, the absolute grant amounts in US\$ can be reduced without leaving the private sector worse off, as has been instituted recently in the NEP and should continue until the broader FX issue is fully resolved.

5) **Using big data tools and analytics delivers efficiency gains from end to end.** The NEP initiated the use of the Odyssey data platform, which has enabled a program involving many small transactions for distributed renewables to manage sequential processes efficiently, from pre-qualification of participating companies to technical design and evaluation to verification of claims and disbursement of grants, as well as e-Tendering. In the future, the use of the Odyssey platform and the data-driven approach should be further augmented with new geospatial, grant management, and impact assessment tools to enhance program administration, and monitoring and evaluation.

6) **Access to finance remains a critical bottleneck for mini grid and solar rooftop developers.** While a market has been established under the NEP, and developers are raising private capital, high commercial interest rates (20-30 percent), high collateral requirements, and short-term maturity loans (two to three years) are making project debt financing difficult in most cases. Most financial institutions cannot conduct credit risk analysis, and others are not confident that sufficient cash flow can be generated from such projects to repay loans. Until the time that the World Bank can provide working capital and other debt facilities through financial intermediation, alternative sources of financing will have to be leveraged to support the industry. This includes funding from philanthropic sources like the Global Energy Alliance for People and Planet (GEAPP) or upstream debt through the International Finance Corporation (IFC).

7) **An FGN-owned scalable platform to coordinate all electrification efforts can significantly speed up the pace of electrification.** While the NEP intended to be this platform and benefitted from their analytics and proof of concept pilots, most development partners operated in coordinated silos. The African Development Bank provided parallel financing for the NEP. However, it primarily replicated rather than complemented the World Bank's interventions. In the future, development partners and financiers will need to coordinate their investment and technical assistance activities to complement public funding for the DRE-led access to achieve maximum mobilization of private sector investment, which will lead to maximum impact on the ground. A notable example is the upstream support provided by the GEAPP through philanthropic capital, enabling debt, equity, and guarantee facilities in coordination with the NEP and Distributed Access through Renewable Energy Scale-Up (DARES).

### C. Relevance to Higher Level Objectives

18. **The proposed DARES is aligned with the World Bank's Country Partnership Framework (CPF, FY21 – FY25) for Nigeria<sup>17</sup>.** In particular, the proposed project is a critical element of CPF Objective 8: To Increase access to reliable

<sup>17</sup> Report No.153873 - NG



and sustainable power for households under the Pillar “Promoting Jobs and Economic Transformation and Diversification.”

19. **The Nigeria DARES project is the first joint World Bank attempt to create a private sector-led electrification ecosystem.** At COP 27 in Egypt, the World Bank announced the launch of the DARES Platform, a new program designed to use innovative financial and de-risking instruments to triple the pace of electrification in Sub-Saharan Africa. This inaugural project in Nigeria is funded by the IFC (debt facility)<sup>18</sup> and the World Bank (IDA financing), collaborating to create the platform for scaling up private sector- led electricity access solutions.

20. **The project is aligned with the World Bank’s Gender Strategy.** The 2016–2023 World Bank Gender Strategy emphasizes women’s access to services and information and the promotion of employment and economic opportunities. The project builds on the NEP’s gender-related actions to facilitate access to electricity for disadvantaged female-headed households and women-led MSMEs. It will also include actions to improve their employment aspects in the energy sector.

21. **In addition, the proposed DARES project supports the World Bank’s agenda of maximizing financing for development by attracting private financing to expand access.** DARES is being developed as a platform that helps developers leverage catalytic public funding to raise private financing. The precursor to DARES was the NEP, which leveraged US\$1.25 of private capital for every US\$1 of public finance in mini grids.<sup>19</sup> Table 1 illustrates how the DARES project will further scale this up.

Table 1. DARES proposed leverage (PCM) estimation.

Components/ Focus Areas	IDA US\$	Private Capital Mobilized (PCM) and Grant Mobilized US\$
<b>Solar Hybrid Mini grids</b> i.e., Isolated mini grids, interconnected mini grids, solar roof top	410 million	613 million (PCM)
<b>Standalone Solar</b> i.e., SHS and Solar PUE Equipment	300 million	415 million (PCM)
<b>Technical Assistance</b> <sup>20</sup>	40 million	40 million (Grant Mobilized)
<b>Total</b>	<b>750 million</b>	<b>1,068 million</b>

22. **The project is consistent with Nigeria’s strategies and commitments on climate change.** Nigeria has submitted an updated Nationally Determined Contribution (NDC) to the Paris Agreement in July 2021. The updated NDC commits Nigeria to reduce emissions by 47 percent from the 2018 business-as-usual projections, conditional on international support (20 percent reductions through unconditional measures) by 2030.<sup>21</sup> Meeting these commitments includes lowering greenhouse gas (GHG) emissions in the energy sector and reducing system losses. The 2050 Long-Term Vision for Nigeria (LTV-2050) includes a significant increase in the use of clean and renewable energy to drive Nigeria’s economic growth as well as deployment of more energy efficient, emerging low-carbon technologies to decarbonize the economy. All components and activities financed under the project are consistent with Nigeria’s climate commitments, captured in the NDC and LTV-2050. (See Technical Note on Climate Change<sup>22</sup>)

<sup>18</sup> A summary of the proposed IFC facility is presented in Annex 5.

<sup>19</sup> Based on a sample of commissioned projects. The REA is currently surveying developers of all completed projects to collect data on actual investments. The Monitoring and Evaluation (M&E) system for the DARES project will be designed to collect such data by the time of project commissioning.

<sup>20</sup> Estimated grant mobilized for technical assistance assumes that DARES will synergize with other development partners by leveraging on-going or already planned technical assistance for similar endeavor in the sector to avoid duplication of efforts.

<sup>21</sup> [https://unfccc.int/sites/default/files/NDC/2022-06/NDC\\_File%20Amended%20\\_11222.pdf](https://unfccc.int/sites/default/files/NDC/2022-06/NDC_File%20Amended%20_11222.pdf)

<sup>22</sup> Disclosed on the World Bank website: [https://documents.worldbank.org/en/publication/documents-reports/documentlist?keyword\\_select=allwords&srt=score&order=desc&qterm=P179687&lang\\_exact=](https://documents.worldbank.org/en/publication/documents-reports/documentlist?keyword_select=allwords&srt=score&order=desc&qterm=P179687&lang_exact=)



23. The proposed project is part of the World Bank’s comprehensive, programmatic engagement in Nigeria’s power sector to help the FGN realize its ambitious ETP vision through a series of interlinked operations under two streams: (i) On-grid reforms – focused on implementing the FGN’s Power Sector Recovery Program and ETP targeting sector fiscal sustainability and regulatory environment through the Power Sector Recovery Operation Program for Results (P164001) and targeting DISCOs’ operational performance and corporate governance through the Distribution Sector Recovery Program for Results (P172891) and (ii) Off-grid reforms – focused on distributed renewable energy led access and energy transition interventions, currently implemented through the NEP and supported by analytics support from the Programmatic Advisory Services and Analytics for Energy.

**II. PROJECT DESCRIPTION**

**A. Project Development Objective**

24. **PDO Statement:** The project development objective (PDO) is to increase access to electricity services for households and MSMEs with private sector-led distributed renewable energy generation.

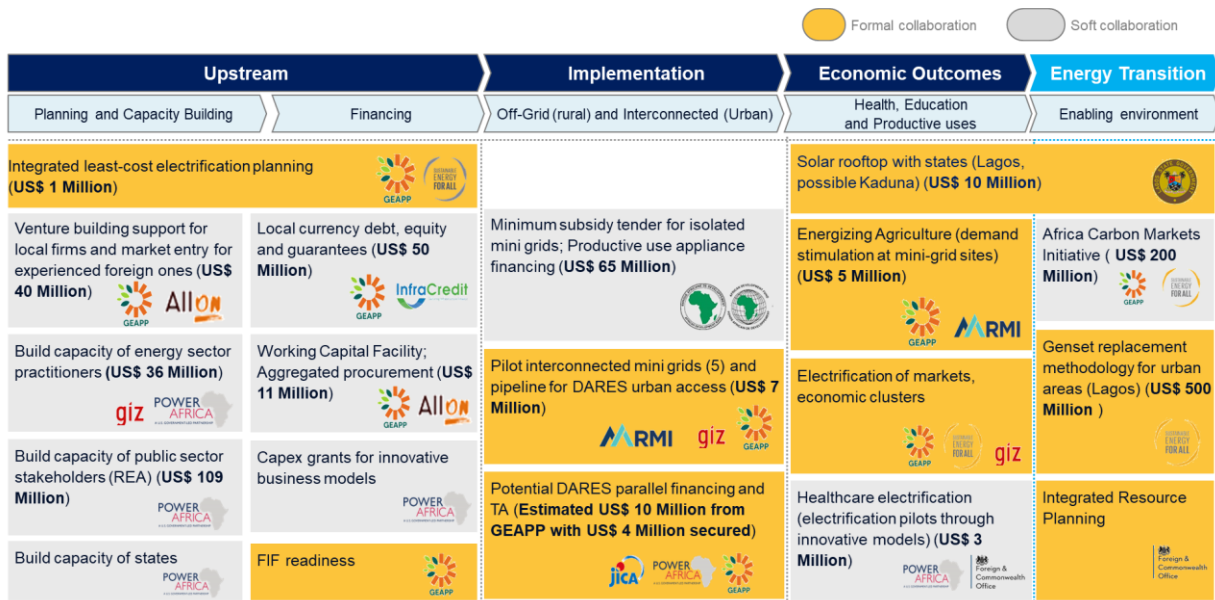
25. **PDO level indicators-** The key results (PDO indicators expected are as follows)

1. People provided with new or improved electricity service (gender-disaggregated) (number) (Corporate Results Indicator [CRI]).
2. MSMEs provided with new and improved electricity services, of which female managed MSMEs (number)
3. Generation capacity of energy constructed or rehabilitated (MW; CRI)
4. Net GHG emissions (metric ton)

**B. Project Components**

**Vision and Approach**

Figure 2. DARES Ecosystem- Collaboration across the value chain with development partners





26. **The Nigeria DARES project is envisioned as the FGN’s scalable platform that builds on the existing NEP program, enabling stakeholders, especially development partners, to combine efforts to achieve universal electrification and support energy transition.** DARES aims to be FGN’s platform to coordinate and finance all off-grid electrification efforts. Building on the NEP, DARES has already become a platform for all development partners to collaborate on their access interventions, ensure efficient use of resources, and create an ecosystem for access (see Figure 2). This ecosystem is already building institutional capacity across stakeholders (including states) and generating a robust pipeline of well-prepared projects that can be financed downstream through the DARES project. Formal collaboration for the same has already started. The GEAPP has provided more than US\$100 million towards pipeline development for DARES, the Sustainable Energy for All (SEforALL) is working on electrification planning and engagement with states, and the United States Agency for International Development (USAID) Power Africa and the German Development Agency (*Deutsche Gesellschaft für Internationale Zusammenarbeit*, GIZ) are working on capacity building and pipeline development. Parallel investment financing of up to US\$200 million is expected from the Japan International Cooperation Agency (JICA). The African Development Bank (AfDB) is expected to provide a scaled-up version of NEP in alignment with DARES.

27. **DARES will benefit over 17.5 million Nigerians (20 percent of the current access gap) and replace more than 280,000 polluting and expensive fossil-fueled generator sets.** DARES aims to provide – (i) subsistence (basic) electrification<sup>23</sup> to about 13.5 million unserved, rural, and remote Nigerians through the deployment of standalone solar. Over time, this will require further investments to increase system capacity and allow for economic activity, and (ii) grid equivalent electrification via mini grids to over 2.7 million Nigerians in rural and peri-urban settings. The platform will also support Nigeria’s clean energy transition by increasing the reliability of electricity supply for 1.3 million existing electricity consumers in peri-urban and urban areas by connecting them to cleaner and more reliable interconnected mini grids that will help replace approximately 288,000 diesel/gasoline generator sets. The platform will also provide an estimated 237,000 MSMEs (including around 124,000 agri-businesses) with reliable and clean electricity for productive uses that will help improve their income generation potential, create local jobs, and improve the financial sustainability of mini grids. The program focuses on scaling up mini grids and SAS deployment in Nigeria. DARES will also improve core activities under the NEP, add new activities based on lessons learned, and push the frontier in the energy sector by engaging with states.

28. **DARES will build on successes and lessons learned from the NEP to scale up the use of RBF to catalyze private investment while introducing improvements.** Stakeholders across the DRE value chain would like the existing approaches under NEP to continue, especially the Performance Based Grants<sup>24</sup> (PBG) for mini grids and SAS that, within three years, have created the largest mini grid and SAS market in sub-Saharan Africa. To scale up the mini grid and SAS deployment in Nigeria, DARES will leverage the familiarity of the existing approaches while enhancing them by incorporating lessons learned from NEP implementation, such as the need for better site selection with identified and targeted PUE opportunities to improve mini grid capacity utilization and sustainability, the need to finetune the level of subsidy provided and the performance indicators for disbursement of subsidies, better targeting based on geographic and socio-economic factors, and better monitoring and evaluation (M&E) framework to minimize incomplete, abandoned, and unsustainable (high tariff, poor service) sites post project closure. These factors have been considered while designing the DARES components to ensure that the familiarity of the approach is maintained.

29. **DARES will offer highly targeted subsidies to support the deployment of SAS systems to populations in most need.**<sup>25</sup> Insights from the NEP emphasize that reaching rural or remote regions requires subsidies tailored to drive private sector engagement in these areas. Supply-side subsidies will incentivize SAS distributors to enter rural areas by offsetting

<sup>23</sup> Multiple lighting, radio, fan(s) and mobile phone charging ability

<sup>24</sup> PBG refers to the capex grant provided by REA to the private developers post verified construction/sale.

<sup>25</sup> The National Social Register was established in 2013 and updated in 2021 with support from the World Bank Social Protection Programs. The National Social Register is a general registry used to identify and register poor and vulnerable households.



some initial investment expenses in supply chain expansion, without raising end-user costs. Demand-side subsidies will narrow affordability gaps by reducing end-user prices for low-income and vulnerable households identified by the National and State Social Registry. Only households registered in the registry, currently comprising 12 million households, will be eligible for end-user price reductions. This will ensure that SAS support is used for providing new connections rather than improving the reliability of existing connections.

30. **DARES will retain the minimum subsidy tender to accelerate deployment of mini grids by efficiently allocating public resources to priority areas.** The Minimum Subsidy Tender was proposed as an important mechanism for the rollout of mini grids under the NEP, but it was ultimately dropped during implementation due to long delays in preparing and executing the tender, which resulted in insufficient number of responsive bids. However, the rationale for the minimum subsidy tender remains valid: it provides price discovery; it affords the government a measure of control on where public investments in electrification are directed, consistent with policy priorities; and it enables the aggregation of projects that can attract a different cohort of developers and investors. The delays under the NEP were primarily related to procurement, and specifically lack of familiarity, both on the World Bank and on the client side, with the design of the minimum subsidy tender and appropriate procurement approaches and applicable standard procurement templates. These issues have been resolved and the client is already conducting a minimum subsidy tender with parallel financing from the AfDB. Therefore, similar procurement delays are not anticipated under DARES.

31. **DARES intends to conduct a massive generator set replacement drive in urban areas to accelerate the electricity transition in Nigeria.** Interconnected mini grid projects are being developed nationwide on a pilot basis. This indicates increasing interest of the DISCOs in collaborating with third parties due to financial constraints that limit their capability to meet their customers' service quality and reliability needs. In addition, the regulator's new requirement for DISCOs to source ten percent of their power supply from embedded generation sources can also be met through these projects. DARES intends to leverage this positive trajectory and incentivize the private sector to scale up deployment of interconnected mini grid projects to support reliable power supply through energy transition from generator sets.

32. **DARES will further push the envelope on supporting clean energy transition through a distributed PV (DPV or solar rooftop) pilot at the state level- to be piloted in Lagos State and technical assistance open to other qualifying states.** The World Bank has provided Lagos State with technical assistance to create an enabling environment for the solar rooftop sector. It has already declared a 1GW policy target for solar DPV for the state's energy mix by 2030. DARES will support the state's ambition to kickstart its solar DPV market by supporting the deployment of solar rooftop solutions in selected diesel generator set-reliant public hospitals providing life-critical services to highlight the state's intent and demonstrate the technology and business model for the larger public and industry. While the recent fuel subsidy reform enhances the financial case for switching from diesel/gasoline to solar solutions, public funding support for the pilot is aimed at two specific objectives: (i) successfully demonstrating a demand aggregation-led reverse action procurement approach for solar rooftop and (ii) overcoming private sector reluctance to work with the public sector as the off-taker for power. The C&I space is already witnessing B2B<sup>26</sup> transactions with no public funding support needed. Technical assistance is envisioned under DARES, especially for financial institutions that are still reluctant due to insufficient awareness.

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<sup>26</sup> Business to Business



Table 2: Program design and funding

		Sources of financing/capital (USD millions)				
		IDA financing	Private capital	Grants mobilized	Parallel Financing*	
<b>Component 1 Mini Grids</b>	<b>Total Component 1 (Mini-grids)</b>		<b>410</b>	<b>613</b>	<b>0</b>	<b>Up to \$380m</b>
	1.1 Minimum Subsidy Tender	Isolated Mini Grids	95	95		100 (GEAPP)
		Interconnected Mini Grids	100	233		100 (IFC loan)
		Solar Roof Top	20	54		Up to 180 (JICA)
	1.2 Performance Based Grants	Isolated Mini Grids	168	168		
		Interconnected Mini Grids	27	63		
<b>Component 2 Standalone Solar</b>	<b>Total Component 2 (Standalone Solar)</b>		<b>300</b>	<b>415</b>	<b>0</b>	<b>0</b>
	2.1 Performance Based Grants	SAS basic electrification	230	340		
		SAS PUE	50	75		
	2.2 Catalytic Grants	Catalytic Grants	20	-		
<b>Component 3 Technical Assistance</b>	<b>Total Component 3 (Technical Assistance)</b>		<b>40</b>	<b>0</b>	<b>40</b>	<b>20</b>
	3.1 Institutional strengthening		10	-	5 (USAID)	20 (JICA)
	3.2 Ecosystem building		20		25 (GEAPP, GIZ)	-
	3.3 Engagement with States		10	-	10 (SEforALL)	0
<b>TOTAL DARES</b>			<b>750</b>	<b>1,028</b>	<b>40</b>	<b>400</b>

\* IFC \$100m debt facility, JICA co/parallel financing and USAID/SEforALL grants are still not finalized

33. **With a push towards decentralization in the power sector through the Electricity Act of 2023, DARES will support the creation of a platform that will facilitate engagement with states on DRE.** Until recently, the power sector in Nigeria was centralized, and the World Bank’s engagement was limited to the FGN. However, recent legislative changes have brought in a more decentralized approach. The World Bank’s engagement with Nigeria’s Governor’s Forum has underlined the need for technical assistance to states to help them develop state-level power sector institutions and markets. DARES will create a platform through which states can access technical assistance to develop institutional capacity and policy frameworks for the power sector, especially solar rooftops. The REA will be tasked as a nodal agency to work with state governments to bring them on the platform as and when they are ready and express an interest to be included. Given its readiness with the platform, Lagos State will launch this engagement before it opens to other states.

34. **DARES has been co-created by the World Bank with three main components designed to achieve its PDO (see Table 2).** Component 1 will focus on mini grid expansion; Component 2 on Stand Alone Solar Systems for electrification and PUE; and Component 3 on technical assistance. A detailed description of project components is provided in Annex 3.

35. **Nigeria DARES is structured as an Investment Project Financing (IPF) and includes three Performance-Based Conditions (PBCs) to unlock additional funding beyond the core allocation to incentivize the crafting of enabling policies and building of long-term capacity.** As DARES intends to build on NEP (an IPF), the expenditure framework of the operation focusses on providing results based public finance (subsidy) to bring down the capital expenditure that private developers need to make, and an IPF was chosen as the best instrument for this purpose. US\$150 million out of the total US\$750 million IDA financing will be available for implementing core project activities, while the remaining US\$600 million is contingent upon achievement of three PBCs. These conditions and the triggers that would unlock the funds associated with them are explained in the project component descriptions below. They have been designed after discussion with the FGN and other stakeholders, and the verification protocol for the achievement of these PBCs is described in Annex 2. Even though access to finance is a major issue, use of financial intermediary for a working capital or debt facility was ruled out given the current assessment of macroeconomic conditions and financial markets.





36. **Component 1. Solar Hybrid Mini Grids for Economic Development (US\$1,023 million, of which US\$410 million from IDA, and US\$613 million from private sector funding).** This component will support the development of privately-owned and operated solar hybrid mini grids in unserved (primarily rural and remote) and underserved (primarily urban and peri-urban) areas with high economic growth potential. The mini grid component consists of two investment sub-components defined by their different subsidy approaches.

37. **Sub-Component 1.1: Minimum Subsidy Tender (IDA US\$215 million, and US\$382 million from private sector)<sup>27</sup>.** The MST sub-component will aggregate demand and prepare portfolios of mini grid projects for tender. The mini grids will be privately financed, owned, and operated, and the tender will select the developer that needs the lowest subsidy to do so. Three separate MST pipelines will be used- one for isolated mini grids, one for interconnected mini grids, and one for solar rooftops in Lagos. The IDA funds will cover the subsidies required, while the private sector will mobilize the balance of the capital costs of these projects.

38. **Sub-Component 1.2: Performance Based Grants Program (IDA US\$195 million, and US\$231 million from private sector).** Under this sub-component, REA will provide administratively set PBGs to mini grid operators based on new customer connections (US\$/end users) for isolated mini grids and the percentage of CAPEX for interconnected (grid-connected) mini grid projects. Performance based grants will be made available to mini grid developers on a rolling basis and differentiated based on geographic and socio-economic factors (determined by existing mini grid activity) and consumer classes (residential, PUE). Eligible projects must have minimum commercial or productive loads to ensure sustainability overall. The IDA funds will cover the PBGs provided, while the private sector will mobilize the balance of the capital costs of these mini grids.

39. **A PBC linked to the presidential approval of a National Electrification Strategy and Implementation Plan (NESIP) (PBC 1),** to provide policy clarity to financiers and the private sector investing long-term capital and resources and to ensure alignment on institutional roles and mandates between FMoP, REA and the States, will be associated with Component 1. US\$30 million out of the US\$410 million IDA for this component will be tied to this PBC, to be unlocked upon preparation of a NESIP that all key stakeholders accept and its formal adoption as policy by FMoP.

Table 3. Description of Component 1

Component	Approach					Result Based Grant	
	Objective	Geographic	Site selection	Target Cluster Type	System Capacity	Determination	Type
<b>1.1 Minimum Subsidy Tender (MST)</b>							
<b>MST for Isolated Mini Grids</b>	Last-mile access	Rural, Remote	REA led (aggregated demand)	Residential and MSMEs	Up to 1MW	Competitive	Per connection
<b>MST for Interconnected Mini Grids</b>	Energy Transition Reliable supply	Urban, peri-Urban	DISCO led (aggregated demand)	Residential and economic clusters <sup>28</sup>	Up to and above 1MW	Competitive	Percentage of CAPEX

<sup>27</sup> For a detailed explanation of the various technologies and the approaches as well as implementation steps please refer to Annex 3.

<sup>28</sup> Economic clusters are locations with high density of commercial and productive activities adding economic value which are also co-located. Examples are markets, plazas, cottage industries, commercial streets, agro-allied centers etc.



Component	Approach					Result Based Grant	
	Objective	Geographic	Site selection	Target Cluster Type	System Capacity	Determination	Type
<b>State Government Led Solar Rooftop Solution</b>	Energy Transition Reliable supply	Urban, peri-Urban	State govt. led (aggregated demand)	Large general hospitals	Up to and above 1MW	Competitive	Percentage of CAPEX
<b>1.2 Performance Based Grants Program</b>							
<b>PBG for Isolated Mini Grids</b>	Last-mile access	Rural, Remote	Developer led (site by site)	Residential and MSMEs	Up to 1MW	Pre-determined	Per connection
<b>PBG for Interconnected Mini Grids</b>	Energy Transition	Urban, peri-Urban	Developer led (site by site)	Residential and economic clusters	Up to 1MW	Pre-determined	Percentage of CAPEX
	Reliable supply						

40. **A PBC linked to the presidential approval of a National Electrification Strategy and Implementation Plan (NESIP) (PBC 1),** to provide policy clarity to financiers and the private sector investing long-term capital and resources and to ensure alignment on institutional roles and mandates between FMO, REA and the States, will be associated with Component 1. US\$30 million out of the US\$410 million IDA for this component will be tied to this PBC, to be unlocked upon preparation of a NESIP that all key stakeholders accept and its formal adoption as policy by FMO.

41. **A second PBC, concerning political endorsement of REA’s mandate, the preparation, adoption, and operationalization of a new business plan for REA (PBC 2.1), and the improvement in key performance indicators (KPIs) to demonstrate increased capacity at REA (PBC 2.2),** will be linked to this component as well. It requires Presidential approval of the Rural Electrification Agency’s mandate and its designation as the apex agency responsible for electrification in the country, covering both unserved and underserved areas. It also covers the completion, formal adoption and operationalization of a new business plan for REA, reflecting this mandate and promoting long-term institutional capacity building in the REA and not just in the Project Management Unit (PMU). Finally, the second PBC requires REA to achieve process improvements measured by meeting performance standards agreed with the World Bank. US\$90 million out of the US\$410 million IDA funding for this component will be tied to this PBC (US\$30 million for PBC 2.1 and US\$60 million for PBC 2.2). These funds would be unlocked after the Presidential approval of REA’s mandate, the completion, adoption and operationalization of its new business plan, and upon the REA achieving process improvements for; (i) time from receipt of applications for performance based grants to the signing of grant agreements or rejection of applications; (ii) time from receipt of payment claims from private sector to disbursement of funds or rejection of claims; and (iii) its grant administrator achieving all targets linked to the KPIs defined in their terms of reference.

42. **A third PBC involving a series of amendments to the regulation of mini grids by the NERC** that simplifies and expedites the development of mini grids by the private sector and enables mobilization of larger pools of capital will also be linked to Component 1. The following amendments to the NERC mini grid regulations<sup>29</sup> will be required to meet the third PBC: (i) allowing applications for permitting of isolated and interconnected mini grids, as well as tariff applications, on a portfolio basis (PBC 3.1); (ii) requiring 12 months’ notice for a DISCO to expand into a site served by a permitted mini grid (PBC 3.2); (iii) specifying the rights, duties and obligations of communities with respect to the termination of tripartite

<sup>29</sup> Nigerian Electricity Regulatory Commission (NERC) Regulation for Mini-Grids 2016



agreements for interconnected mini grids (PBC 3.3); and (iv) increasing the maximum capacity of mini grids governed by the NERC mini grid regulations from 1 MW to 5 MW (PBC 3.4). US\$50 million will be unlocked upon the promulgation of each of these four regulations for a total of US\$200 million out of the US\$410 million IDA for this component.

43. All of the PBCs need to be achieved within one year of effectiveness, except for the amendment to increase the maximum capacity of mini grids governed by the NERC mini grid regulations from 1 MW to 5 MW (PBC 3.4), which must be achieved within two years of effectiveness, and improvement in KPIs to demonstrate increased capacity at REA (PBC 2.2), which is assessed at the end of each year of project effectiveness over four years. The third PBC related to improving the regulatory framework for mini grids can be achieved anytime within the first year of effectiveness to unlock the US\$200 million linked to it, but if it has not been realized by one year from effectiveness, achievement of the PBCs on the preparation and adoption of a NESIP and on the preparation, adoption, and operationalization of a new business plan for REA will become a prerequisite for unlocking funds associated with all of PBCs, including PBC 3.

44. Component 2: Standalone Solar Systems (SAS) for Households, MSMEs, and Agribusinesses (US\$715 million, of which US\$300 million IDA and US\$415 million from private sector funding). This component will expand the availability and affordability of SAS for households (basic electrification), MSMEs, and agribusinesses (PUE support) in rural areas. Through targeted and competitively awarded performance-based and catalytic grants, the uptake of 2,750,000 quality-certified SHS and 75,000 PUE products in rural areas and among lower-income segments will be promoted. Under Sub-component 2.1, the PBG will provide results-based payments per connection (verified product sale). Under Sub-component 2.2., catalytic upfront grants will support companies seeking to distribute in hard-to-reach, underserved areas focusing on poor, remote, and hardest-to-reach consumers.

Table 4. Description of component 2

Component	Approach				Subsidy	
	Objective	Modality	Geographic	Target	Determination	Type
<b>2.1 Performance Based Grants for Standalone Solar</b>						
PBG for SHS	Last mile access	Private Sector led	Rural, remote	Households, MSMEs	Pre-determined	Per connection
PBG for PUE	Productive uses	Private sector led	Rural, remote	MSMEs, farmers, Agribusinesses,	Pre-determined	Per connection
<b>2.2. Catalytic Grants</b>						
Catalytic Grant	Last mile access in fragile, hard areas	Private sector led	Rural, remote	Households, MSMEs, agribusinesses	per business plan	Milestone based

45. Sub-Component 2.1 Performance Based Grants for Standalone Solar (IDA US\$280 million, and US\$415 from private sector). The sub-component will provide PBGs to enable rapid deployment of SHS in rural and underserved areas. Supply and demand side support will be provided through the PBG to address the viability and affordability gap, respectively. Companies will receive a grant based on independently verified outputs with incentives varying by location and type of business model. The sub-component will help reduce the end-user prices for households identified as poor and vulnerable by the National and State Social Registry. This sub-component will also support deploying solar-powered PUE equipment to MSMEs, agribusinesses, and commercial customers. The private sector will mobilize the capital needed to produce and distribute SHS and solar-powered PUE equipment, and the IDA-supported PBG will defray some of these costs, but the rest of the cost of the standalone solar solutions will be borne by the end-users themselves.

46. Sub-Component 2.2: Catalytic Grants (IDA US\$20 million). This sub-component will incentivize companies targeting the poor, remote, or hardest-to-reach consumers in the country. Grants will be offered on a matching basis to ensure the company commits its funding and has ‘skin in the game.’



47. **PBC 1 (presidential approval of a NESIP), PBC 2.1 (preparation, adoption, and operationalization of a new business plan for REA), and PBC 2.2 (improvement in KPIs to demonstrate increase in capacity at REA) will be linked with this Component.** Out of the US\$300 million IDA for Component 2, US\$70 million will be tied to PBC 1 and US\$180 million will be tied to PBC 2 (US\$60 million for PBC 2.1 and US\$120 million for PBC 2.2).

48. **Component 3: Technical Assistance (US\$80 million, of which US\$40 million IDA, and US\$40 million from other development partners).** This component will be supported by parallel financing and collaboration from various development partners, such as GEAPP, SEforALL, JICA, USAID, etc., to create an ecosystem for universal electrification. Technical assistance provided under the DARES umbrella will focus on the following -

49. **Sub-Component 3.1: Institutional Strengthening (US\$10 million IDA and US\$5 million from other development partners)** will support activities to build institutional capacity, including (i) strengthening of implementation capacities of REA, FMoP and other relevant agencies like Nigerian Electricity Management Services Agency (NEMSA), Federal Ministry of Environment (FMoE), NERC, and Federal Ministry of Finance (FMoF), and (ii) development of critical studies, including the national electrification plan. USAID intends to mobilize an additional US\$5 million for similar activities through their country programs.

50. **Sub-Component 3.2: DARES Ecosystem and Implementation (US\$20 million IDA and US\$25 million from other development partners)** will provide support to the implementation of the project, focusing on (i) pipeline preparation for isolated and interconnected mini grids; (ii) building the PUE ecosystem, including geospatial mapping, demand stimulation and capacity building of financial institutions on market-based products and pricing, financial literacy to enable FIF readiness in the long-run; and (iii) managing Environmental and Social (E&S) risks, including the development of a citizen engagement framework. GEAPP and GiZ intend to mobilize an additional US\$25 million for similar activities through their country programs.

51. **Sub-Component 3.3: Engagement with States (US\$10 million IDA and US\$10 million from other development partners)** will focus on (i) supporting states in formulating their role in the energy transition agenda during decentralization by providing technical assistance for designing electricity markets, building capacity of state-level sector institutions, developing regulatory and procurement capacity, and preparing policy framework and its implementation; and (ii) determining viability for solar rooftop and setting up a one-stop-shop model for market creation – for interested and qualified states. All eligible states can avail this technical assistance. The states will need to demonstrate readiness towards joining the project. The assessment will be made using a set of criteria as follows- (i) providing a written commitment on setting up a policy target for solar rooftop PV as an outcome of the TA support; (ii) existence of densely populated urban areas that can be targeted for solar rooftop; and (iii) any experience in solar rooftop. SEforALL intends to mobilize another US\$10 million for similar activities through their country programs.

52. **PBC 2 will also be associated with Component 3** in addition to Components 1 and 2. US\$30 million (US\$10 million for PBC 2.1 and US\$20 million for PBC 2.2) out of the US\$40 million IDA for Component 3 will be tied to this PBC.

### C. Project Beneficiaries

53. Project beneficiaries will be households, MSMEs (including agribusinesses), and users of public hospitals (in Lagos State). Approximately 17.5 million people, 237,000 MSMEs, and about 30<sup>30</sup> state hospitals will receive new or improved access to electricity services because of the proposed project. The project will target women-led households and MSMEs

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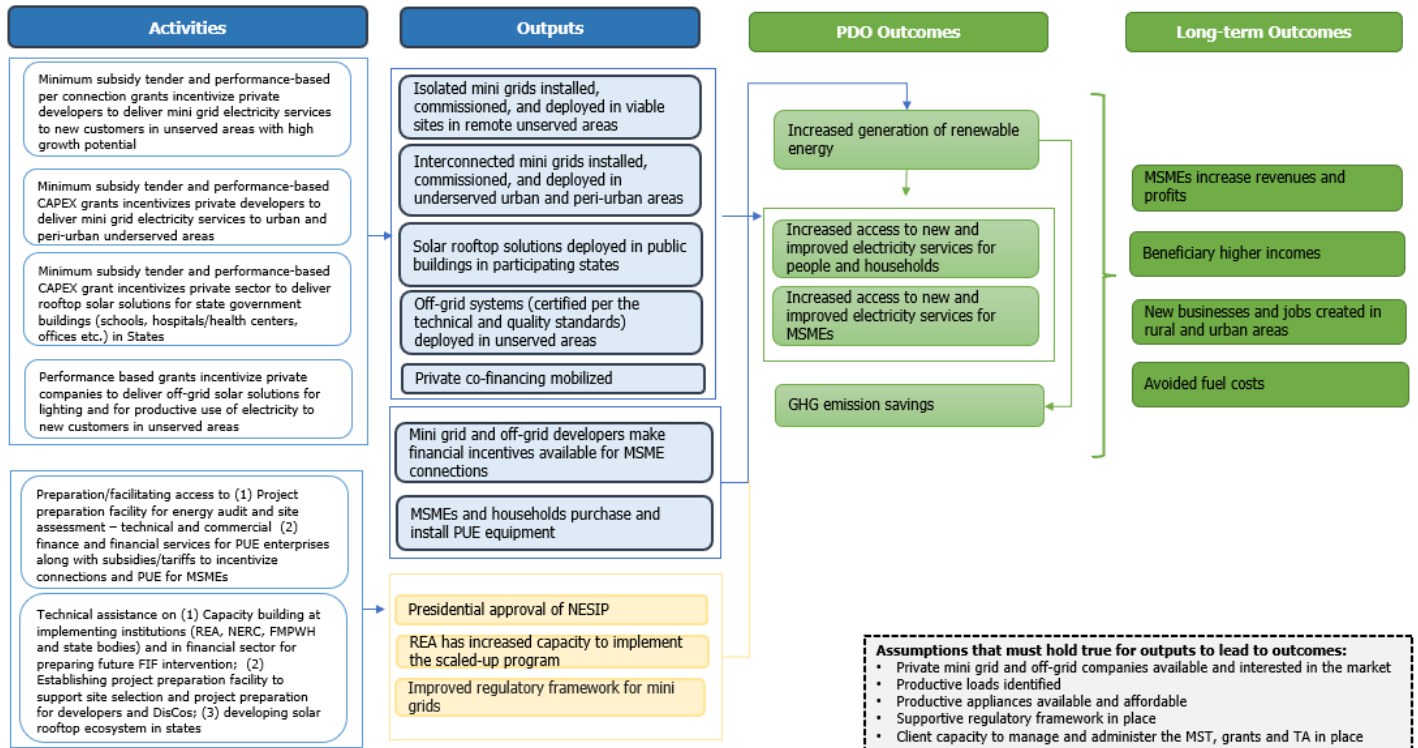
<sup>30</sup> To be decided



that will benefit from access to reliable and affordable electricity, offering opportunities to increase productivity, and create jobs. On the supply side, local mini grid developers and solar companies will benefit from technical assistance to help them grow their businesses. Interconnected mini grids will help DISCOs secure new revenue growth by regularizing supply in select areas and reducing Aggregate Technical, Commercial, and Collections losses in project clusters.

### D. Results Chain

Figure 2. Theory of change



54. **DARES will utilize results-based financing to scale up the mini grid and SAS deployment and improve the reliability of electricity service for underserved urban consumers using mini grids.** DARES will also target PUE in rural areas, especially water pumping and refrigeration. These interventions will increase access to new and reliable electricity services for households and MSMEs and expand PUE. Figure 2 illustrates the DARES theory of change.

### E. Rationale for the World Bank Involvement and Role of Partners

55. **Achieving universal electrification requires substantial catalytic public resources to buy down the cost of electricity service from privately financed, owned, and operated mini grids and standalone systems, which typically serve poorer people.** Public financing is necessary not only to expand energy access to rural areas but also to reduce entry costs to the market and facilitate private investment in mini grids and standalone systems. Public resources are also essential for removing other barriers (for example, lack of market intelligence) to doing business that has prevented the private sector from scaling up operations in Nigeria.

56. **The World Bank, with its global experience and partnerships, including the last four years of the NEP, is well placed to assist Nigeria in preparing and implementing this program.** The project leverages the convening power of the World Bank to attract significantly more private investment in a region challenged by a lack of private capital and local



currency financing. DARES also benefits from several formal and informal partnerships with development partners such as AfDB, JICA, GIZ, the United Kingdom's Foreign, Commonwealth & Development Office, USAID, and non-governmental organizations such as GEAPP, Rocky Mountain Institute (RMI), SEforALL contributing with over US\$100 million of grant support towards upstream technical assistance (project preparation, transaction advisory services, market intelligence) to develop pilots that can work as proof of concept.

#### F. Lessons Learned and Reflected in the Project Design

Covered under the sector context and in Annex 4.

### III. IMPLEMENTATION ARRANGEMENTS

#### A. Institutional and Implementation Arrangements

57. **REA will be the primary implementing agency, with some activities being implemented at the state level by the designated state agency.** PMU created for the NEP by the REA will be adapted for the DARES implementation to better integrate within the REA. PMU manages NEP implementation through consultants and seconded personnel. The REA will also hire additional staff as required to implement the project activities. The REA will implement Sub-components 1.1 and 1.2 (deployment of mini grids), Sub-components 2.1 and 2.2 (deployment of SAS and PUE), and Sub-components 3.1, 3.2, and 3.3. The designated agency will implement Sub-component 1.1 (solar rooftop) and Sub-component 3.3 (engagement with states). Given its readiness, the Lagos State Electricity Board (LSEB), currently engaged as the state's implementing agency, will manage, and implement Sub-component 1.1 (solar rooftop) and the designated technical assistance allocation. As additional states meet the eligibility criteria to access funds under Sub-components 3.3, they will need to undergo an assessment of their FM, procurement, and E&S capacity before joining the project.

58. **A DARES steering committee, chaired by the Honorable Minister of Power, will be established with the Honorable Minister of Finance as co-chair for broad oversight and guidance on all access-related operations.** The steering committee will consist of representatives of key government stakeholders such as the Federal Ministry of Power, Federal Ministry of Finance, NERC, States, and REA. In the absence of a comprehensive national electrification strategy, the steering committee's role will be to ensure that all stakeholders are aligned on the overall project activities. The steering committee will meet semiannually and play a significant role in ensuring inter-agency coordination (especially between the Nigerian NERC, the States, and the FMoP and the REA) and provide overall guidance to the project. The steering committee will be established immediately after project effectiveness. In case the new administration creates a high-powered body to look at electrification issues, then DARES will be flexible to consider that body as the steering committee to allow for better strategic oversight.

59. **An Independent Verification Agency (IVA) and a grants administrator will be hired to support the implementation of all components.** The IVA's primary function is to independently assess and verify the results or outputs claimed by participating companies. Under the PBG and MST, participants must submit claims to be verified by an IVA. Payments will be made only after verification of installation by the IVA. The grants administrator will be onboarded to administer the grant and improve overall grant management, including disbursement forecasting and reporting. A data monitoring tool will track and verify all supply-side subsidies, while verification of the demand side or end-user subsidy will require verification of the household identification system leveraging the FGN social protection registry.

60. **REA will develop a Project Implementation Manual (PIM) as a condition of effectiveness detailing the implementation arrangements.** The PIM will provide detailed information on the procedures to be put in place for procurement, the eligibility and selection criteria for firms who want to participate in the project, grant disbursement procedures and milestones against which disbursements of the grant will be made, among other project related



information. The PIM will also provide the eligibility criteria for any new state that intends to avail the technical assistance support.

## B. Results Monitoring and Evaluation Arrangements

61. **The REA will monitor all component activities and send progress reports in a form and substance satisfactory to the World Bank.** As needed, to review progress and address issues that may arise, the REA will convene meetings with relevant stakeholders, including the NERC, private sector mini grid developers and stand-alone system providers, DISCOs, Engineering, Procurement and Construction (Engineering Procurement and Construction [EPC]), and Operations and Maintenance (O&M) contractors. Following the project results framework (Section VII), monitoring results and outcomes will be reported in the project progress reports. The REA will hire a firm for data collection and processing, integrating Multi-Tier Framework (MTF) data and findings, and coordination with the private sector. Participating companies will have their own E&S management systems per the specifications set in the Project Implementation Manual.

62. **The World Bank will provide implementation support and regularly monitor results and outcomes to evaluate the achievement of the PDO.** A mid-term review will be conducted within two years after project start to assess project performance and ensure that lessons learned are considered in implementation over the remaining period.

## C. Sustainability

63. **The financial and technical sustainability of mini grids will be supported through targeted results-based grant financing and qualified private developers.** To ensure standard mini grid systems are built, and commitment to sustainable O&M is demonstrated by developers/operators, the second tranche of grant disbursement will occur one year after the commissioning of the mini grid system, when a level of utilization threshold would have been achieved. Technical sustainability will be supported by the continued availability of appropriately trained local technicians and operators for maintenance, remote control, and monitoring of systems and after-sales service plans. Mini grid developers will have flexibility in setting cost-recovering tariffs (subject to a ceiling) and selecting the appropriate generation, distribution, and metering technologies (subject to minimum standards).

64. **Focus on financing mechanisms that enable the private sector to take informed risks while providing after-sales service and warranties for the solar systems ensures sustainability for the SAS.** The proposed grants will balance affordability for the end users, with maintaining an appropriate level of service, and a competitive marketplace. Emphasis will be placed on ensuring high quality of systems and services. Grant financing will be provided only to companies selling products in compliance with quality standards of systems and appropriate product guarantees and after-sales service.

## IV. PROJECT APPRAISAL SUMMARY

### A. Technical, Economic and Financial Analysis

#### (i) Technical

65. SAS technologies are well known, and their deployment involves minimal risks. The MST and PBG approaches used under NEP are also well-established regarding their requirements and implementation. Even the new modalities, such as DPV (rooftop solar), are technologically similar to SAS. Interconnected mini grids are technologically like isolated mini grid constructed under NEP, albeit capable of power exchange with the main grid. In all cases technical standards are well known and will be referred to or specified in the PIM.



**(ii) Economic and Financial Analysis**

66. **The project will produce economic benefits to existing and new electricity customers by providing new or improved service.** This service will be made available through investments in isolated and interconnected mini grids, solar rooftop solutions (Component 1), and stand-alone solar home systems and PUE equipment (Component 2). Detailed economic and financial analysis for interconnected mini grids, including sensitivity analyses, are provided in Annex 6.

67. **An economic analysis based on avoided costs carried out shows that the project is economically viable even without any consideration of environmental externalities.** The project’s economic internal rate of return (EIRR) and net present value (NPV) are calculated using a standard cost-benefit methodology. The economic evaluation is confined to project activities for which an economic value can be identified and measured. The baseline NPV is US\$3,822 million (at a five percent discount rate<sup>1</sup>) with an economic return of 31 percent. Table 5 presents the NPV and EIRR by component.

*Table 5. Project EIRR and composition of NPV*

	Excl. CO <sub>2</sub>		Incl. CO <sub>2</sub> (Low)		Incl. CO <sub>2</sub> (High)	
	NPV (US\$ million)	EIRR	NPV (US\$ million)	EIRR	NPV (US\$ million)	EIRR
Mini Grids	\$3,370	30%	\$3,625	32%	\$3,879	34%
Standalone Solar Systems	\$452	33%	\$872	61%	\$1,290	98%
<b>Project</b>	<b>\$3,822</b>	<b>31%</b>	<b>\$4,496</b>	<b>37%</b>	<b>\$5,170</b>	<b>44%</b>

68. **GHG accounting has been carried out for the project,** which will result in significant GHG emission avoidance by replacing kerosene, gasoline, and diesel usage in households, MSMEs, and institutions. SAS will not directly emit GHG, but solar hybrid mini grids are assumed to source a small part of its electricity from backup diesel generators. A twenty-one year analysis of GHG emissions for mini grids and rooftop solar has been carried out. A seven-year product life is assumed for SAS and SAS PUE equipment. Total baseline emissions are estimated to be 16,848,829 tCO<sub>2</sub>, with a total gross emission of 291,519 tCO<sub>2</sub>, whereas the project’s net emissions total -16,557,310tCO<sub>2</sub>.

69. **The project is aligned with the Paris Agreement goals on both mitigation and adaptation. Assessment and reduction of mitigation risks:** All components support activities on the list of Universally Aligned activities. The proposed project aims to promote low-carbon energy generation and reduce kerosene and fossil-fuel-based generator sets for lighting and productive uses. All financed components will facilitate decarbonizing the power supply to meet the Paris Agreement mitigation goals. Deployment of mini grids, SAS, and solar rooftop solutions will reduce GHG emissions and help achieve Nigeria’s climate commitments. These activities will increase RE generation, reduce GHG emissions, and mobilize private-sector funding to maximize DRE development. **Assessment and reduction of adaptation risks:** Key climate risks include flooding, extreme heat, drought, wildfire, and landslides. The project incorporates resilience measures to reduce these climatic risks to an acceptable level. These include siting analysis and measures such as elevation and water-resistant protections in the design and construction of civil works to protect infrastructure from risks like flooding. Further details are provided in the Technical Note on climate change<sup>31</sup>.

<sup>31</sup> Disclosed on the World Bank website: [https://documents.worldbank.org/en/publication/documents-reports/documentlist?keyword\\_select=allwords&srt=score&order=desc&qterm=P179687&lang\\_exact=](https://documents.worldbank.org/en/publication/documents-reports/documentlist?keyword_select=allwords&srt=score&order=desc&qterm=P179687&lang_exact=)





## B. Fiduciary

### (i) Financial Management (FM)

70. An assessment of the existing NEP under the REA and the LSEB under the Ministry of Energy and Mineral Resources was conducted to determine the capacity of the entities to carry out the project's FM functions. The assessment of the Federal Project Management Unit (FPMU) in the REA implementing the NEP and the State Project Management Unit (SPMU) under the LSEB, a new agency that will be involved in the implementation of DARES, indicated that they are adequately operated with well-qualified accounting staff. The FM assessment revealed that the DARES project under the REA and the LSEB have established adequate FM arrangements to ensure that project funds are used for the intended purposes of the financing, with due attention to economy, effectiveness, and efficiency. As and when new states are ready to join the project, similar assessments will be carried out for the concerned implementing entity. For details on the Fiduciary Assessment of REA and LSEB and mitigation actions, please refer to Annex 1.

71. The Federal Project Financial Management Department (FPFMD) and Lagos State Project Financial Management Unit (LSPFMU), established in the Office of the Accountant General of the Federation and the Lagos State Office of Accountant General, respectively, have well-qualified, trained FM staff in place, who are experienced in the implementation World Bank-supported operations. The FPFMD and the LSPFMU will be responsible for managing the financial affairs of the DARES project. The FPFMD and the LSPFMU are performing satisfactorily. They will and will assign representatives from the pool of professional accountants (project accountants and internal auditors) and other qualified accounting personnel for REA-FPMU and LSEB-SPMU.

72. **Overall, the FM risk for the DARES project is assessed as Substantial.** The FM risks include: (a) the use of financing proceeds for purposes not intended; (b) fraud and corruption; (c) political interference in the deployment of FM staff; (d) the capacity of the PMU staff to render acceptable financial reports in a timely manner; and (e) use of the fund for expenditures that may not meet fiduciary requirements. These risks will be mitigated by drawing up a robust action plan and implementation support arrangements for the project. To mitigate the risk arising from the fact that LSEB has no experience in managing World Bank-financed operations, FM staff well-qualified and experienced in IDA implementation and robust internal controls will be put in place. The FM risks will be reviewed during project implementation and updated as appropriate. The FM assessment concludes that the FM arrangements, including the mitigation measures for the Project, meet IDA's minimum FM requirement and are, therefore, adequate to provide reasonable assurance, accurate, and timely information on the project's status as required by the World Bank.

### (ii) Procurement

73. **Procurement will be carried out using the following World Bank procedures:** (a) the World Bank Procurement Regulations for IPF Borrowers (Procurement Regulations) dated September 2023; (b) "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006, and revised in January 2011 and as of July 1, 2016; and (c) other provisions stipulated in the Financing Agreements. Under paragraph 5.9 of the Procurement Regulations, the World Bank's Systematic Tracking and Exchanges in Procurement (STEP) system will be used to prepare, clear, and update procurement plans and conduct all procurement transactions for the project. In this regard, the allocation of roles in STEP shall be forwarded to the World Bank to register the implementing agency in STEP. World Bank Standard Procurement Documents to be used may be obtained at [www.worldbank.org/procurement](http://www.worldbank.org/procurement).

74. **A Project Preparation Strategy for Development (PPSD) was prepared.** The PPSD describes how procurement activities under the Technical Assistance component of the project, which will be managed by the REA and LSEB, will support project operations for the achievement of the PDOs and deliver Value for Money (VfM). The PPSD does not include



procurement activities that will directly be handled by private developers under the performance-based operations. The PSD has been reviewed and the 18-month Procurement Plan of the project has been cleared by the World Bank.

75. **Use of Commercial Practices:** Private sector enterprises, beneficiaries of loans/grants under Components 1 and 2, shall be selected following eligibility and selection criteria to be described in the PIM. Commercial Practices shall apply to procurement of Goods/Works/Consulting and non-Consulting Services done by private sector enterprises (ref. Procurement Regulations article 6.46). The guiding principles and private sector procurement procedures acceptable to the World Bank should be outlined in the PIM. These principles shall, inter alia, include: (a) compliance with the World Bank eligibility requirements in accordance with Procurement Regulations articles 3.21-3.24; (b) compliance with the World Bank Anti-Corruption Guidelines in the procurement process and during contract execution; (c) maintaining all relevant records for the World Bank's audits, when requested; and (d) compliance with World Bank's Environment and Social Framework (disco) requirements.

76. **Project implementation will be carried out by the PMU established under REA for implementing NEP.** The PMU is composed of five staff headed by a procurement specialist, assisted by a procurement officer, data filing officer and two support staff. The PMU and procurement officers have considerable experience procuring large-value and complex solar hybrid systems. The PMU also has experience in procurement using rated criteria for evaluating bids and proposals. The REA is advised to deploy some of its procurement staff to the PMU to enhance the procurement capacity of the REA.

77. **The REA has an e-procurement system (Odyssey platform) established under the NEP.** The system is expected to be used for most of its procurement under DARES. This will further improve value for money, transparency, economy, efficiency, effectiveness, integrity, and openness of the procurement process under the project.

78. **Regarding the proposed inclusion of a state-level implementing agency, a procurement assessment was conducted to determine the capacity of the LSEB to carry out the project's procurement functions.** LSEB has reasonable capacity and experience in small value contracts but no direct experience in World Bank-financed projects. Limited training of the existing staff, especially on World Bank Procurement procedures and STEP and lack of adequate office space have been identified as challenges. Some key measures such as renovating, furnishing existing space along with high-speed internet and procurement of essential office equipment (such as computers, printers, and scanners) will be implemented within 90 days of effectiveness to reduce the Procurement risk, currently determined as Substantial, to Moderate. As and when new states join the project, a similar assessment will be carried out of the concerned implementing agency.

79. **Considerations of risk of forced labor in the supply chain for solar systems.** The project will involve the procurement and installation of solar panels for connection to isolated and centralized grids. There are allegations of forced labor risks associated with the polysilicon suppliers. Any identified seller involved with forced labor in the manufacture and supply of solar panels and components will be declared ineligible to be awarded a contract under the project. Prior to beginning the procurement process, the Borrower will undertake a market analysis to identify the possible sellers of solar panels to the project. The Bidding Documents will emphasize forced labor risks in solar panels and components and require that sellers of solar panels to the project do not engage or employ any forced labor among their workforces. The Borrower will require Bidders to provide two declarations: a Forced Labor Performance Declaration (which covers past performance) and a Forced Labor Declaration (which covers future commitments to prevent, monitor, and report on any forced labor, cascading the requirements to their sub-contractors and suppliers). In addition, the Borrower will include enhanced language on forced labor in the procurement contracts. The World Bank will review prior procurements of solar panels and components to ensure that the Borrower use enhanced provisions.



### C. Legal Operational Policies

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Area OP 7.60	No

### D. Environmental and Social

80. **Environmental and social** (Moderate). The project will have moderate E&S risks and impacts associated with its activities, primarily constructing mini grids and deployment of standalone solar solutions. While all activities are expected to have moderate E&S impacts due to the limited scale of civil works required to develop solar hybrid mini grids of less than 1 MW, there are inherent environmental, social, health, and safety risks. These include electronic and hazardous wastes, solid waste, development of land for the construction of the powerhouse (land clearing, tree cutting, etc.), and end-of-life disposal of batteries containing hazardous materials (lead acid batteries), along with noise and dust emissions during the movement of equipment, soil pollution due to leakages, occupational and community health and safety risks common to civil works, and procurement of non-energy efficient machinery. Poor occupational health and safety practices among developers exist, although not expected to be high among international developers working in Nigeria. Bird and bat mortality is noted as a possible risk due to the perception of solar panels as water bodies (collisions). To address the identified risks, the previous Environmental and Social Management Framework (ESMF) under NEP was updated and disclosed in-country on October 6, 2023, and on the World Bank website on October 9, 2023. The updated Labor Management Procedures (LMP) and Stakeholder Engagement Plan (SEP) were also disclosed by the client on October 6, 2023, and on the World Bank’s website on October 9, 2023. The commitments from these instruments are captured in the Environmental and Social Commitment Plan (ESCP). The ESCP, which is part of the Financing Agreement, was also re-disclosed in-country on October 6, 2023, and on the World Bank’s website of October 9, 2023.

81. Under **land acquisition and land use**, some tiny pieces of land may need to be acquired. However, economic and physical displacements are very unlikely due to the small scale of the facilities to be constructed. The existing Resettlement Policy Framework (RPF) used for the NEP was updated and disclosed in-country on October 6, 2023 and on the World Bank website on October 9, 2023. The applicable Resettlement Action Plan (RAP) will be prepared, disclosed, and implemented if displacement becomes an unavoidable reality before the commencement of project activities, requiring land acquisition and displacement.

82. Project preparation will also involve the development of **citizen engagement** mechanisms and indicators, such as effective grievance redress and beneficiary feedback through, intensive periodic consultations with the project stakeholder’s, beneficiaries, strategic communications and public education initiatives, awareness raising campaigns, and surveys to measure citizens satisfaction and social impact. It is expected that the surveys will take place once at mid-term. The citizen engagement feedback will be integrated into the project interventions to close the feedback loop. The approach will have a feedback loop and use gender-disaggregated filters where possible.

83. Risks related to **labor and working conditions** exist (e.g., poor working environments, improper handling of workers' relations, misunderstanding of the rules of engagement for community workers, and use of child and forced labor by primary suppliers). Regarding **community health and safety**, the small-scale construction activities under Components



1 and 2 could likely attract migrant workers, whose impacts on receiving communities may need to be addressed. Community health and safety risks common to civil works also exist.

84. **The Technical Assistance component** will support activities to build institutional capacity, strengthen project implementation capacity of the REA, LSEB, FMoP, NEMSA, NERC, FMoE, FMoF and relevant project stakeholders such as mini-grid developers, local financial institutions, and PMUs in the ESF application and management during project implementation. The technical assistance component will also provide capacity support in developing a sector-specific citizen engagement framework and strategic solutions for the E&S risk management for the off-grid solar systems and private developers.

85. **Gender.** In Nigerian urban areas, female-headed households (FHHs) have lower access to electricity (79.2 percent) than male-headed households (MHHs, 83.6 percent).<sup>32</sup> The gap also depends on the region, varying from 10 percent (Ebonyi) to 28 percent (Jigawa). In addition, access varies by household composition, number of children, and income level. In urban areas, the electricity access gap is concentrated in the bottom quintile, where 13 percent of MHHs have access to electricity compared to six percent of FHHs.<sup>33</sup> Additional gender gaps also exist in entrepreneurship opportunities in Nigeria, with only 14 percent of firms managed by women<sup>34</sup>, with these MSMEs often disadvantaged also for their access to financing, information, and electricity. The project can be leveraged to help narrow the gender gaps to benefit those disadvantaged female-headed households and women-led firms. It will therefore include measures to reduce disparities of electricity access through subsidies and targeted communication campaigns. Indicators will track progress towards reduced disparities in household electricity access for disadvantaged FHHs and monitor newly obtained and improved access to electricity connections of female managed MSMEs. The target values will be selected based on the prevalence of disadvantaged FHHs and women-led businesses, in the case of households connecting 100 percent of FHHs as per NEP observations. In addition, the project will promote the increased participation of women in mini grid and standalone solar operations to provide new employment opportunities in the energy sector where women are often overlooked during recruitment processes and critically underrepresented as a result.

86. **Security.** The security situation in the country remains challenging. In view of this, a security risk assessment will be conducted based on the activities to be implemented. The assessments will be documented, and a Security Management Plan will be developed, which will increase the awareness of safety and security in project sites and ensure information flow on a timely basis.

## V. GRIEVANCE REDRESS SERVICES

87. **Grievance Redress.** Communities and individuals who believe they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the World Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit their complaint to the World Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of World Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to

<sup>32</sup> Demographic and Health Surveys (DHS) 2018 Nigeria

<sup>33</sup> Calculated from Demographic and Health Surveys (DHS) 2018

<sup>34</sup> Women's Financial Inclusion Data (WFID) Partnership 2022. A Gender Data Diagnostic of Nigeria.



the attention of World Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's GRS, please visit <https://accountability.worldbank.org>.

## VI. KEY RISKS

88. **Overall, the project risk rating is Substantial.** All risks rated higher than moderate and their respective mitigation strategies are discussed below.

89. **Political and governance (High).** The security situation in parts of northern and southeastern Nigeria, also areas with low electricity access rates, is still complex, with increasing banditry and kidnapping. Escalating security concerns post the Niger coup d'état could also have a negative impact on foreign investment. Specifically for the project, security situation in these areas could lead to limited deployment or delays that could also lead to communities feeling left out. The project will continuously monitor the security situation in the affected areas and engage stakeholders extensively to provide solutions for communities that are affected.

90. **Macroeconomics (High).** Nigeria has recently taken important policy actions on managing its exchange rate regime and Premium Motor Spirit (PMS) subsidies. The Central Bank of Nigeria has unified exchange rates and allows the rate to reflect market conditions. At the proper time, these changes should remove hitherto critical access to FX constraints, facilitating the importation of equipment, access to foreign financing, and profits repatriation. PMS subsidies were removed. However, inflation is entrenched at elevated levels, fiscal financing gaps remain material, and public debt sustainability concerns linger on. The outlook for Nigeria's growth is uncertain and dependent on external factors and the government's policy response to longstanding issues. With limited local manufacturing for renewable equipment (solar PV and batteries), expanding off grid renewable solutions will depend heavily on imports and fluctuations in exchange rate as well as dollar availability can have serious impact on developer financials and timelines. To mitigate partially against this risk, the project will continue discussions with FGN to allow grant disbursement in dollars providing some security to developers.

91. **Sector strategies and policies (Substantial).** Overall, power sector strategies, policies, and regulations for off-grid electricity supply are adequate, with progressive regulatory reviews often consistent with international good practices. However, the sector lacks an overall electrification strategy or plan, leaving the approach to electrification unclear. In situations where policies or regulations exist, inconsistent application and enforcement are an issue (imports). Additionally, regulations on options for mini grids when the grid arrives have yet to be tested in practice, and the potential for stranded assets remains a source of anxiety for mini grid developers and investors. As part of the project design, PBCs (defined above) have been introduced to improve the policy and regulatory framework for distributed access sector.

92. **Institutional capacity for implementation and sustainability (Substantial).** REA's PMU has gained extensive experience implementing NEP and has weathered significant departures through the capacity built. However, DARES comes with a significant scale-up of financing and scope. The implementation capacity of REA will have to be scaled up accordingly to meet the implementation progress expected. The proposed inclusion of a new state-level implementing agency to carry out technical assistance and grant management activities adds to the capacity needed for implementation under DARES. Hence, the risk has been elevated to Substantial despite substantial progress under NEP. To mitigate this risk, the project has introduced a PBC that specifically target the development of REA capacity through the development of a business plan and its implementation.



93. **Fiduciary Risk** (Substantial). The fiduciary risks include: (i) the use of financing proceeds for purposes not intended; (ii) fraud and corruption; (iii) political interference in the deployment of FM staff; (iv) the capacity of the PMU staff to render acceptable financial reports in a timely manner; and (v) use of the fund for expenditures that may not meet fiduciary requirements. These risks will be mitigated by drawing up a robust action plan and implementation support arrangements for the project. Additionally, the project will include improved measures for M&E with more data sharing on generation, consumption and performance by mini grids, clarity on beneficiaries of the project fund recipients and also exploring technical and geospatial solutions for verification.



VII. RESULTS FRAMEWORK AND MONITORING

PDO Indicators by PDO Outcomes

Baseline	Period 1	Period 2	Period 3	Period 4	Closing Period
<b>Access to electricity services for households and MSMEs with private sector led distributed RE.</b>					
<b>People provided with new or improved electricity service (Number) <sup>CR1</sup></b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	2628652	5257304	9638391	140190478	17524348
➤ People provided with new or improved electricity service - Female (Number) <sup>CR1</sup>					
0	1296188	2592377	4752691	6913005	8641256
➤ Households provided with new electricity services (Number)					
0	486,735	973,470	1,784,695	2,595,920	3,244,900
➤ Households provided with improved electricity services (Number)					
0	38,995	77,991	142,983	207,976	259,970
➤ Female-headed households provided with new electricity services (equaling 100% of female-headed households) (Number)					
0	73,010	146,021	267,704	389,388	486,735
➤ Female-headed households provided with improved electricity services (equaling 100% of female-headed households) (Number)					
0	5,849	11,699	21,447	31,196	38,996
<b>Generation capacity of energy constructed or rehabilitated (Megawatt) <sup>CR1</sup></b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	70	140	256	372	465
➤ Renewable energy generation capacity (other than hydropower) constructed under the project (Megawatt) <sup>CR1</sup>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	70	140	256	372	465
<b>Net GHG emissions (Metric ton)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	0	0	0	0	-16,242,863
<b>MSMEs provided with new and improved electricity services (Number)</b>					



May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	35,548	71,096	130,342	189,588	236,986
➤ Female-managed MSMEs provided with new and improved electricity services (Number)					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	10,664	21,329	39,103	56,877	71,096

**Intermediate Indicators by Components**

Baseline	Period 1	Period 2	Period 3	Period 4	Closing Period
<b>Component 1. Solar Hybrid Mini Grids for Economic Development</b>					
<b>Grant agreements signed (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	200	500	900	1295	1295
<b>Isolated mini grids commissioned (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	100	300	600	1000	1170
<b>Gasoline gensets replaced (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	0	59,000	155,000	223,000	288,000
<b>Interconnected mini grids commissioned (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	0	30	40	55	125
<b>Private capital mobilized for mini grids (Amount(USD))</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	91,950,000.00	184,000,000.00	337,150,000.00	490,400,000.00	613,000,000.00
<b>Public institutions electrified with rooftop solar (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	0	10	20	30	30
<b>Presidential approval for a national electrification strategy and implementation plan (NESIP) (Text) <sup>PBC</sup></b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028





No National electrification strategy and implementation plan	N/A	National electrification strategy and implementation plan prepared by FMoP and REA in consultation with States and approved by the President	N/A	N/A	National electrification strategy and implementation plan prepared by FMoP and REA in consultation with States and approved by the President
<b>Adoption, and operationalization of a new business plan for REA (Text) <sup>PBC</sup></b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
REA business plan does not allow for sufficient capacity to manage the scaled-up program.	N/A	Business plan prepared by REA, approved by FMoP, and adopted by REA; and Pre-defined KPIs satisfied by REA	Pre-defined KPIs satisfied by REA	Pre-defined KPIs satisfied by REA	Improvement in KPIs to demonstrate REA increased capacity
<b>Improved regulatory framework (Text) <sup>PBC</sup></b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
Insufficient regulatory framework for mini grids in place.	N/A	NERC mini grid regulations revised by NERC to (i) allow for batch processing of license and tariff applications; and (ii) require Distribution Companies to provide 12-month notice before reaching a mini grid site; and (iii) clarify duties, rights and obligations of communities in urban mini grids	NERC mini grid regulations revised by NERC to revise the permit limit for a mini grid.	N/A	Improved regulatory framework for mini grids is in place.
<b>Component 2. Stand-alone Solar Systems for Households, MSMEs and Agribusinesses</b>					
<b>Grant agreements signed (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	50	75	100	115	130



<b>Solar home systems deployed (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	550,000	1,100,000	1,650,000	2,200,000	2,750,000
<b>PUE systems deployed (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	15,000	30,000	45,000	60,000	75,000
<b>Women employed by Standalone Solar companies (Percentage)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	15	15	20	25	30
<b>Private capital mobilized for Solar Home Systems (Amount(USD))</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	62,250,000.00	124,500,000.00	228,250,000.00	332,000,000.00	415,000,000.00
<b>Component 3. Technical Assistance</b>					
<b>Geospatial planning platform for mini grids (Yes/No)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
No	Yes	Yes	Yes	Yes	Yes
<b>Pipeline of interconnected mini grid projects prepared (Yes/No)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
No	No	Yes	Yes	Yes	Yes
<b>Implementation of skills development program for solar supply chain (Yes/No)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
No	No	Yes	Yes	Yes	Yes
<b>Qualified states receiving technical assistance (Number)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	1	1	2	2	3
<b>Distributed Renewable Energy expert/advisor embedded at at least one DisCo (Yes/No)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
No	Yes	Yes	Yes	Yes	Yes
<b>Survey respondents reporting satisfaction with project delivered benefits (Percentage)</b>					
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028
0	0	0	70	0	70



Project related grievances registered and addressed (Percentage)						
May/2023	Jun/2024	Jun/2025	Jun/2026	Jun/2027	Dec/2028	
0	60	70	80	90	95	

**Performance-based Conditions (PBC)**

Period	Period Definition	Timeline
Period 1	Intermediate target 1	2024
Period 2	Intermediate target 2	2025
Period 3	Intermediate target 3	2026
Period 4	Intermediate target 4	2027
Period 5	Final target	2028

Baseline	Period 1	Period 2	Period 3	Period 4	Period 5
<b>1 : Presidential approval for a national electrification strategy and implementation plan (NESIP) (Text )</b>					
No National electrification strategy and implementation plan	N/A	National electrification strategy and implementation plan prepared by FMoP and REA in consultation with States and approved by the President	N/A	N/A	Approved NESIP
0.00	0.00	100,000,000.00	0.00	0.00	0.00
PBC allocation		100,000,000.00	As a % of Total Financing Amount		13.0%
<b>2 : Adoption, and operationalization of a new business plan for REA (Text )</b>					
REA business plan does not allow for sufficient capacity to manage the scaled-up program.	N/A	(i) Business plan prepared by REA, approved by FMoP, and adopted by REA; and (ii) Pre-defined KPIs satisfied by REA	Pre-defined KPIs satisfied by REA	Pre-defined KPIs satisfied by REA	Pre-defined KPIs satisfied by REA
0.00	0.00	150,000,000.00	50,000,000.00	50,000,000.00	50,000,000.00
PBC allocation		300,000,000.00	As a % of Total Financing Amount		40.0%



**3 : Improved regulatory framework (Text )**

Insufficient regulatory framework for mini grids in place.	N/A	NERC mini grid regulations revised by NERC to (i) allow for batch processing of license and tariff applications; (ii) require Distribution Companies to provide 12-month notice before reaching a mini grid site; (iii) clarify duties, rights and obligations of communities in urban mini grids	NERC mini grid regulations revised by NERC to revise the permit limit for a mini grid.	N/A	N/A
0.00	0.00	150,000,000.00	50,000,000.00	0.00	0.00
PBC allocation		200,000,000.00	As a % of Total Financing Amount		27.0%



### Monitoring & Evaluation Plan: PDO Indicators by PDO Outcomes

<b>Access to electricity services for households and MSMEs with private sector led distributed RE.</b>	
<b>People provided with new or improved electricity service (Number) <sup>CRI</sup></b>	
Description	The indicator measures the increase in number of people provided with new or improved electricity service. It is derived from the number of households with access multiplied by the household size in Nigeria (5 people).
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>People provided with new or improved electricity service - Female (Number) <sup>CRI</sup></b>	
Description	The indicator measures the increase in number of people provided with new or improved electricity service, disaggregated by gender.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Households provided with new electricity services (Number)</b>	
Description	The indicator measures the increase in number of households with new electricity services (i.e., new connections).
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Households provided with improved electricity services (Number)</b>	
Description	The indicator measures the increase in number of households with improved electricity services (i.e., improved quality of service).
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Female-headed households provided with new electricity services (equaling 100% of female-headed households) (Number)</b>	
Description	The indicator measures the increase in the number of the households headed by women with new electricity services.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Female-headed households provided with improved electricity services (equaling 100% of female-headed households) (Number)</b>	



Description	The indicator measures the increase in the number of the households headed by women with improved electricity services.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Generation capacity of energy constructed or rehabilitated (Megawatt) <sup>CRI</sup></b>	
Description	The indicator measures the increase in renewable energy <i>constructed</i> .
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Renewable energy generation capacity (other than hydropower) constructed under the project (Megawatt) <sup>CRI</sup></b>	
Description	The indicator measures the increase in renewable energy provided from the mini grids and solar home systems. The indicator includes the following breakdown of the final target: 117MW from isolated mini grids, 145MW from interconnected mini grids, 126MW from solar home systems, 30MW from rooftop solar and 47MW from solar home systems for productive uses of electricity. It contributes to Climate Change cross-cutting theme.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Net GHG emissions (Metric ton)</b>	
Description	The indicator measures Net Emissions over the economic lifetime, tCO <sub>2</sub> e.
Frequency	One time: at the time of project completion.
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>MSMEs provided with new and improved electricity services (Number)</b>	
Description	The indicator measures the increase in MSMEs with access to electricity services using mini grids, and standalone home systems. Specific metrics on the types of the MSMEs (commercial, agricultural etc.) will be provided by the mini grid and SAS developers and included in qualitative project reporting.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Female-managed MSMEs provided with new and improved electricity services (Number)</b>	
Description	The indicator provides a breakdown in female-managed MSMEs with access to to electricity services using mini grids, and standalone home systems. Specific metrics on the types of the MSMEs (commercial, agricultural etc.) will be



	provided by the mini grid and SAS developers and included in qualitative project reporting.
Frequency	Annual
Data source	REA, LSEB, mini grid and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB

### Monitoring & Evaluation Plan: Intermediate Results Indicators by Components

<b>Component 1. Solar Hybrid Mini Grids for Economic Development</b>	
<b>Grant agreements signed (Number)</b>	
Description	The indicator measures the number of grant agreements signed for commissioning of isolated and interconnected mini grids.
Frequency	Annual
Data source	REA, LSEB, mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Isolated mini grids commissioned (Number)</b>	
Description	The indicator measures the increase in the number of isolated mini grids.
Frequency	Annual
Data source	REA, LSEB, mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Gasoline generator sets replaced (Number)</b>	
Description	The indicator measures the increase in the number of the gasoline generator sets replaced.
Frequency	Annual
Data source	REA, LSEB, mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Interconnected mini grids commissioned (Number)</b>	
Description	The indicator measures the increase in the number of interconnected mini grids.
Frequency	Annual
Data source	REA, LSEB, mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Public institutions electrified with rooftop solar (Number)</b>	
Description	The indicator measures increase in the number of public institutions electrified with rooftop solar.
Frequency	Annual



Data source	REA, LSEB, mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Private capital mobilized for mini grids (Amount(US\$))</b>	
Description	The indicator measures the private capital required to be mobilized for mini grids.
Frequency	Annual
Data source	REA, LSEB, and mini grid companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Component 2. Stand-alone Solar Systems for Households, MSMEs and Agribusinesses</b>	
<b>Grant agreements signed (Number)</b>	
Description	The indicator measures the number of grant agreements signed for commissioning of solar home systems.
Frequency	Annual
Data source	REA, SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Solar home systems deployed (Number)</b>	
Description	The indicator measure an increase in the number of solar home systems deployed.
Frequency	Annual
Data source	REA, SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>PUE systems deployed (Number)</b>	
Description	The indicator measures the increase in deployment of PUE systems.
Frequency	Annual
Data source	REA, SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Women employed by Standalone Solar companies (Percentage)</b>	
Description	The indicator tracks the increase in the percentage of women employed (of total number of people employed ) by mini grid companies.
Frequency	Annual
Data source	REA, SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Private capital mobilized for solar home systems (Amount(US\$))</b>	





Description	The indicator measures the private capital required to be mobilized for solar home systems.
Frequency	Annual
Data source	REA, LSEB, and SAS companies
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Component 3. Technical Assistance</b>	
<b>Geospatial planning platform for mini grids (Yes/No)</b>	
Description	The indicator measures the rollout of the geospatial planning platform for mini grids.
Frequency	Annual
Data source	REA
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Pipeline of interconnected mini grid projects prepared (Yes/No)</b>	
Description	The indicator will measure the readiness for deployment of the interconnected mini grid projects.
Frequency	Annual
Data source	REA
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Implementation of skills development program for solar supply chain (Yes/No)</b>	
Description	The indicator measures the rollout of the skills development program for solar supply chain.
Frequency	Annual
Data source	REA
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA
<b>Qualified states receiving technical assistance (Number)</b>	
Description	The indicator measures the increase in the number of states qualified to receive technical assistance for creating an enabling environment for solar rooftop sector (e.g., support in assessment and adoption of policy targets).
Frequency	Annual
Data source	REA, LSEB
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Distributed Renewable Energy expert/advisor embedded at at least one DisCo (Yes/No)</b>	
Description	The indicator measures the availability of a distributed renewable energy expert/advisor in at least one DisCo. The embedded advisor will help with the preparation of an interconnected mini grid project pipeline at the DisCo.
Frequency	Annual
Data source	REA
Methodology for Data Collection	Project implementation reports



Responsibility for Data Collection	REA
<b>Project related grievances registered and addressed (Percentage)</b>	
Description	The indicator measures the functionality of the Grievance Redress Mechanism (GRM) process. Reporting will be disaggregated by gender.
Frequency	Biannual
Data source	REA, LSEB
Methodology for Data Collection	Project implementation reports
Responsibility for Data Collection	REA, LSEB
<b>Survey respondents reporting satisfaction with project delivered benefits (Percentage)</b>	
Description	The indicator measures the beneficiary satisfaction with project delivered benefits.
Frequency	Once, mid-term through project implementation
Data source	REA, LSEB
Methodology for Data Collection	Beneficiary survey
Responsibility for Data Collection	REA, LSEB



**ANNEX 1: Implementation Arrangements and Support Plan**

**Overall Implementation Support Needs**

1. The World Bank team will comprise members with different skills and required experience for successful project implementation. Tables A1.1 and A1.2 outline the expected staff/weeks and travel needed to ensure the actions and schedules are appropriately resourced.

*Table A1. 1 World Bank implementation support*

Time	Focus	Skills Needed	Resource Estimate (US\$, 000)
First 12 months	Pipeline and project readiness Procurement preparation pre-award Capacity building	Mini grid, SAS and PUE experts, procurement, FM, environmental, social, and gender/ Gender Based Violence (GBV)	1,500
12-24 months	Review of progress in deployment Capacity Building	Mini grid and SAS experts, procurement, FM	1,000
12-24 months	Review of progress in construction Review of O&M Capacity building M&E, ESF, and FM	Mini grid and SAS experts, procurement, FM	1,000
24-60 months	Closing out open contracts New pipeline development Continued review of construction and O&M, capacity building, M&E, ESF and FM	Mini grid and SAS experts	4,000

*Table A1. 2 Skills mix required.*

Skills Needed	Number of Staff Weeks	Number of Trips per Year	Comments
Team leaders	20	3-4	TTL based in Abuja; co-TL in Washington DC
Energy specialists	24-30	3-4	At least one based in Abuja
Procurement specialists	10-15	N/A	Based in Abuja
FMS	6	N/A	Based in Abuja
Environmental specialists	5-6	N/A	Based in Abuja
Social specialists	5-6	N/A	Based in Abuja
GBV specialists	2-3	N/A	Based in Abuja
Gender specialists	1-2	N/A	
Operational support	5-10	2	
Specialized technical experts	5-10	3-5	Initially 5, reduced to 3 later
Administrative support	5-10	N/A	Based in Abuja



## Financial Management

2. **Planning and Budgeting.** Budget preparation for DARES will follow the Federal and Lagos State procedures as appropriate. On an annual basis, the Project Accountants, under the leadership of the Director of FPFMD and the Head of LSPFMU, and in consultation with other key members of the implementing entities, will prepare an annual budget based on the prepared annual work plan for the fiscal year. The prepared annual work plan will be submitted to the World Bank for approval/No Objection.

3. **Accounting.** The REA FPMU and LSEB PMU will deploy an accounting system to prepare and report financial transactions. The accounting system to be deployed will be in place and functioning well by effectiveness of the project. A separate book of records will be maintained to track commitments and assets. Note that accounting records will be maintained in dual currencies (i.e., US\$ and NGN). All accounting and control procedures will be documented in the Financial Procedures Manual. The FPFMD/REA FPMU will be responsible for coordinating the preparation of the FPM and ensuring that it is regularly updated and shared with the relevant stakeholders.

4. **Financial Reporting.** The REA FPMU and FPFMD (Federal Projects Financial Management Department), including the LSEB SPMU (State Project Management Unit) and the LSPFMU (Lagos State Projects Financial Management Department), will prepare and submit semi-annual consolidated Interim Financial Reports (IFRs) within 45 days after the end of the semester in a format agreed upon with the World Bank and the annual audited financial statements which will be delivered six months after the financial year. The FPFMD/REA FPMU will be responsible for ensuring that the consolidated IFR and annual audit reports are delivered to the World Bank within the agreed timelines. Project Bank Designated (US\$) accounts and drawdown (NGN) accounts will be opened for the scale-up operation separately for REA FPMU and LSEB PMU with the Central Bank of Nigeria and a Commercial Bank acceptable to the World Bank for the execution of project activities. The FPFMD/REA FPMU and the LSPFMU/LSEB PMU will maintain separate financial transactions using their computerized accounting system, to generate separate IFRs for each entity. The LSPFMU/LSEB PMU is expected to prepare and deliver its IFR to the FPFMD/REA FPMU 30 days after the end of the semester.

5. **Internal Control, including Internal Audits.** The project's internal control and control environment was adequate with the segregation of functions. The internal auditors will conduct a risk-based review of project transactions and activities, and a quarterly internal audit report will be prepared and delivered to the World Bank 45 days after the end of the quarter.

6. **External Auditing.** The project will prepare and submit one annual consolidated audited financial statement to the World Bank. The LSEB PMU will submit records of its financial transactions 30 days after the end of the fiscal year to the REA FPMU for consolidation. The FPFMD/REA FPMU shall appoint relevantly qualified, experienced, competent, and independent audit firms for the project to prepare a consolidated audit report based on terms of reference acceptable to the World Bank. The auditors will express an opinion on the annual financial statements in compliance with international auditing standards. In addition to the audit reports, the auditors will prepare a management letter giving observations, and comments and providing recommendations for improvement and management responses in compliance with financing covenants. The FPFMD/REA FPMU will ensure that a copy of the consolidated audit report, including the management letter, is delivered to the World Bank six months after the end of each financial year.

## Funds Flow and Disbursement Arrangements

7. **DARES, REA FPMU.** A Designated (US\$) Account will be opened with the Central Bank of Nigeria. It will be



managed by the FPFMD within the Office of the Accountant General of the Federation for the project. Eligible expenditures incurred could be paid from the Designated Account (DA). Similarly, a current drawdown (NGN) account will be opened with the Central Bank of Nigeria to which drawdowns from the DA will be deposited to be applied for the payment of incurred eligible expenditures.

8. **DARES, LSEB SPMU.** A Designated (US\$) Account will be opened in a commercial bank acceptable to the World Bank. It will be managed by the Lagos State Project Financial Management Unit within the Lagos State Office of the Accountant General. Eligible expenditures incurred could be paid from this account. Similarly, a Current (NGN Drawdown) Account will be opened in a commercial bank acceptable to the World Bank, to which drawdowns could be deposited to be applied for payment of incurred eligible expenditures.

9. **Bank Accounts Signatories.** Authorized account signatories will consist of panels (A and B). One signatory from each panel will jointly sign project financial documents/instruments as follows:

**FOR REA FPMU/FPFMD**

**Panel A:** (i) the project coordinator, main, and (ii) a director in the department responsible for implementation, alternate.

**Panel B:** (i) Director FPFMD, main, (ii) Deputy director, FPFMD, alternate, and (iii) Project accountant, FPFMD/PMU, alternate 2.

**FOR LSEB PMU/LSPFMU**

**Panel A:** (i) the project coordinator, main, and (ii) a director in the department responsible for implementation, alternate.

**Panel B:** (i) Head Project Financial Management Unit (HPFMU), main, and (ii) Project Accountant, alternate

10. **Disbursement.** The minimum value of applications for Reimbursement, Direct Payment and Special Commitments is US\$100,000.00 equivalent. Replenishments of the DA will be done against withdrawal applications supported by the Statements of Expenditures. The option to disburse against submission of IFRs (also known as report-based disbursement) could be considered based on the quality of the IFRs, timeliness, and overall FM performance during implementation. Table A1.3 specifies categories of eligible expenditures.

*Table A1.3 Eligible Expenditures*

Category	Amount of Credit A Allocated (expressed in US\$)	Amount of Credit B Allocated (expressed in US\$)	Amount of Credit C Allocated (expressed in US\$)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, Training, Operating Costs, and Sub-financings under Parts 1 and 2 of the project	140,000,000			100%



Category	Amount of Credit A Allocated (expressed in US\$)	Amount of Credit B Allocated (expressed in US\$)	Amount of Credit C Allocated (expressed in US\$)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(2) Goods, non-consulting services, consulting services, Training, and Operating Costs under Part 3 of the project	10,000,000			100%
(3) Eligible PBC Expenditures for Parts 1, 2 and 3 of the project	200,000,000	250,000,000	150,000,000	100%
<b>Total Amount</b>	350,000,000	250,000,000	150,000,000	

Table A1.4 Financial management (FM) action plan

Action	Due Date (Timelines)	Responsible Entity
Agreed format for IFRs	At Appraisal (Completed)	FPFMD/REA FPMU and LSEB PMU
External audit Terms of Reference (TOR)	Before Effectiveness	FPFMD/REA FPMU and LSPFMD/LSEB PMU
Assign FM staff and supporting staff	Before effectiveness	FPFMD/REA FPMU, LSPFMD/LSEB PMU, World Bank
Deploy an Accounting software	Before effectiveness	FPFMD/REA FPMU and LSPFMD/LSEB PMU

11. **FM implementation support mission arrangement.** FM supervision will be consistent with a risk-based approach. The supervision frequency will initially be based on the assessment of FM risk rating at appraisal and subsequently will be updated on a continuous basis during implementation. Regular on-site reviews will cover key elements of financial management, overall fiduciary control environment, transactions review, and statements of expenditures (SOEs) review. Additionally, desk review during supervision will also include IFRs review, quarterly internal audit review, audited financial statements including management letters, and primarily timely follow-up of FM issues that will arise during implementation, and regularly updating FM risks and performance ratings of the project as appropriate.

**Procurement**

12. **The appropriate World Bank Standard Procurement Documents will be used for all international competitive procurement.** For national competitive procurement, the Federal Government standard bidding documents as published by the Bureau of Public Procurement may be used provided the following are incorporated into the documents: (i) open advertising of the procurement opportunity at the national level; (ii) the procurement is open to eligible firms from any country; (iii) the request for bids/request for proposals document shall require that bidders/proposers submitting bids/proposals present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts, confirming application of, and compliance with, the World Bank’s Anti-Corruption Guidelines, including without limitation the World Bank’s right to sanction and the World Bank’s inspection and audit rights; (iv) Procurement Documents include provisions, as agreed with the World Bank, intended to adequately mitigate against environmental, social (including SEA and GBV), health and safety risks and impacts, as well as cyber security risks, to apply for contracts that have been assessed to present potential or actual cyber security risks; (v) publication of contract award information; (vi) contracts with an appropriate allocation of responsibilities, risks, and liabilities; (vii) rights for the World Bank to review procurement



documentation and activities; (viii) an effective complaints mechanism; and (iv) maintenance of records of the Procurement Process. Other national procurement arrangements (other than national open competitive procurement), that may be applied for the project (such as limited/restrictive competitive bidding, request for quotations/shopping, direct contracting), shall be consistent with the requirements set out in paragraph 5.3 of the Procurement Regulations. As the core of the project involves the supply and installation of solar systems, the mandatory provisions to mitigate forced labor risk in the procurement of solar panels/components shall be adhered to. All new international procurements advertised on or after September 1, 2023, using the World Bank Standard Procurement Documents must use Rated Criteria. The latest versions of SPDs as published on the World Bank's external website shall be used for all international competitive procurements.

13. **Project implementation at the Federal Level shall be carried out by the PMU already established under the REA for implementing NEP.** The PMU has seven procurement officers headed by a Senior Procurement Consultant and assisted by other procurement specialists. The PMU and the procurement officers have considerable experience procuring large-value and complex solar hybrid systems. Some of the key procurements concluded include the Development of Solar Hybrid Power Systems for Universities and Teaching Hospitals awarded in seven Lots at the total cost of US\$104,816,995.70. The procurement process involved Initial Selection followed by Single-Stage, Two-Envelope process with Rated Criteria. On September 1, 2023, Rated Criteria became mandatory for most international competitive procurements where the World Bank's standard procurement documents are used. The REA is advised to deploy some of its procurement staff to the PMU for capacity building. The PMU office is generally spacious, accommodating most of its operational staff. However, additional space for proper storage of procurement documents will be required. The PMU may establish an electronic document management system (EDMS) effective storage and retrieval of documents.

14. The REA has an e-procurement system (Odyssey platform) established under the NEP. The Odyssey platform has been assessed by the World Bank for use as e-procurement system under NEP. The system is expected to be used for most procurement under DARES. This will further improve value for money, transparency, economy, efficiency, effectiveness, integrity, and openness of the procurement process under the project.

15. **Procurement assessment has been conducted to determine the capacity of the LSEB to carry out the project's procurement functions.** The LSEB has a Procurement Unit which reports directly to the General Manager of the Board. The Procurement Unit has two middle level staff being led by an Assistant Director who has Higher National Diploma in Purchasing and Supply Management and belongs to Chartered Institute of Purchasing and Supply Management of Nigeria. All three staff of the procurement unit are civil servants employed by the Lagos State Government. The procurement staff have reasonable experience in procurement of small value contracts using the Lagos State Procurement Law which was passed in 2012. Some of the procurement activities carried out include supply of power transformers for electrification of unserved communities, supply of solar streetlights and other electrical materials. Installations services are usually carried out through direct labor using engineers and technical staff of LSEB. However, the DARES procurement team does not have experience in World Bank financed projects and have not attended any major training on Procurement except local training occasionally being organized by the State Public Procurement Agency. Training on the World Bank's Procurement Regulations and the online STEP are required.

16. Lagos State has an e-Procurement System in place, but it is not fully deployed to cover the entire procurement cycle. LSEB is one of the Ministries, Departments and Agencies on the e-Procurement System. The State may consider deployment/activation of other modules of the System to incorporate the entire procurement cycle. Meanwhile, an EDMS may be established to ensure seamless filing and retrieval of procurement documents even after project closure.



17. Procurement activities under DARES are generally simple and standard. The procurement risk is therefore considered **Moderate**. However, LSEB is required to implement the following action plans.

Table A1.5 LSEB Procurement action plan

Action	Due Date (Timelines)	Responsible Entity
Train Procurement staff on World Bank Procurement procedures and STEP	Within 90 days of effectiveness	LSEB/World Bank
Obtain additional office space, renovate, furnish, and provide high speed internet facility	Within 90 days of effectiveness	LSEB
Procure new computers, printers, and scanners	Within 90 days of effectiveness	LSEB

### Environmental and Social

18. **Land Acquisition and Land Use:** The existing ESMF has been updated to include mitigation measures for the potential E&S risks and has provided a subproject screening and assessment mechanism. The screening and assessment mechanism has (i) utilized the World Bank General Environmental, Health, and Safety Guidelines; (ii) included templates for health, safety, and environmental (HSE) plans and waste management plans; and (iii) provided references to relevant disease preventive measures. REA will establish company selection criteria and compliance clauses in the grant agreement, both of which will include E&S requirements. In addition to other E&S due diligence processes that will be conducted by REA prior to implementation, all eligible Private developers would be required to develop an Environmental and Social Management System (ESMS) consistent with ESS9 and NEP ESMS system prior to onboarding such private developer on the project. Similarly, identified relevant participating government agency’s (e.g., LSEB Board - pilot) E&S system would be assessed prior to implementation of the solar roof top solution system.

19. **Labor and Working Conditions:** There could be a risk of accidents, particularly during installation and maintenance works of distribution lines which can result in injury and fatalities. Risks of falling objects, risks from manual handling of heavy loads. In addition, working from height at the roof top of buildings may also bring an occupational hazard for the solar installation. **Forced labor** - to address risks of forced labor in the project due to sourcing of solar PV materials, Environmental and Social Standard 2 (ESS2) requires, where there is a significant risk of forced labor related to primary supply workers, the Borrower requires the primary supplier to identify those risks and if forced labor cases are identified, the Borrower will require the primary supplier to take appropriate steps to remedy them. Ultimately, where remedy is not possible, the Borrower will, within a reasonable period, shift the project’s primary suppliers to suppliers that can demonstrate that they are meeting the relevant requirements of ESS2.

20. **Grievance Redress Mechanism:** The NEP GRM will be adapted to the locations and specifications of DARES. Project affected communities and individuals may submit their complaint to the World Bank’s independent AM. The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, because of World Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank’s GRS, please visit <https://accountability.worldbank.org>.





**ANNEX 2: Verification Protocol for Performance Based Conditions**

Table A2. 1 Verification Protocol

#	PBC	Definition/Description of achievement	Protocol to evaluate achievement of the DLI and data/result verification		
			Data source	Verification entity	Procedure
<b>PBC 1: Presidential approval for a national electrification strategy* and implementation plan (NESIP)</b>					
1	<i>Presidential approval for a national electrification strategy and implementation plan (NESIP*).</i>	<ol style="list-style-type: none"> <li>1. FMoP and REA, in consultation with States, prepare the NESIP and send to the President for approval</li> <li>2. The President approves the NESIP</li> </ol>	FMoP	REA PMU	<ol style="list-style-type: none"> <li>1. MOP notifies REA of the Presidential approval of the NESIP.</li> <li>2. REA PMU informs the World Bank and provides documentary evidence of the Presidential approval.</li> </ol>
<b>PBC 2: REA capacity building</b>					
2.1	<i>Preparation, adoption, and operationalization of a new business plan</i>	<ol style="list-style-type: none"> <li>1. REA prepares a new business plan detailing mandate, organizational structure, skills gap and required skills, staffing, investment and budgeting plan, key identified activities, operations roadmap for short term and medium term.</li> <li>2. FMoP approves the business plan</li> <li>3. REA operationalizes the business plan by initiating the activities scheduled for year 1.</li> </ol>	REA	REA PMU	REA PMU notifies the World Bank of milestone achievements, and provides the following documentary evidence: <ol style="list-style-type: none"> <li>a) An approved business plan</li> <li>b) Procurement and commencement of activities scheduled for year 1 of the business plan</li> </ol>
2.2	<i>Improvement in KPIs# to demonstrate increased capacity (at the end of each year of effectiveness)</i>	This PBC entails the following: <ol style="list-style-type: none"> <li>1. REA ensures time taken (working days) to sign grant agreement from receipt of completed and eligible application is reduced by at least 20% from current baseline that will be established at project effectiveness.</li> <li>2. REA ensures time taken to disburse funds from receipt of verified claims is reduced by at least 20% from current baseline that will be established at project effectiveness.</li> </ol>	REA	IVA	IVA carries out the following on an annual basis: <ol style="list-style-type: none"> <li>1. Review of time taken to review applications and sign grant agreements, and time taken to process claims by REA based on data extracted from Odyssey or other applicable enterprise data platforms approved by the World Bank</li> <li>2. Compare REA performance on the abovementioned processes with historical benchmarks established at project effectiveness.</li> </ol>



		3. REA ensures recruitment of an effective grant administrator that will achieve all targets linked to KPIs defined in the terms of reference (TOR)			3. Review performance of REA grant administrator against KPIs defined in their TOR 4. Provide the World Bank with a report summarizing the performance of REA against the historical benchmarks and of the grant administrator against KPI targets
PBC 3: Improving regulatory framework					
3.1	<i>Allow applications for permitting of isolated and interconnected mini grids, as well as tariff applications, on a portfolio basis</i>	The PBC entails the following:  NERC issues regulations that captures PBC 3.1	NERC	REA PMU	REA PMU verifies that NERC has issued a new regulation <i>allowing applications for permitting of isolated and interconnected mini grids, as well as tariff applications, on a portfolio basis</i> and notifies the World Bank by sharing an approved copy of the regulation as published by NERC.
3.2	<i>Require 12 months' notice for a DISCO to expand into a site served by a permitted mini grid.</i>	This PBC entails the following:  NERC issues regulations that captures PBC 3.2	NERC	REA PMU	REA PMU verifies that NERC has issued a new regulation <i>requiring 12 months' notice for a DISCO to expand into a site served by a permitted mini grid</i> and notifies the World Bank by sharing an approved copy of the regulation as published by NERC.
3.3	<i>Specify the rights, duties and obligations of communities with respect to the termination of tripartite agreements for interconnected mini grids</i>	This PBC entails the following:  NERC issues regulations that captures PBC 3.3	NERC	REA PMU	REA PMU verifies that NERC has issued a new regulation <i>specifying the rights, duties and obligations of communities with respect to the termination of tripartite agreements for interconnected mini grids</i> and notifies the World Bank by sharing an approved copy of the regulation as published by NERC.
3.4	<i>Increase the maximum capacity of mini grids governed by the NERC mini grid regulations from 1 MW to 5 MW</i>	This PBC entails the following:  NERC issues regulations that captures PBC 3.4	NERC	REA PMU	REA PMU verifies that NERC has issued a new regulation <i>increasing the maximum capacity of mini grids governed by the NERC mini grid regulations from 1 MW to 5 MW</i> and notifies the World Bank by sharing an approved copy of the regulation as published by NERC.



### ANNEX 3: Project Component Description

#### **Component 1: Solar Hybrid Mini Grids for Economic Development (US\$1,023 million, of which IDA US\$410 million and US\$613 million from private sector funding)**

- 1. Mini grids are electricity systems with independent power generation or decentralized energy resources (up to 1MW capacity in Nigeria) that serve multiple customers through a distribution network.** A mini grid can be fully isolated from the central grid or interconnected. If it is interconnected to the national grid, it must also be able to isolate (“island”) from the national grid and continue to serve its customers while operating in island or autonomous mode. Larger projects beyond 1 MW are similar in technical design to a typical mini grid but are regulated under a separate set of regulations – franchising guidelines and embedded generation regulations.
- 2. The NEP has helped establish Nigeria’s mini grid sector as one of the leaders in Sub-Saharan Africa over the past four years.** There are 74 developers registered on the NEP platform interested in developing mini grids in the country, with 52 having already submitted at least one project for consideration. More than 300 mini grid projects have grant agreements under the NEP, and 103 have already been commissioned and are functioning with 46,661 connections installed. While 5.5 MW PV capacity has been installed so far, 167 MW of capacity is in the pipeline. Nigeria’s mini grid sector is poised for scaling given there are 10,000 potential mini grid sites identified.<sup>35</sup>
- 3. However, access to finance remains a critical bottleneck for mini grid and solar rooftop developers.** While the market has been established and developers are raising private capital, high commercial interest rates (20-30 percent), high collateral requirements and short-term maturity loans (two to three years) are making debt financing of projects difficult in most cases. Most financial institutions do not know how to conduct credit risk analysis for renewable energy projects. Many lenders are skeptical that meaningful cash flow can be generated from renewable energy projects or doubt that the cash flow can be relied on to repay loans. In addition, the devaluation of the Nigerian Naira and rationed access to FX are limiting factors for companies that import most of their hardware but collect revenues from electricity tariffs in local currency. The devaluation of the Nigerian Naira and currency convertibility difficulties also constrain the ability of mini grid developers to access financing from international investors.
- 4. The bankability of mini grid projects, both isolated and interconnected, depends on upstream development efforts, which include site selection and preparation.** Key considerations during site selection are (i) customer economics, including current levels of grid supply; (ii) customer load profile and size; (iii) level of commercial activities and productive use of electricity; (iv) physical availability of space for DER installation; (v) community interest in mini grid solution; (vi) ease of community engagement; (vii) availability of clear leadership and governance structure in target community clusters; (viii) ease of data collection; and (ix) consumer interest in signing a long-term contract.
- 5. The mini grid component will support deploying private sector-led mini grids across Nigeria through results-based grant support.** The component will provide financial support to the private sector to deliver isolated mini grids (to increase access) and interconnected mini grids (to increase reliability) through two funding approaches – (i) MST, where developers bid for the minimum subsidy needed for a pre-determined lot of sites and (ii) PBG where the developer gets a pre-determined subsidy per connection for their proposed site or as a percentage of CAPEX for grid integrated projects.

<sup>35</sup> A World Bank geospatial analysis identifies around 10,000 settlements in Nigeria that are not electrified and have the attributes typically considered necessary for mini grid development, such as a minimum number of households, a certain population density, and so forth.



The existing NEP program included both these approaches, though the MST could not be implemented due to procurement delays and cost overruns on other components.

**Sub-Component 1.1: Minimum Subsidy Tender for Mini Grids (IDA US\$215 million, and US\$382 million from private sector)**

6. The key objective of the MST is to (i) enable grant-level discovery; (ii) aggregate demand that provides the level of scale and replicability required to attract larger investors; and (iii) direct project development to FGN’s geographical areas of interest that the private sector may be reluctant to consider.

**Isolated mini grids**

7. REA already has a pipeline of over 500 projects at various stages of readiness for tendering. REA had identified 150 sites under the proposed MST for the NEP that were not tendered due to procurement delays and cost overruns. These 150 sites, with completed pre-feasibility studies and community engagement, are ready for tendering and can serve as the initial pipeline for DARES. The REA has also conducted energy audits in about 500 commercial markets across the country out of which at least 150 are expected to be in unelectrified areas, suitable for isolated mini grid models. Another 250 isolated sites have been

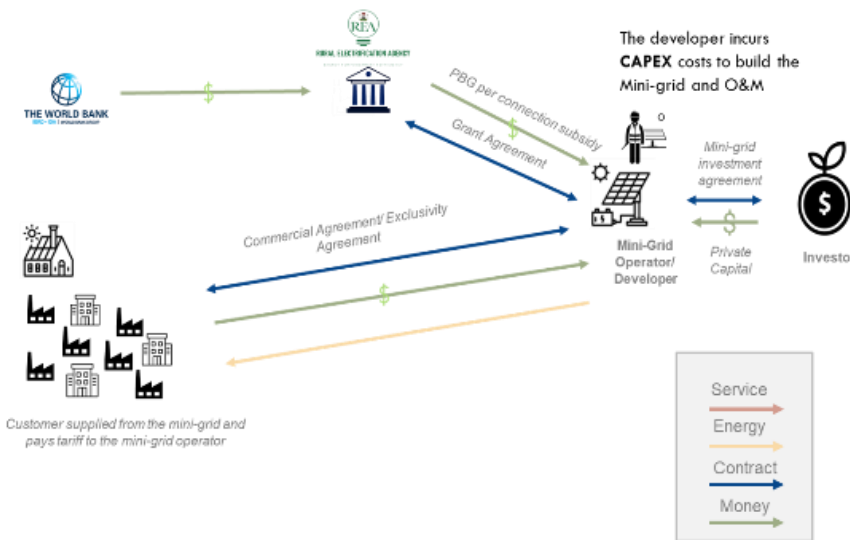


Figure A3.1 An indicative isolated mini grid model for DARES

identified through a geospatial assessment that host primary healthcare facilities prioritized by the government for electrification and have the attributes (in terms of population density, etc.) suitable for mini grid development. While the NEP did not implement the MST mechanism, the bidding documents and preparation for the pipeline had been completed. AfDB launched the MST using these documents as inputs. DARES intends to incorporate the lessons learnt from the AfDB experience in its MST process.

8. For the MST process to begin, REA will complete the pre-feasibility studies and community engagement at sites shortlisted for the process. Below is a summary of the steps needed for the MST process involving isolated mini grids: (i) Using the existing pipeline of over 500 projects, REA identifies the sites it intends to issue the Request for Proposal (RFP) for; (ii) The RFP documents are prepared, building on the NEP documents, and incorporating lessons learned from AfDB’s MST process; (iii) The selected developer from the competitive MST process gets on-boarded on the DARES grant program; (iv) The selected developer is assigned for registration with the grant administrator appointed by REA and executes a grant agreement with REA PMU; (v) The selected developer is expected to fulfill all fiduciary, E&S, and regulatory requirements expected of a participant of the DARES program through the project development processes; (vi) The developer receives the grant on a per- connection basis (level to be determined by their winning bid) in two different tranches subject to meeting the milestones, as specified in the DARES PIM; and (vii) The maximum time between grant agreement signing and Milestone 1 achievement will be 12 months, beyond which the developer may be delisted from the grant program.



**Interconnected Mini Grids**

9. **The project will support the deployment of interconnected mini grids in urban and peri-urban areas.** The focus areas of DARES interventions are in locations that the DISCOS do not prioritize for Performance Improvement Plan (PIP)<sup>36</sup> investments and are classified as tariff band C and below. Tariff band A to E implies the tariff charged by DISCOs in Nigeria for the different service levels expressed in the number of hours of supply enjoyed by customers in various locations within their franchise. Customers in tariff band A locations have a minimum of 20 hours per day; customers in tariff band B locations have a minimum of 16 hours per day; while customers in tariff band C, D and E receive 12, 8, and 4 hours of supply daily respectively.

10. **The MST becomes viable only with the availability of a pipeline of potential interconnected mini grid sites that can be put up for the tender.** A significant amount of preparation will be needed to develop a pipeline for interconnected mini grids. DARES will leverage the pipeline development work done by various other organizations, such as GiZ, KfW Entwicklungsbank, GEAPP, and RMI who have identified several sites with three-four DISCOs that are suitable for deploying interconnected mini grids. The project will collaborate with these development partners to ensure their pipelines are used for the MST process. DARES has earmarked resources to support the site identification work that involves pre-feasibility studies, energy audits, and initial community engagement.

11. **The first step in the MST process involves identifying DISCOs interested in deploying interconnected mini grids or franchise projects.** Given that the DISCOs are a critical stakeholder in the process, it is imperative that there is buy-in from the outset. Key steps are: (i) Participating DISCO will execute a Memorandum of Understanding (MOU) with REA on developing an initial number of selected sites within its franchise area; (ii) The participating DISCO receives technical assistance through REA PMU, which includes support for capacity building, site assessment, energy audit and demand studies. DISCOs can also leverage the work they are currently undertaking with various development partners such as GEAPP, GIZ, and others; (iii) REA PMU, supported by specialist consultants, issues a RFP to pre-qualified developers for pre-identified sites leveraging

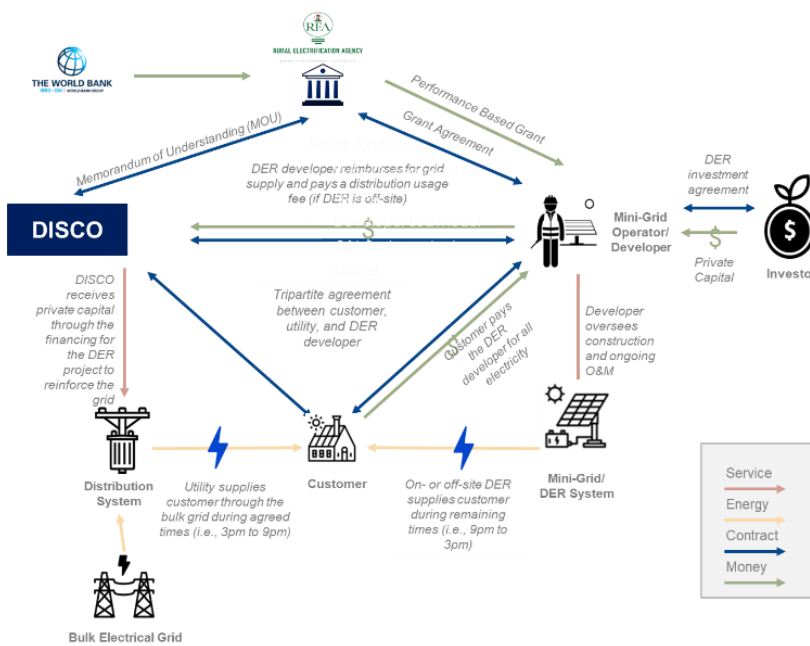


Figure A3.2 Indicative Interconnected Mini Grid model for DARES

the energy audit reports, economic assessment, financial assessment, investment teasers, and information memorandum for each site, made possible by the technical assistance facility; (iv) Selected developer from the competitive MST process

<sup>36</sup> The PIPs have been developed by each DISCO to define the technical and operational interventions required to turn-around their operations as well as detailing the requisite capital investment. The PIPs were developed, as part of the World Bank financed Nigeria Distribution Sector Recovery Program (DISREP), in accordance with the NERC guidelines and are approved by the NERC before becoming operational. The PIPs are tailored specifically to the unique needs and circumstances of each DISCO. The PIP includes technical investments, such as new and refurbished infrastructure, and commercial investments such as commercial management systems and revenue protection programs. There will be no overlap in World Bank funding between DARES, and any other World Bank financed projects, including DISREP.



approaches the REA PMU with a tripartite agreement executed with the DISCO and Community and/or Franchise agreement executed with the DISCOs (approved by the NERC) to get onboarded on the DARES grant program; (v) The selected developer/franchisee is assigned for registration with the grant administrator appointed by REA and executes a grant agreement with REA PMU; (vi) The selected developer is expected to fulfill all fiduciary, E&S, and regulatory requirements expected of a participant of the DARES program through the project development processes; (vii) The developer receives the grant as a percent of their overall CAPEX cost (level to be determined by their winning bid) in two-three different tranches as specified in the DARES PIM; and (viii) The maximum time between grant agreement signing and Milestone 1 achievement will be 12 months, beyond which the developer may be delisted from the grant program.

12. For projects that exceed 1 MW, although the grant criteria, award, and process remain the same, they will be subject to different regulatory treatment: embedded generation regulation and franchising guidelines will apply. The DARES program will include these projects under the MST process. The MST will be used to determine the minimum CAPEX results-based grant that will be provided for the selected developer/franchisee. As indicated above, all sites above 1 MW will need both franchisee and generation components to be considered for DARES support.

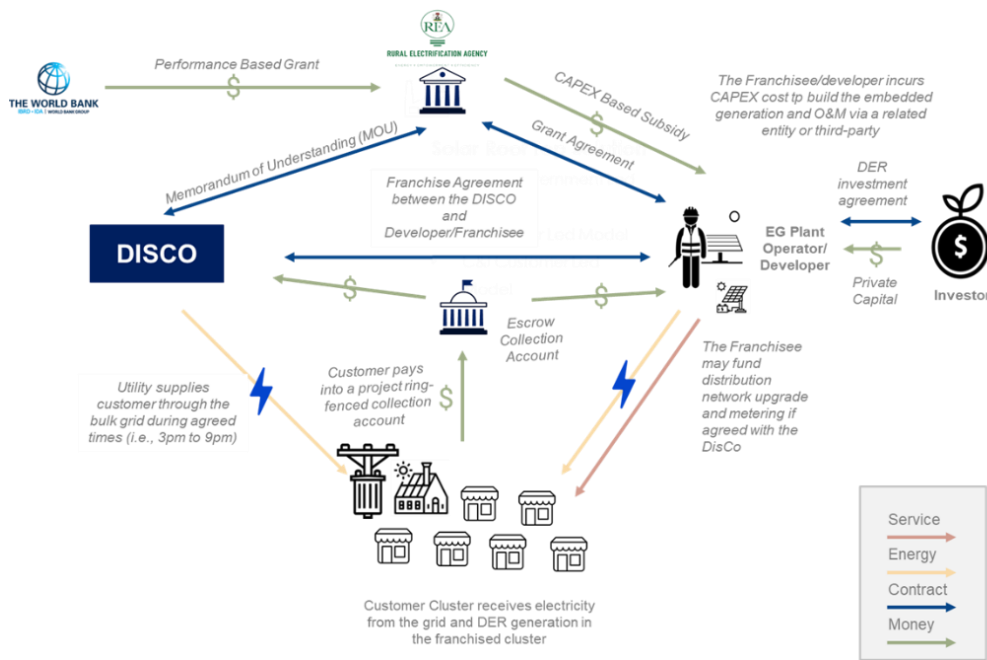


Figure A3.3 An indicative embedded generation/franchising model under DARES

**State Government-led Solar Rooftop Solutions (Solar DPV)**

13. **Support to states for deploying solar DPV will start with Lagos State serving as the first pilot.** The World Bank has been working with Lagos State to develop an enabling framework for solar rooftops, leading to the state announcing a 1GW target for solar DPV by 2030. World Bank Geospatial analysis suggests a potential of approximately 10-15 million MWh/year of electricity generation from DPV in Lagos State, and the addressable market demand is estimated at approximately US\$ 1.5-3 billion. While there are several ways to deploy solar DPV, given the market nascency and DARES’ private sector-led approach, the program will encourage the energy as a service (EAAS) model. This will also improve project sustainability as general hospitals lack the capacity to operate and maintain solar DPV installations sustainably.

14. **Lagos State will pilot the deployment of solar rooftop solutions at large general hospitals in the state to demonstrate the technology and the EAAS model.** The process under DARES will involve the following key steps: (i) Lagos State government executes a subsidiary agreement with the Federal Ministry of Finance Budget and National Planning (FMFBNP) to participate in the DARES program, providing an indicative number of projects they intend to develop. (ii)



Lagos State compiles information on diesel genset powered general hospitals to determine the solar potential and demand- Lagos State has already carried out energy audits for hundreds of state government buildings, including general hospitals. (iii) The information will be used to prepare lots for the bidding process based on their profile, roof material, location, demand, etc. (iv) The demand is aggregated and warehoused into lots with a number of project sites which is leveraged to conduct a tender wherein an RFP is issued to selected developers on a competitive basis to enable price discovery and cost optimization. (v) State government appoints a technical consultant or Owner Engineer in the absence of in-house capacity to evaluate submitted proposals and select developer. (vi) Negotiation and signing of a power purchase agreement (PPA) occurs between the developer and the State Government under an EAAS model. (vii) The PPA forms the basis of CAPEX performance based grant support provision that is channeled through the state government directly to the selected developer (the level of grant as a percentage of total capital cost will be determined by using the data from existing solar rooftop projects). The developer receives the grant as a percent of his overall CAPEX cost in two different tranches subject to meeting the milestones, as specified in the DARES PIM. (viii) The developer will be responsible for the design, supply, installation, and O&M of the solar rooftop system. (iv) The selected developer is expected to fulfill all fiduciary requirements, E&S requirements, and regulatory requirements expected of a participant of the DARES program.

**Sub-Component 1.2: Performance Based Grants Program (IDA US\$195 million, and US\$231 million from private sector)**

15. **The PBG for mini grids will be carried over from the existing NEP with improvements based on lessons learned from the NEP implementation.** Under this sub-component the REA will provide pre-determined PBGs to mini grid operators in US\$ based on new customer connections (US\$/end-user) for isolated mini grids and as a percentage of CAPEX for interconnected mini grids. The grant program will be kickstarted with a pre-determined grant level based on rigorous market analysis and experience from the implementation of the NEP. However, price discovery from the minimum subsidy tender is expected to provide a better understanding of prevailing market fundamentals, and the performance based grant may be adjusted accordingly. Furthermore, cost benchmarking and market assessment activities will be carried out on a regular basis to inform the recalibration of PBG levels in a predictable manner.

16. **Grants may be differentiated based on attributes of the community, such as geographic location and socio-economic status, and by mini grid customer segment.**

At the site level, higher grants can be offered for poorer or more insecure regions/areas such as north-east and south-east Nigeria, determined by the current level of activity by existing mini grid players (dividing the country into 3-4 tiers of grants). Within sites, higher grants will be offered for connecting productive loads to compensate for the switching cost from existing fossil-fueled generator sets. Grant will be disbursed against two pre-defined milestones: commissioning and customer connections, and upon meeting a certain capacity utilization factor one year after commissioning.

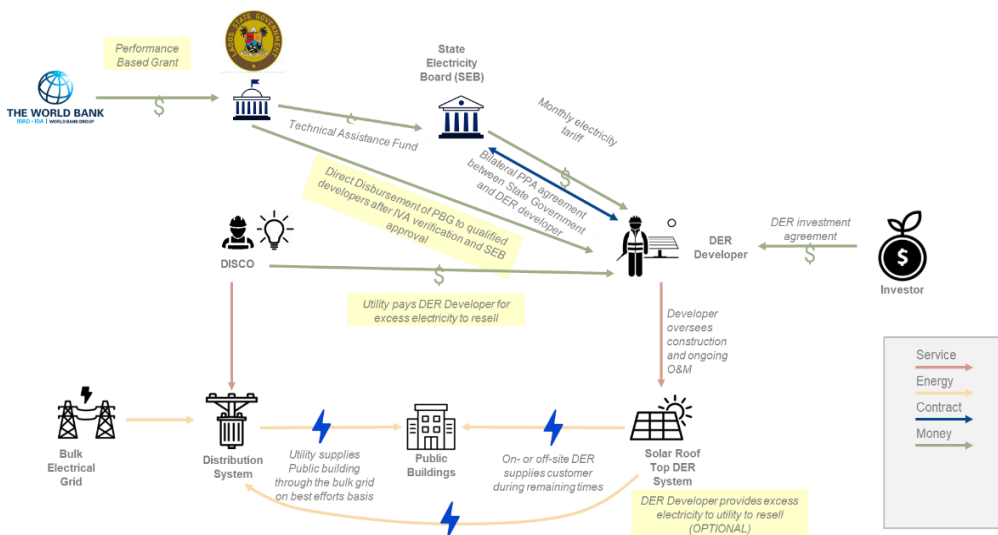


Figure A3.4 An indicative solar rooftop model under DARES

customer connections, and upon meeting a certain capacity utilization factor one year after commissioning.



17. **The following provides a broad summary of the implementation steps for the PBG window:** For isolated mini grids (i) The private developer prospects for sites (ii) The private developer secures an exclusivity agreement with the community of interest (iii) Following project development activities, including economic assessments and community engagement, the developer secures a commercial agreement with the community cluster (iv) The developer approaches the REA PMU with a business proposal, including an executed commercial agreement with the target community approved by NERC for onboarding into the grant program (v) After the proposal assessment by REA PMU and eligibility conditions are met, a grant agreement is executed with the developer (vi) The selected developer is expected to fulfill all fiduciary requirements, E&S requirements, and regulatory requirements expected of a participant of the DARES program through the project development processes (vii) The developer receives the grant in different tranches as specified in the DARES PIM. (viii) The maximum time between grant agreement signing and Milestone 1 achievement is 12 months beyond which the developer may be delisted from the grant program. The process is similar for interconnected mini grids except it requires securing a tripartite agreement with the community and the distribution company, not just an agreement with the community.

***Component 2. Standalone Solar Systems (SAS) for Households, MSMEs, and Agribusinesses (IDA US\$715 million, of which IDA US\$300 million and US\$415 million from private sector funding).***

18. **The SAS market in Nigeria is vibrant and has already demonstrated considerable success, with over 50 international and local companies actively operating in the market and two million<sup>36</sup> SAS sold from 2018 to the first half of 2022**, of which over 1.1 million systems were deployed with NEP support, reaching households and businesses that were previously without electricity or underserved. Many products sold in Nigeria are sold in cash and qualify as entry-level products. The PAYGo financing model significantly increased access to SAS by making it more affordable by allowing customers to pay overtime.

19. **The SAS market, while active, faces several barriers to reaching rural areas, including a viability and affordability gap.** The viability gap is caused by the high distribution cost of SAS, which may not generate enough revenue to cover installation and maintenance costs, making it unviable for companies to expand their supply. The ability to pay is also a challenge. Affordability of systems, however, increases substantially if consumer financing is introduced: 98 percent of the off-grid households currently below tier 1 level of access would be able to afford a tier 1 solar system. And 84 percent would be able to afford a tier 2 system<sup>37</sup>.

20. **DARES seeks to address some of these barriers through PBGs and catalytic grants.** This component will expand the availability and affordability of SAS for households, MSMEs, and farmers in rural areas. Through targeted and competitively awarded performance-based and catalytic grants, the uptake of 2,750,000 quality-certified SAS and 75,000 PUE products in rural areas and amongst lower-income segments will be promoted. Under Sub-component 2.1, the PBG will provide results-based payments per connection. Under Sub-component 2.2., Catalytic upfront grants will support companies seeking to set up distribution in hard-to-reach, underserved areas focusing on low-income poor consumers. The REA will implement the component with assistance from a sub-contracted dedicated grant administrator and an IVA.

***Sub-Component 2.1: Performance Based Grants for Standalone Solar Systems (IDA US\$280 million, and US\$415 from private sector)***

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<sup>37</sup> Please see Annex 8 for tiers description





21. **Performance Based Grants for Solar Home Systems.** Both supply and demand side support will be provided through the PBG to address the viability and affordability gap, respectively.

- **Supply Side Subsidies** will incentivize distributors of SAS to enter rural areas without increasing end-user prices by partially absorbing initial investment costs associated with the expansion of supply chains. Serving rural households is currently not viable. When expanding supply to rural areas, additional costs incurred by companies would have to be passed on to the end-user, making products unaffordable. Incentive payments will vary by location and size, with higher payments awarded for larger systems installed in deeper rural areas. To further promote affordability of systems and digital inclusion, extra incentive payments will be awarded to systems sold through consumer financing mechanisms, such as PAYGo. Tier 1 and Tier 2 systems are eligible for the supply side subsidy.
- **Demand Side Subsidies** will address the affordability gap by reducing the end-user prices for households identified as poor and vulnerable by the National and State Social Registry. The registry is currently comprised of 12 million households. Only households listed on the registry will be eligible for end user price reductions. Households will be further categorized based on income levels to determine appropriate subsidy level per type of household. The demand side subsidy will be channeled through companies: via an ‘eligibility tool,’ companies will cross-check the status of a household. If listed in the registry, companies may sell the system at reduced price. These rates will be calculated taking into account the average price of the solar product and the estimated end-user's ability to pay. The demand side subsidy will be available for Tier 1 systems only. The component will start with a pilot in a few states to test the efficiency and effectiveness of this highly targeted subsidy before a nationwide scale-up.

Only companies that sell VeraSol<sup>38</sup>-certified products or equivalent and have the demonstrated ability to honor warranties and provide adequate after-sales services will be eligible to participate in the PBG for SAS. Connections in urban centers are not eligible for supply and demand side PBG. Analytical work is ongoing to review results achieved via the subsidies offered under the NEP. The results of this study will inform the final PBG design for SAS, including incentive amounts, which will be specified in the PIM.

22. **Performance Based Grants for Solar PUE Equipment.** The PBG for PUE aims to support mature standalone solar PUE technologies. Although the solar-powered PUE market is still in its preliminary stages, various established and innovative technologies across sectors and value chains can benefit from solar solutions. A phased and targeted approach will prioritize mature technologies based on VeraSol testing, recipients of Global Leap Awards, or SONCAP certification. Support will begin with quality-verified technologies such as solar water pumps for farming and aquaculture, solar cooling units for MSMEs and agribusinesses, and charging stations for e-mobility. The multi-tier framework tiers will be used to categorize the technologies by installed capacity and service level. Allocation of subsidies will be based on equipment type, solar and system capacity, and price. Funds will be distributed through PUE suppliers responsible for procurement, distribution, marketing, and after-sales support. Additional incentives will be provided for consumer financing and to overcome market growth barriers, including high product prices. Targeted demand-side subsidies will be explored to reduce appliance costs for specific groups such as MSMEs and smallholder farmers.

23. The project aims to scale down subsidies over time to ensure the long-term sustainability of the sector. To achieve this, the project will establish a geospatial index that merges socio-economic risk data with SHS market penetration statistics, enabling the effective targeting of supply-side subsidies to underserved regions. Geofencing will be applied to

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<sup>38</sup> On February 18, 2020, Lighting Global, CLASP, and the Schatz Energy Research Center launched VeraSol, an evolved quality assurance program that responds to the market's growing needs. VeraSol builds upon the strong foundation laid by Lighting Global, and expands its services to encompass appliances, productive uses, and component-based solar home systems.



direct subsidy allocation and monitor market penetration trends. The project will conduct assessments of socio-economic risk and market penetration data for each geofenced region to make necessary subsidy adjustments based on the progress observed. Concurrently, the project will closely track the expansion of PAYGo models, which enhance affordability, foster market growth, unlock economies of scale, and drive down costs, thus diminishing reliance on subsidies. Steady PAYGo revenues can attract private sector investments, further lessening subsidy reliance. Detailed subsidy reduction methods will be outlined in the project implementation manual.

***Sub-Component 2.2: Catalytic Grants (IDA US\$20 million)***

24. This sub-component will incentivize companies targeting poor and hardest-to-reach consumers in remote areas by offering matching or “catalytic” grants. Matching grants will be offered to companies to ensure the company has available funding and skin in the game. Payments will be tranche-based and paid against pre-determined milestones. The product scope of this sub-component will remain flexible, given the need to support less mature PUE technologies. This window of funding will be delineated from the PBG.

***Component 3. Technical Assistance (US\$80 million, of which US\$40 million from IDA and US\$40 million from other development partners)***

25. **For Technical Assistance component - REA will be the implementing agency for two sub-components alongside a state-level agency for the third sub-component.** Sub-component 3.1 (institutional strengthening) and 3.2 (DARES ecosystem and implementation) will be implemented by the REA while Sub-component 3.3 (engagement with states) will be implemented by state-level agencies. The LSEB, currently engaged as the implementing agency for Lagos State, will manage and implement the designated technical assistance for Lagos State given its readiness. As new states express interest to join the project and meet the eligibility criteria, they will be able to access the technical assistance funds under Sub-component 3.3 through their designated implementing agency.

26. **This component is designed to build a framework for rural electrification upscaling, support project implementation as well as broad capacity building in REA, NERC, FMoP and other relevant stakeholders like NEMSA, FMoE and FMoF.** The creation of the DARES platform requires expanded upstream technical assistance from stakeholders. DARES will partner with other development agencies to implement such support. Extensive stakeholder consultations, bilaterally and through workshops, identified the need for an upstream project preparation across all components to help developers prepare better projects, perform market intelligence for project bankability, write business/funding proposals, and build capacity.

27. **Extensive collaboration is already happening on technical assistance under DARES.** The DARES team is in consultation with multiple DFIs to structure supportive technical assistance and has already received US\$4 million technical assistance funding support from the GEAPP, expandable to US\$10 million, to support ecosystem building (planning, access to finance, Financial Intermediary Financing (FIF readiness)<sup>39</sup>, pre-investment and safeguards linked activities). The GEAPP has separately provided around US\$100 million to support the private sector developer ecosystem (capacity, pipeline, grant financing). SEforALL is providing electrification planning support toward the preparation of DARES. USAID and JICA will provide coordinated institutional strengthening and capacity support through embedded personnel in REA towards policy and process reforms. SEforALL, in consultation with the Nigerian Energy Transition Office, will provide analytical and advisory support on energy transition areas (generator set replacement, tapping carbon markets) and electrification planning.

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<sup>39</sup> FIF readiness activities comprising of capacity building on new product development and pricing, facilitation of consultative dialog on policy reforms, etc.



28. **For better monitoring and evaluation, a big data platform will be used to administer and manage the results-based financing programs and competitive tenders.** The project will continue to utilize the Odyssey platform, which REA is already using to manage the NEP, to implement, monitor and report on the status of all of the PBG and MST programs. Since it centralizes data on a single platform, the project will exploit this end-to-end solution to organize data across the entire lifecycle of sub-projects, including: (i) feasibility analysis, proposal submission and evaluation for tenders; (ii) qualification and grant claim submission and tracking for results-based financing programs; and (iii) performance monitoring of DRE assets. Since DARES will require verification of capacity utilization in mini grids after one year, more extensive data sharing will be necessary than has been the practice under the NEP. Smart meter integration with Odyssey will be required from mini grid projects in order to verify electricity consumption, and the Project will implement a responsible data sharing framework, currently under development with input from a wide group of sector stakeholders, to ensure that due attention is paid to concerns around data privacy and security.



#### ANNEX 4: Lessons Learned from the NEP implementation

- 1. Untargeted subsidies allowed a fast scale-up to kickstart the market, but better-calibrated, differentiated subsidies are necessary to reach targeted populations sustainably.** While the SAS market scaled up rapidly under the NEP, results leaned towards easier-to-serve urban areas since no geographical area or sector of the population was targeted. A broad product scope was adopted that required a minimum of 6wp capacity and a minimum service of three light bulbs and phone charging capabilities with no maximum capacity or service. Participating companies could choose the type of system and the area best suited for their business model. This resulted in a high concentration of systems in urban and peri-urban areas, while penetration in rural and remote areas remains untapped and insufficient.
2. Despite the untargeted market-based approach, the PBG supported the sale of over a million solar home systems across the 36 states, and FCT in Nigeria, with higher concentration in the South- West and North- West. Sales activity after adjustments to the NEP subsidies demonstrated that that higher supply and demand side subsidies are catalysts for significant market scale-up, and a study is underway to analyze the impact and performance of the end-user subsidy. In the future, a more effective way could be to direct end-user subsidies under the SAS through the FGN's National and State Social Registry to ensure that they are directed towards the poorest households and to develop subsidy tiers to better align the level of subsidy with the viability gap applicable to different geographies and populations.
3. The SAS market in Nigeria currently has two core business models: (i) cash sales, typically smaller and cheaper systems, such as solar lanterns, and (ii) PAYGo models, typically for plug-and-play solar energy kits and SAS (which are larger). The PAYGo model is known to drive digital financial inclusion in remote areas where customers would have otherwise not been able to access financing. These models make the services more affordable for households that cannot pay the high costs of such systems, especially for low-income households. Offering higher incentives to systems sold on PAYGo to support faster scaling of this business model, which was not addressed under the NEP, is a good example of how differentiated subsidies can better promote affordability for targeted populations.
- 4. MSTs are still needed for mini grids to ensure that public funding, and private co-financing leveraged by those public resources, can be efficiently directed to priority areas and market segments.** The complete delegation of site selection decisions to the private sector and the offer of a single grant level for all types of projects under the PBG have led to an uneven deployment of mini grids across the country. Mini grid rollout has been concentrated in relatively easier-to-reach/operate areas rather than the whole country, especially the FCV portions. Achieving universal access and other policy goals that the government may have (such as the equitable distribution of public resources for a federal state like Nigeria) require tools for the government to direct electrification efforts towards areas that would not otherwise receive interest from the private sector.
5. Competitive mechanisms like MSTs, which aggregate and tender sites to the private sector to build, operate, and maintain mini grids based on a reverse auction of the subsidy required, provide both price discovery as well as a modicum of control over where investments in rural electrification are channeled. While the MST could not be concluded successfully under the NEP due to procurement delays and insufficient responsive bids, the rationale for it remains valid and, going forward, a more streamlined procurement approach and selecting robust, economically viable sites should be considered for implementation success.
- 6. PUE is key to sustainability and requires a specific focus (covered in main text)**
- 7. Urban populations reliant on expensive and polluting generator sets cannot be ignored (covered in main text)**



8. **Direct disbursement of grants in US\$ for mini grids and standalone solar allows for greater leverage of private capital.** The devaluation of the Naira and rationed access to FX are limiting factors for companies that import most of their hardware but collect revenues from electricity tariffs in local currency. Results-based grants for both mini grids and standalone solar were increased under the NEP due to (i) losses incurred by participating companies when receiving the grants in Nigerian Naira at the official exchange rate and converting the proceeds to foreign currency at the parallel market rate combined with the depreciating Nigerian Naira, and (ii) longer wait times to access US\$ from the Central Bank of Nigeria. While the FX unification addresses some of these issues, the structural problem persists. With direct disbursement, the absolute grant amounts in US\$ can be reduced without leaving the private sector worse off, as has been instituted recently in the NEP and should continue until the broader FX issue is fully resolved.

9. **Using big data tools and analytics delivers efficiency gains from end to end.** The NEP initiated the use of the Odyssey data platform, which has enabled a program involving many small transactions for distributed renewables to manage sequential processes efficiently, from pre-qualification of participating companies to technical design and evaluation to verification of claims and disbursement of grants, as well as e-Tendering. In the future, the use of the Odyssey platform and the data-driven approach should be further augmented with new geospatial, grant management, and impact assessment tools to enhance program administration, and monitoring and evaluation.

10. **Access to finance remains a critical bottleneck for mini grid and solar rooftop developers.** While a market has been established under the NEP, and developers are raising private capital, high commercial interest rates (20-30 percent), high collateral requirements, and short-term maturity loans (two to three years) are making project debt financing difficult in most cases. The devaluation of the Nigerian Naira and currency convertibility difficulties also constrain the ability of developers to access financing from international investors. Notwithstanding some recent instances of developers securing project finance from several types of local and international investors, which portend well for the sector, the industry has struggled to raise capital commensurate with the pipeline of projects ready for deployment. Local currency finance has been complicated to unlock, with local commercial banks still skeptical of the viability of mini grid projects and typically seeking collateral more than the value of the project assets when willing to lend at all. Most financial institutions cannot conduct credit risk analysis, and others are not confident that sufficient cash flow can be generated from such projects to repay loans. Until the time that the World Bank can provide working capital and other debt facilities through financial intermediation, alternative sources of financing will have to be leveraged to support the industry. This includes funding from philanthropic sources like the GEAPP or upstream debt through the IFC.

11. **An FGN-owned scalable platform to coordinate all electrification efforts can significantly speed up the pace of electrification.** While the NEP intended to be this platform and benefitted from their analytics and proof of concept pilots, most development partners operated in coordinated silos. The African Development Bank provided parallel financing for the NEP. However, it primarily replicated rather than complemented the World Bank's interventions. In the future, development partners and financiers will need to coordinate their investment and technical assistance activities to complement public funding for the DRE-led access to achieve maximum mobilization of private sector investment, which will lead to maximum impact on the ground. A notable example is the upstream support provided by the GEAPP through philanthropic capital, enabling debt, equity, and guarantee facilities in coordination with the NEP and DARES.



## ANNEX 5: Summary of the potential IFC facility linked to DARES

### Background:

- IFC intends to provide a facility envelope of up to US\$100 million, through a combination of own account and blended finance, to eligible developers<sup>40</sup> to accelerate the rollout of mini grids<sup>41</sup> in Nigeria. The required access to finance (a key constraint for developers) will be provided through US\$-revolver facility that benefits from the PBG framework under DARES.
- IFC has requested specific provisions, discussed below, which have been agreed upon in principle with the Rural Electrification Agency (“REA”) and the Ministry of Finance (“MoF”), to ensure the success of the proposed IFC facility.

### Proposed revolver facility structure & key terms:

- The facility will have a tenor of five years. Each tranche of disbursement made under the facility will have a maximum tenor of 24 months.
- The repayment of each tranche of the revolver shall be matched to the receipt of PBG based on the milestones achieved. The amount repaid shall be available for further drawdown, subject to the Conditions Precedent (CP) to disbursement being met.
- Key CPs include: (i) Signing of the Grant Agreement (GA) with REA; (ii) required equity<sup>42</sup> brought in by the developer; and (iii) site selection report confirming the number of customers.
- The total amount drawable under the facility for a mini grid site shall be restricted to a maximum of 80 percent of the PBG amount allocated for that individual mini grid site, and a key security requirement will be the assignment of PBG in favor of IFC. The haircut to the PBG amount accounts for interest during construction and contingencies encountered during execution (this can be optimized during the diligence stage).

### Key highlights of the structure:

- **Multiplier Effect:** Optimal utilization of the facility is a function of the efficiency of the developers. If the developers can “turn around” the facility three times in five years, it effectively provides financing of up to US\$300 million to the developers.
- **Low costs:** The US\$ facility leads to a lower cost of funds than the high-interest costs on local currency financing in Nigeria.
- **Collateral Requirements:** No collateral will be required from the developers beyond the financed mini grid assets— as “non-recourse” as it can get in the distributed generation space.
- **Faster rollout:** Due to the programmatic approach, developers can roll out the mini grid pipeline faster without having to arrange for debt finance for individual mini grid sites (subject to the required equity being in place).

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<sup>40</sup> Eligible developers shall be a subset of the NEP approved developers who meet IFC’s Know Your Customer, Integrity Due Diligence, and other requirements. IFC to work closely with the World Bank to shortlist the developers based on their operating track record and the other factors mentioned.

<sup>41</sup> The initial proposal from IFC limits eligibility for the facility to a subset of projects participating in the DARES PBG program for mini grids. However, based on feedback received from World Bank to widen the scope of IFC’s facility to include all the components of the DARES program, IFC has agreed to explore this possibility, subject to IFC’s understanding of the details on the other components of DARES (for example, the MST), and if the existing revolver structure can be extended to other components without any additional risk(s) to IFC.

<sup>42</sup> IFC funding not to exceed 80 percent of PBG, and a debt-to-equity ratio of no more than 60:40.



- **Eliminating<sup>43</sup> greenfield risk:** IFC's facility can take the execution risk involved in a green field project, and once operational, the project(s) can be refinanced with an improved risk profile of an operational asset, making it attractive to other lenders.
- **Replication across geographies:** Subject to the successful implementation of the facility in Nigeria, the structure and terms could be easily replicated across the other focus countries under the DARES program.

The proposed structure provides for IFC's immersion into the perceived "high-risk" mini grid sector while minimizing the risks taken. Continued involvement of IFC in the sector and the successful implementation of the facility is expected to moderate the risk perception over the medium term, leading to longer tenor financing.

#### **Requested Changes to the current REA framework:**

IFC has worked closely with the World Bank-DARES team and requested the following adjustments to the existing PBG regime to ensure the successful implementation of IFC's proposed facility. The REA has confirmed its willingness to accommodate these requests.

- **PBG disbursement in US\$:** Given that the facility proposed is a US\$ facility, it is imperative for the PBG disbursement to be in US\$. The Ministry of Finance (MoF) has authorized the direct disbursement of PBG in US\$ to participating developers under the ongoing NEP. REA will implement direct disbursement in US\$ in the NEP shortly and continue the practice in DARES. Assignment of the PBG proceeds to IFC and the recent liberalization of the FX regime in Nigeria will ensure that there is no arbitrage opportunity available to the developers (a concern flagged by the MoF).
- **Grant Agreement language changes:** Beyond being subject to the relevant payment milestones being met by the developer, the current language in the GA indicates that the PBG shall be paid by the REA subject to the availability of funds. IFC expressed concerns about the legal enforceability of this PBG-assignment structure and required that PBG funds assigned to IFC are ringfenced to ensure they are available at maturity of the facility. This will ensure that the GA signed by REA matches the PBG pool of funds committed and is available to avoid excess commitment without the required PBG funds to honor such commitments. REA has agreed to ring-fence PBG funds for projects that have secured financing, from IFC or from other investors.

#### **Next Steps:**

- IFC will work closely with the World Bank to develop the funding envelope in collaboration with the DARES program. IFC has prepared a Concept Note for this facility and circulated it for review.
- IFC is coordinating with REA to collect data on developers and executed projects under the NEP to be analyzed to shortlist eligible developers for IFC financing.

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<sup>43</sup> The devaluation risk of the Nigerian Naira is also eliminated under this facility structure.



**ANNEX 6: Economic and Financial Analysis**

**Economic Analysis**

1. The economic viability of the proposed project was assessed using a standard cost-benefit methodology. Net benefits for the project were calculated by comparing total system costs and benefits for the “with project” and “without project” scenario. Economic costs were estimated based on the preparatory studies developed for the project and adjusted to remove duties and taxes, while economic benefits were based on a conservative approach using an avoided cost methodology derived mainly from survey results and first-hand interviews. The proposed project is also expected to have several additional benefits which are either uncertain or difficult to quantify. As such, the results of the economic analysis can be considered a conservative estimation of the total economic benefits for society. The tables below detail assumptions and costs.

*Table A6.1 Assumptions*

Indicator	Value	Comments/sources:
Exchange rate	758 (NGN/US\$)	FX Window exchange rate <sup>1</sup>
US Inflation	n/a	Modeled in real US\$
Diesel price (economic)	1.11 US\$/liter	Country sources
Gasoline Price (economic)	0.81 US\$/liter	National Bureau of Statistics’ monthly price survey (avg)
Crude oil price (base year)	77 US\$/bbl	Commodity prices
Economic Discount Rate	5%	Derived using the World Bank technical guidance note on discount rates
Diesel generator set efficiency factor	3.4 kWh/l	Country sources
Gasoline generator set efficiency factor	0.63 kWh/l	Country sources

The initial economic capital cost is around US\$1,736 million for a twenty-one-year project period.

*Table A6.2 CAPEX and Operational Expenditure (OPEX) by Component*

	Mini grids	SASs
Description	- 1,170 100kWp solar hybrid isolated mini grids - 120 1MWp solar hybrid interconnected mini grids - 5 5MWp solar hybrid interconnected mini grids - 30 1MWp solar hybrid rooftop	- 1,650,000 26Wp SAS - 1,100,000 75Wp SAS - 40,000 Tier 2 125Wp PUE equipment - 24,000 Tier 3 500Wp PUE equipment - 5,500 Tier 4 1,400Wp PUE equipment - 5,500 Tier 5 2,000Wp PUE equipment
Total capacity	292 MW*	173 MW
# of units	1,325	2,750,000
Total CAPEX (US\$, millions)	1,021.0 (initial costs)	683.0





	Mini grids	SASs
	1,242.6 (lifetime costs)**	
Annual OPEX (US\$/year avg)	23,948,740	27,629,058 (3% CAPEX)

\*Not including diesel back-up systems.

\*\* Includes replacement costs of battery, inverters, and metering and connection components.

2. **Mini Grids.** The key data used to analyze the hybrid solar PV-diesel mini grids component and the solar rooftop solution was gathered from private mini grid developers in the country. This included (i) cost data, which was disaggregated by component and any subsequent investment such as battery, inverter, and meter replacements, and (ii) electricity demand per residential, commercial, or productive customer, as well as the total number of these customers. For rural, isolated mini grids, urban interconnected mini grids, and solar rooftop solutions, an avoided cost analysis was carried out to estimate the total benefits based on the assumption that mini grids and solar rooftop solutions will typically be replacing the costs of gasoline generators, which were calculated separately based on usage patterns gathered from household surveys and data from developers. The cost of gasoline per liter was assumed to increase yearly based on a correlation factor with current and projected future crude oil prices.

3. **Standalone Solar Systems.** Energy use data on energy sources for lighting in Nigeria was synthesized from the 2018-19 Nigeria General Household Survey-Panel surveys carried out by the National Bureau of Statistics, which serves as the primary basis for households not connected to the grid or with unreliable grid supply. The proposed intervention solutions were then analyzed vis-à-vis the annualized cost for gasoline generator sets. The analysis was then done on three levels: (i) at the Tier 1 level, a 26 Wp SAS was assumed as displacing the household cost of gasoline; (ii) at the Tier 2 level, a 75 Wp SAS was similarly assumed as displacing the household costs of gasoline; and (iii) finally, between Tiers 2 through 5, PUE equipment between 125 and 4,000 Wp would also replace gasoline generator sets for appliance use. The economic costs of the solar products were estimated based on the detailed costing data provided by private companies operating in Nigeria, less duties, and other taxes.

4. The economic evaluation is confined to the project activities that generate quantifiable benefits for which an economic value can be identified and measured. Economic benefits are attributable to replacing the more expensive gasoline, using conservative assumptions about the daily power usage or fuel for lighting and fuel quantity during the period analyzed. The analysis shows that the project is economically viable even without considering the environmental externalities.

Table A6.3 Summary of Net Economic Benefits

	Excl. CO <sub>2</sub>		Incl. CO <sub>2</sub> (Low)		Incl. CO <sub>2</sub> (High)	
	NPV (US\$ million)	EIRR	NPV (US\$ million)	EIRR	NPV (US\$ million)	EIRR
Mini Grids	\$3,370	30%	\$3,625	32%	\$3,879	34%
Standalone Solar Systems	\$452	33%	\$872	61%	\$1,290	98%
<b>Project</b>	<b>\$3,822</b>	<b>31%</b>	<b>\$4,496</b>	<b>37%</b>	<b>\$5,170</b>	<b>44%</b>

5. **A sensitivity analysis in the form of switching values, such as increasing costs and decreasing benefits at various levels, has been performed to test the robustness of the economic results to changes in overall costs and benefits.** The results show that the project remains economically viable if the total costs do not increase by more than 180 percent.



Finally, a sensitivity analysis on individual components was also performed to indicate thresholds for each component to remain economically viable.

*Table A6.4 Sensitivity Analysis (excl. CO<sub>2</sub>)*

	NPV (US\$ million)	EIRR
Base Case	\$3,822	31%
Costs Increase 15%	\$3,504	26%
Benefits Decrease 15%	\$2,931	25%
Costs Increase and Benefits Decrease 15%	\$2,613	21%
<b>Thresholds for Economic Viability by Component</b>		
Mini-grid Costs increase 259% (EIRR = discount rate)	\$818	5%
Solar Systems Costs increase 55% (EIRR = discount rate)	\$192	5%
Total Project Costs increase 180% (EIRR = discount rate)	\$1,490	5%

6. **GHG accounting has been carried out for the project**, resulting in significant GHG emission avoidance by replacing gasoline usage in households, businesses, and institutions. Most project activities will not directly emit GHG due to solar technologies, except for solar hybrid mini grids that may source a small part of their electricity from backup diesel generators. For isolated and interconnected mini grids, and rooftop solar, GHG emissions over 21 years have been analyzed. For standalone solar solutions, a seven-year life has been assumed. Total baseline emissions are estimated to be 16,848,829 tCO<sub>2</sub>, with total gross emission of 291,519 tCO<sub>2</sub>, whereas the project's net emissions total -16,557,310 tCO<sub>2</sub>.

### Financial Analysis

7. A financial analysis was carried out for interconnected mini grids, which are generally not viable on a purely commercial basis in Nigeria. Most rural and peri-urban customers could not afford the cost-reflective tariffs that mini grid operators would have to charge. However, once partial grants are factored in, there is a win-win-win scenario whereby interconnected mini grids leave the distribution company (DISCO), the mini grid developer, and the end user better off than when the DISCO was directly serving the end user. This financial analysis presents such a scenario, with the financial returns for all three parties from a financial model for a notional 464 kWp solar-battery-diesel-hybrid interconnected mini grid with grant support of 25 percent of CAPEX in the (i) Business as Usual (BAU) scenario without deployment of interconnected mini-grid in a cluster served by DISCO network, and (ii) distributed energy resources (DER) scenario with the deployment of interconnected mini grid to augment grid supply from the DISCO network.

### 8. Financial Model Assumptions.

(i) The system configuration and overall cost for the interconnected mini grid are provided below.

*Table A6.5 System configuration and costs*

S/N	Description	Figure
1	Solar PV size (kW)	464
2	Diesel Generator (kW)	220
3	Battery (kWh)	1316



S/N	Description	Figure
4	Battery lifetime throughput (kWh)	1000
5	DER system CAPEX Cost (US\$)	770,580
6	Fuel Consumption per annum (US\$)	294
7	Diesel Generator Set Hours of Operation per annum	3953
8	Nominal Levelized Cost of Electricity (US\$)	0.89
9	Diesel Fuel Price (US\$/Liter)	1.74
10	Diesel Generator Set minimum loading (%)	25
11	Pre-DER Technical losses (%)	10
12	Pre-DER Commercial/Billing Losses (%)	10
13	Pre-DER Collection Losses (%)	35
14	Community Self Generation Cost (US\$/kWh)	0.65
15	Annual Load Growth (%)	2

- (ii) Replacement CAPEX schedule has been assumed as follows: 10 percent of CAPEX in year 4, 8 and 12 for diesel generator set replacement; 22 percent of CAPEX in year 5 and 10 for battery replacement.
- (iii) The interconnected mini grid is expected to serve 2006 customers with estimated consumption at 1,291,066kWh. The DISCO network will supply 24 percent of this energy while the interconnected mini grid will supply 76 percent of the energy. Annual demand growth is estimated at 2 percent.
- (iv) Blended tariff of the cluster is US\$0.36/kWh with expected annual increase tied to the prevailing inflation rate, and total project cost is estimated at US\$1,285,053.57.
- (v) In the DER base case, a grant level of 25 percent of CAPEX was assumed.

**Results of Financial Analysis**

9. The project has the following financial returns based on model result:

*Table A6.6 Financial results*

Summary	BAU Scenario	DER Scenario
<b>DISCO Metrics</b>		
Net Present Value (NPV) (US\$)	(63,945.59)	118,054.49
<b>Customer Metrics</b>		
Net present energy costs (NPC) (US\$)	(5,579,223.82)	(4,497,873.97)
Net present costs (NPC) per kWh (US\$/kWh)	0.82	0.66
<b>Developer Metrics</b>		
Net Present Value (NPV) (US\$)		6,646.93
Internal Rate of Return (IRR) (percent)		19.1
Payback Period (Years)		6.55

10. In the BAU scenario, the DISCO is incurring losses in the cluster, while the customers incur an excessive cost despite receiving poor service from the grid network. In the DER scenario, deploying an interconnected mini grid in a loss-making cluster within a DISCO franchise positively impacts DISCO revenues as project-financed grid network upgrades, metering,



and improved customer service result in improved customer supply levels and reduced losses. The cost for customers declines due to their purchase of mini grid electricity and reduced spending on expensive self-generation.

11. **Sensitivity analysis.** A sensitivity analysis was conducted to understand the impact of varying amounts of CAPEX grants on the financial returns for the developer. The project only results in positive returns for the developer with a 25 percent CAPEX grant, whereas for the DISCO, the returns are positive even with a 20 percent grant.

*Table A6.7 Financial returns for varying level of grant*

<b>Key Model input</b>	<b>Grant @ 20percent of CAPEX COST</b>	<b>Grant @ 25percent of CAPEX COST</b>	<b>Grant @ 30percent of CAPEX COST</b>
Blended Tariff (US\$/kWh)	0.36	0.36	0.36
CAPEX COST (US\$)	770,580	770,580	770,580
DISCO NPV (US\$)	119,017.71	118,054.49	117,091.26
Customer NPC (US\$/kWh)	0.66	0.66	0.66
Developer NPV (US\$)	(32,845.30)	6,646.93	46,139.15
Developer IRR (US\$)	18.5	19.1	19.7
Developer Payback Period (years)	6.64	6.55	6.45



## ANNEX 7: Macro-economic and Fiscal Framework Requirements: Preliminary Review

1. Access to finance has been highlighted as one of the major concerns by all stakeholders. However, DARES does not use financial intermediary for a working capital or debt facility given the current assessment of macroeconomic conditions and financial markets, and there will not be any FIF investments made under DARES. However, there will be technical assistance support to facilitate this in the future. Assessing the presence of conditions required by the World Bank's FIF policy framework involves a multistage approach covering the adequacy of (i) macro-fiscal developments, prospects, and policies; (ii) financial infrastructure (e.g., laws, regulations, credit bureaus); and (iii) specific financial sector policies and interventions (e.g., interest rate caps, competitive advantages for SOBs, other distortions). This Annex focuses briefly on the first stage of the approach.

### Recent macroeconomic developments

Macroeconomic performance and policy predictability deteriorated over the last decade eroding Nigeria's growth potential (NDU December 2022), while GDP per-capita has barely risen since 2014-15. GDP growth rebounded in 2021 (3.6 percent) but has slowed down since (2.7 percent Q2-2023 (y/y)). Muted growth prospects in the medium term (IMF 2022 Article Staff Report) results in limited economic opportunities contributing to conflict and violence (NDU December 2022).

### Inflation developments and prospects

With lingering supply-chain disruptions, large monetary financing of public deficits, and large FX parallel market premiums inflation has continued to rise and reached an 18-year high in October 2023 (27.3 percent, y/y). Average annual inflation for the year through October 2023 was 24.9 percent--the highest rate in 21 years. There is an increasing risk that inflation expectations could become unanchored making it more challenging and costlier to rein inflation in; annual inflation has been rising steadily since November 2021. Persistently elevated (and volatile) inflation drives lending rates higher, discourages lending, and increases credit risk.

### Monetary policy and interest rate developments

The CBN embarked on a tightening of its Monetary Policy Rate since May 2022, raising the rate by 725bp through October 2023. However, the Monetary Policy Rate is still well below inflation. The effectiveness of those hikes in tightening financial conditions is yet to be seen. In addition, they are undermined by the continued monetary financing of the FGN deficits--albeit at a slower rate of growth in Q3-2023 than preceding quarters-- and the CBN's provision of heavily subsidized development finance--there is some early evidence that this source of funding is also being dialed-down. Bank lending rates have barely risen, and the ten-year FGN bond yields stood at around 15.0 percent (mid-November 2023), all negative in real terms. Financial intermediation is undermined by CBN's use of unremunerated cash reserve requirements, set at an elevated rate and at times discretionary deployed.

The policy stance would need to be tightened, and its implementation efficiency much improved to deliver on the CBN's inflation objective (nine percent-11 percent). Statutory changes to the CBN's act are needed to make price stability its clear primary policy objective, while sharply scaling down the development finance activities. Critically, the CBN financing of government should not exceed the CBN's statutory limits and be fully sterilized with market-based instruments. An important policy step was the conversion of the bulk of the balance in the "Ways and Means" government account of CBN--the channel for the monetary financing of deficits--into a government bond.

### Exchange rate policy and access to FX

In June 2023, the CBN unified multiple exchange rates into the Investors & Exporters (I&E) window and allowed market forces to be reflected in the exchange rate. The market rate depreciated sharply, and initially the parallel market premium was eliminated. Further, the CBN did away with market access restrictions for 42 items in October 2023, however the



parallel market premium which started to reemerge in July and stood at 35.4 percent on November 16, 2023—the premium has been volatile reflecting the volatility of the official exchange rate in the I&E window.

In the near term, the exchange rate policy needs to be strengthened by inter-alia channeling oil revenue to the I&E window, establishing an effective interbank FX market, and enhancing bank regulation undergirded by clear communication on FX market rules, tighter monetary policy, and credible revenue-based fiscal consolidation.

#### **Fiscal policies and public debt sustainability**

Prior to the removal of the PMS subsidies in May 2023, the fiscal situation continued to deteriorate, worsening debt dynamics. The FGN revenue mobilization grossly underperformed budgetary projections, and policy makers resorted to disruptive investment expenditure compression to keep the FGN public deficit from ballooning. The overall fiscal deficit remained elevated at about 5 percent of GDP in 2022.

The stock of public debt (including CBN overdraft facilities and the debt of the Asset Management Company of Nigeria reached 40 percent of GDP at end-2022. However, public debt service indicators are at stressed levels, the debt service topped 100 percent of revenues in 2022. The stock of CBN financing of the government stood at 11.8 percent of GDP in 2022, and CBN advances to the government are a major driver of credit growth in the economy undermining monetary policy efforts to rein in inflation. Monetary financing of government continued to expand at an elevated rate through end-Q3 2023, albeit at slower pace than in preceding quarters.

The PMS subsidy reforms removed an unsustainable fiscal burden (one third of Nigeria’s revenue in 2022), however it is not sufficient to bring public finances fully under control and change debt dynamics. Financing needs and debt service ratios remain elevated and were the government to undertake large new expenditures the fiscal situation could deteriorate rapidly again in 2023. Otherwise, failure to sustainably improve the fiscal position would heighten macro-financial risks.

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ANNEX 8: Multi-Tier Framework for Access

MINIMUM REQUIREMENTS BY TIER OF ELECTRICITY ACCESS



Tier 0	Tier 1	Tier 2
<p>Electricity is not available or is available for less than 4 hours per day (or less than 1 hour per evening). Households cope with the situation by using candles, kerosene lamps, or dry-cell-battery-powered devices (flashlight or radio).</p>	<p>At least 4 hours of electricity per day is available (including at least 1 hour per evening), and capacity is sufficient to power task lighting and phone charging or a radio. Sources that can be used to meet these requirements include a SLS, a solar home system (SHS), a minigrid (a small-scale and isolated distribution network that provides electricity to local communities or a group of households), and the national grid.</p>	<p>At least 4 hours of electricity per day is available (including at least 2 hours per evening), and capacity is sufficient to power low-load appliances—such as multiple lights, a television, or a fan (see table 1)—as needed during that time. Sources that can be used to meet these requirements include rechargeable batteries, an SHS, a mini-grid, and the national grid.</p>
Tier 3	Tier 4	Tier 5
<p>At least 8 hours of electricity per day is available (including at least 3 hours per evening), and capacity is sufficient to power medium-load appliances—such as a refrigerator, freezer, food processor, water pump, rice cooker, or air cooler (see table 1)—as needed during that time. In addition, the household can afford a basic consumption package of 365 kWh per year. Sources that can be used to meet these requirements include an SHS, a generator, a mini-grid, and the national grid.</p>	<p>At least 16 hours of electricity per day is available (including 4 hours per evening), and capacity is sufficient to power high-load appliances—such as a washing machine, iron, hair dryer, toaster, and microwave (see table 1)—as needed during that time. There are no frequent or long unscheduled interruptions, and the supply is safe. The grid connection is legal, and there are no voltage issues. Sources that can be used to meet these requirements include diesel-based mini-grids and the national grid.</p>	<p>At least 23 hours of electricity per day is available (including 4 hours per evening), and capacity is sufficient to power very high-load appliances—such as an air conditioner, space heater, vacuum cleaner, or electric cooker (see table 1)—as needed during that time. The most likely source</p>