



Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)

Appraisal Stage | Date Prepared/Updated: 01-May-2018 | Report No: PIDISDSA22990



BASIC INFORMATION

A. Basic Project Data

Country Nigeria	Project ID P161885	Project Name Nigeria Electrification Project	Parent Project ID (if any)
Region AFRICA	Estimated Appraisal Date 30-Apr-2018	Estimated Board Date 21-Jun-2018	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Federal Ministry of Power, Works and Housing (Works), Federal Ministry of Finance	Implementing Agency Rural Electrification Agency	

Proposed Development Objective(s)

The development objective is to increase access to electricity services for households, public institutions, and micro, small and medium enterprises.

Components

Solar Hybrid Mini Grids for Rural Economic Development
Stand-alone Solar Systems for Homes and Enterprises
Energizing Education
Technical assistance

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	765.00
Total Financing	765.00
of which IBRD/IDA	350.00
Financing Gap	0.00

DETAILS

World Bank Group Financing



International Development Association (IDA)	350.00
IDA Credit	350.00

Non-World Bank Group Financing

Counterpart Funding	5.00
Borrower	5.00
Commercial Financing	410.00
Unguaranteed Commercial Financing	410.00

Environmental Assessment Category

B - Partial Assessment

Decision

The review did authorize the team to appraise and negotiate

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **The 2015 elections marked, for the first time in Nigeria’s history, a peaceful democratic transfer of power between two political parties, but the new administration faced a fast-deteriorating macroeconomic environment.** GDP growth fell from 6.3 percent in 2014 to 2.7 percent in 2015, and to negative 1.6 percent in 2016, bringing Nigeria’s first full-year of recession in 25 years. In 2016, global oil prices reached a 13-year low and oil production was severely constrained by vandalism and militant attacks in the Niger Delta. While the oil sector represents only 8.3 percent of total GDP, it provides majority of foreign exchange (FX) earnings and three-quarters of government revenues. The decline in FX earnings from oil exports, compounded by Central Bank of Nigeria’s (CBN) introduction of several FX allocation/utilization rules that restricted access to FX at the official market rate, had significant negative spillover effects on non-oil sectors dependent on FX to import inputs and raw materials.

2. **The Nigerian economy emerged from the recession with GDP growth of 0.8 percent in 2017.** The recovery was driven by higher oil prices and production. Agriculture and non-oil industry grew by 3.4 percent and 0.6 percent, respectively. However, services, which account for over half of GDP, continued to contract (-0.9 percent). Unemployment increased in 2017 to 18.8



percent of the labor force, with a further 21.2 percent underemployed in Q3. The recovery is expected to be slow and largely oil driven, with real GDP growth just over 2 percent in the World Bank's medium-term baseline growth scenario.

3. **The Government launched the National Economic Recovery and Growth Plan (ERGP) for the period 2017-2020 in March 2017.** The ERGP sets out to restore macroeconomic stability in the short-term and to undertake structural reforms, infrastructure investments and social sector programs to diversify the economy and set it on a path of sustained inclusive growth over the medium- to long-term. The priority areas of action under the ERGP are: stabilizing the macroeconomic environment; achieving agriculture and food security; ensuring energy sufficiency in power and petroleum products; improving transportation infrastructure; and driving industrialization through focus on small- and medium-scale enterprises.

Sectoral and Institutional Context

4. **Access to energy is low, with approximately 80 million people lacking access to electricity.** Nigeria has the largest absolute access deficit in Sub-Saharan Africa and the second-largest in the world, after India. The national electrification rate is 55 percent, and the rural electrification rate is only 39 percent. To achieve universal access to electricity by 2030, Nigeria would need to connect between 500,000 to 800,000 households per year. Both grid extension and off-grid solutions will be needed to provide quality services to unserved and underserved households and businesses in a timely manner. While female-headed households are more likely to be connected to the grid (72 percent) compared to male-headed households (53 percent), female-headed households tend to consume less.

5. **Nigeria's power sector is unbundled and largely privately-owned.** Following the passage of the Electric Power Sector Reform Act (2005), the sector was unbundled into six generation companies (GENCOs), eleven distribution companies (DISCOs) and the Transmission Company of Nigeria (TCN). The privatization of the DISCOs and GENCOs was completed in 2013. Three of the five thermal GENCOs (that use natural gas as fuel) were sold in their entirety to new owners, while three hydropower plants were concessioned to private operators. TCN has remained a fully Government-owned monopoly. In the current stage of market development, known as the Transitional Market, the Government-owned Nigerian Bulk Electricity Trading Company (NBET) fulfills the role of bulk trader, buying electricity from GENCOs (including Independent Power Producers) under Power Purchase Agreements (PPAs) and reselling it to DISCOs under Vesting Contracts.

6. **The sector is under severe stress as the transition from a publicly-owned to largely privately-owned power sector did not bring the expected outcomes.** High losses, low collections and lack of cost recovery tariffs have resulted in an annual financial deficit to the sector of approximately US\$1 billion. Sector Aggregate Technical Commercial and Collection (ATC&C) losses are extremely high, averaging 54 percent in 2017.

7. **The Government has demonstrated its commitment to addressing these issues through the Power Sector Recovery Program (PSRP).** Approved by the Federal Executive Council in March 2017, the PSRP includes measures to improve the financial viability of sector companies, increase power supply, and strengthen sector governance and contract enforcement, de-risking the sector for private investment and putting it on a path to long-term sustainability.

8. **The PSRP seeks to de-risk the power sector for private investment through a comprehensive package of financial, operational, governance, and policy interventions.** The financial interventions of the PSRP aim to fully fund the historical tariff shortfall and the projected tariff shortfall until 2021. The PSRP's operational/technical interventions aim to ensure that DISCO performance and electricity supply



improve. Strengthening sector governance and transparency, enforcement of contracts, and the communication of reforms are the major priorities of the PSRP's governance interventions. Policy interventions aim to increase electricity access and manage costs by ensuring that new capacity is procured competitively.

9. **Recognizing the need for action outside the DISCO territories, the President approved the Rural Electrification Strategy and Implementation Plan (RESIP) in July 2016.** The strategy states:

“The primary objective of the Nigerian Rural Electrification Policy and by extension this Rural Electrification Strategy and Implementation Plan is to expand access to electricity as rapidly as possible in a cost-effective manner. This implies full use of both grid and off-grid approaches, with subsidies being primarily focused on expanding access rather than consumption. It is assumed that private sector providers will be heavily involved in enhancing access.”

10. **RESIP calls for a particular focus on underserved rural populations and rural institutions** such as schools, health centers, administrative buildings as well as rural businesses, farms and enterprises for job creation and economic development. The strategy aims to facilitate the entry of new market participants, especially the private sector. Furthermore, it provides for diverse approaches, including a “bottom-up” approach through spontaneous initiatives by project proponents as well as a “top-down” approach through organized large-scale procurements.

11. **The Rural Electrification Agency (REA) has been authorized to establish a Rural Electrification Fund (REF)** to help finance rural electrification expansion in Nigeria. The REF promotes “fast and cost-effective expansion of electricity access in un-electrified rural areas evenly among the geopolitical zones in Nigeria” through on-grid, mini grid and off-grid electrification solutions featuring renewable energy and hybrid power systems.

12. **Mini grids will play a significant role in rural electrification.** A Ministry of Power, Housing and Works (MoPHW) study based on geo-referenced data of population clusters and load centers, concluded that an estimated 8,000 potential load centers are suitable for mini grids powering 14 percent of Nigeria's population. NERC issued a regulatory framework in support of mini grid market development in May 2016. These regulations address the issue of grid extension by DISCOs to mini grid locations so that the mini grids' assets do not become stranded. It is also worth noting that most mini grid sites are likely to be located in areas that are unlikely to be reached by grid extension within the next 7 to 10 years. Nevertheless, mini grids have yet to achieve the scale needed in Nigeria due to constraints such as limited pre-investment support, the absence of adequate viability gap financing and by the lack of credible market intelligence on the opportunities for mini grid development in Nigeria that has deterred international investors.

13. **Stand-alone solar PV systems offer a viable option in areas where mini grids are not sustainable.** Several relatively well-established solar PV companies are now operating in Nigeria, utilizing cash sales and pay-as-you-go (PAYG) business models. The main challenge is that for businesses to grow rapidly the companies must fund an ever-increasing amount of stock in the supply chain and invest substantial amounts in building their ‘soft infrastructure’ to reach and serve new customers. Key regulatory challenges include: a 25 percent combined import duties and VAT for solar importers, which is transferred as additional cost to customers, streamlining the mobile payment systems as well as ensuring high product standards. Key financial barriers include a lack of access to both local currency loans for operating expenses and hard currency loans for capital costs.



14. **The electrification of federal universities improves and modernizes the services they offer.** In general, these institutions are expected to be served by the DISCOs. Federal universities and teaching hospitals currently use diesel-based self-generation to meet their power needs, due to unreliable service from DISCOs. The high cost of fuel and maintenance results in rationing of on-site generated electricity and poor reliability, which disrupts learning. The Energizing Education program will provide dedicated power systems for these universities as a first phase of a larger program supporting public institutions. Eventually, the turnaround of DISCOs under the Power Sector Recovery Program supported by the proposed IDA supported Power Sector Recovery Performance Based Loan (P164001) will enable DISCOs to supply university campuses with reliable service at a cost that is competitive with or lower than that of the dedicated power station under the project. In keeping with this DISCO turnaround plan, the power systems installed in the universities represent interim power until the DISCOs are able to supply adequate, reliable power to the universities. When improved network supply is achieved, universities may either enter into purchase sale agreements with DISCOs for peak period supply of power to the DISCO, using NERC's net metering regulations (discussed earlier) or find a buyer for the dedicated power station.

C. Proposed Development Objective(s)

Development Objective(s) (From PAD)

15. The development objective is to increase access to electricity services for households, public institutions, and micro, small and medium enterprises.

Key Results

16. The key results expected and associated indicators are as follows:

(a) PDO Indicator:

- (i) People provided with new electricity service (number) of which female (percentage).
- (ii) MSMEs and public institutions provided with new or improved electricity service.
- (iii) Increased private sector investment in renewable energy electrification (U.S. dollars).
- (iv) Generation capacity of renewable energy (solar) (MW).

D. Project Description

17. **Overview.** The project, with three investment components, is nationwide in scope. It promotes technologies and business models that are emerging in Nigeria. Components 1 and 2 are private sector led, and IDA financing will mobilize significant private sector investment. Component 3 is fully funded by IDA for construction of the power systems as well as operation and maintenance for at least five years by private firms. The project aims to provide electricity to households, MSMEs and public institutions in a least-cost and timely manner. Most of the project's funds, will be used to establish an enabling environment for private sector involvement by providing financial incentives and technical support as well as strengthening of key institutions and the development of streamlined policies and regulations. The remaining project funds will be used to acquire, by competitive tender, supply systems for selected Federal universities.

18. **A sustainable framework for electricity access using off-grid solutions will be created.** The



project is designed as a ‘large-scale proof of concept.’ Given the scale of the energy access deficit in Nigeria, this project alone, even including leveraged investments, is too small to fully address the national and sub – national electricity access challenge. Hence, the project aims to build a sustainable framework for continued investments for expanding energy access after the project ends. This framework will build on the project’s implementation experience, particularly from the results of the project’s mid-term review.

19. **Focus on private investment.** The project is premised on a design that involves large-scale investments by the private sector in off-grid supply of electricity. However, off-grid investments in Nigeria are still in their early development stage. Developing these investments in a business-as-usual manner means that it will take time to provide electricity to those who lack it now. Hence, the project aims to catalyze large scale investments with one-off support through a minimum subsidy tender for mini grid developers and deployment of a challenge fund for individual solar system companies. In parallel, deployment of performance-based, viability gap grants will be offered to qualified companies for every new client provided with electricity. In addition, technical assistance for strengthening the institutional and regulatory environment will focus on leveraging private sector investment.

20. **Focus on promoting Nigerian firms and local expertise.** Nigerian firms will be supported through technical assistance to enhance their opportunity of participation under the project. Furthermore, the project will provide opportunities for engineering faculties of universities or higher institutions to participate in the project, and for engineering students to be trained in new renewable technologies. The planning and installation of these new solar hybrid power systems provide for a unique opportunity for these students to complement their current curriculum through learn-by-doing on-site.

21. **Project components.** This project has four components, all of which will be implemented by the Rural Electrification Agency (REA):

- Component 1 Solar Hybrid Mini Grids for Rural Economic Development
- Component 2 Stand-alone Solar Systems for Homes and Enterprises
- Component 3 Energizing Education
- Component 4 Technical Assistance.



Component 1. Solar Hybrid Mini Grids for Rural Economic Development (IDA US\$150 million).

22. **Objective and targets.** Under this component, the project will support the development of private sector mini grids in unserved and underserved areas that have high economic growth potential. The target is to provide access to electricity to 300,000 households, and 30,000 MSMEs, with an estimated 15 mini grid operators. Early activities are expected in Niger, Sokoto, Ogun, Plateau, and Cross River states based on initial market studies. The component will be implemented under a market-based approach and work with the private sector to construct, operate, and maintain economically viable mini grids, made possible by subsidies that reduce initial capital outlays. There are two investment sub-components that are implemented in parallel, a minimum subsidy tender (and also a tender for fully public projects), and a performance-based grant program that target different sets of private developers, as described below.

23. **It is expected that about 850 mini grids will be built by private firms.** At least eight companies are already developing mini grids in Nigeria. Large multinational companies that develop mini grid technologies are interested in the minimum subsidy tender. The estimated investment cost of the component is about US\$330 million, of which about US\$150 million will be provided by IDA. Additional finance will come from the private firms, commercial debt providers, other development partners and the Government. It is envisaged that US\$180 million of private capital will be leveraged under the component.

24. **Market Assessment.** Considering the cost of production and the targeted clients in rural areas, mini grids are not viable in most cases on a purely commercial basis in Nigeria. Most rural customers would not be able to afford the cost-reflective tariffs that mini grid operators would have to charge. Hence, REA will provide partial grant funding to reduce the CAPEX requirement for mini grid projects to enable operators to charge less than cost-reflective tariffs. Mini grid deployment is also constrained by the significant cost of prospecting for viable sites and carrying out the necessary financial, business and E&S-safeguards due diligence for each of the prioritized sites. REA will address this by providing market intelligence to the potential subsidy bidders and by offering partial grants for pre-investment activities (see component 1.1).

25. **Component 1.1: Minimum Subsidy Tender for Mini Grids (IDA US\$70 million).** To kick start implementation, REA will select 200 sites in areas where there is already significant private sector interest. REA will invite private developers to bid for minimum capital cost subsidies according to their business plans to provide electricity to these sites. The qualification criteria for participating companies are outlined in the REA Operating Guidelines for the project. Given the substantial number of sites and preliminary market analysis, this tender is expected to attract some international private developers to enter the market in Nigeria. Nigeria presents a high-risk, high-return opportunity. In spite of the risks, a number of large international companies already have presence in Nigeria, and several mini grid companies are already operating. An indicator of private sector interest is the participation of several hundred private sector participants from around the world in an ESMAP-hosted mini grid conference in Abuja in December.

26. Mini grids using a combination of solar PV, batteries, and a generator are quickly becoming a long-term solution for providing electricity even in the presence of grid expansion programs (see figure 1). Most modern mini grid regulations stipulate co-existence models for mini grids and the main grid, in which mini grids continue to operate as small power distributors.

27. From the 8,000 potential mini grid sites identified by the MoPHW, REA is preparing market intelligence for a portfolio of 200 projects in five states based on geo-spatial assessments combined with



on-the-ground validation by REA survey teams. The georeferenced database includes 16,000 telecom towers, agricultural loads and rural enterprises that could function as anchor loads. The longlist of sites is prioritized based on economic parameters.

28. REA is preparing bid packages that will give significant commercial choice to the bidders, including specifying the tariff, subject to a tariff ceiling; selecting the technology, subject to minimum technical specifications; client selection, subject to a minimum population that will need to be connected; and promotional sales campaigns, subject to a minimum adoption of productive use appliances. In addition, the mini grid sites contained in the bid packages have been selected based on economic parameters and are the “low-hanging fruit” with significant populations, high population densities, and available productive uses to support daytime demand for electricity.

29. **Component 1.2: Performance-Based Grants Program (IDA US\$80 million).** REA will use a market-based approach to support eligible companies. REA will provide performance-based grants to mini grid operators on the basis of new customer connections (US\$/end user). Performance-based grants will be made available to mini grid developers on a rolling basis until funding is exhausted.

30. The value of the capital grant will be set to ensure both financial viability by the supplier and affordability by the consumer. There is a cohort of private mini grid developers in Nigeria that has already completed initial stages of project development for about a dozen mini grids. These and other developers will be encouraged to submit their business plans incorporating the preset performance grants in their financial projections for their portfolio of mini grid sites of their own choosing. Unlike the minimum subsidy tender, which is focused on kick-starting the market by identifying high-potential sites and providing the scale that may be required for larger or international developers to participate, performance-based grants will be available for sites that developers have themselves identified and developed according to sustainable business plans for the deployment of mini grids.

31. **Energy and agriculture nexus, productive uses and collaboration.** The presence of productive uses is important for the commercial operation and long-term sustainability of mini grids. Therefore, the proposed project collaborates with World Bank assisted agricultural programs, such as the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support Project (P148616) and the Fadama III Project (P096572 and P131075) implemented by FADAMA, to identify agricultural load centers. FADAMA and REA have started mapping the electricity demand of farmers who have machinery, such as those for milling and for water pumping, that is currently idle due to lack of power. These loads are incorporated in the database that is an input to the market intelligence packages.

32. **Technical specifications.** The mini grids will be built to Nigeria’s grid code standard in order to allow for future integration with the network grids of DISCOs. This is specified in the NERC regulations for mini grids. It is expected that most mini grids will use solar generation with battery storage, and diesel back-up generation; however, other technologies may be proposed by bidders depending on site-specific circumstances. Solar hybrid mini-grids can be rolled out quickly because the physical generation and distribution infrastructure components, as well as the skills to install them, are readily available in Nigeria. The mini grids will be required to (i) use prepay meters to mitigate revenue collection risk, (ii) use smart meters to enable better understanding of consumer behavior, and (iii) promote energy efficient appliances through technical specifications.

33. **Legal Considerations, Regulations, and Tariffs.** The RESIP specifies that the tariffs for rural electricity service will be cost-reflective. Projects below 100kW must register with NERC, but a permit is



optional. Obtaining a permit from NERC enables the mini grid developer to be compensated for its assets if the main grid is extended to reach a mini grid site. NERC in its promotion and communication strongly encourages developers of 100kW and smaller projects to obtain a permit to avoid the risk of stranded assets if a DISCO grid arrives. Tariffs for mini grids larger than 100kW (and for smaller mini grids electing for a permit) are subject to a ceiling calculated by NERC using a model specifically designed for mini grids. Registered mini grids below 100kW are free to set their tariffs by agreement with the community.

34. **Readiness and timeline.** REA conducted public consultations at the Mini Grid Action Learning Event organized by REA and ESMAP in Abuja in the week of December 4, 2017. The Operating Guidelines are available. REA has completed feasibility level studies of 97 candidate sites, and additional surveys are planned to prepare a total of 200 sites for inclusion in the minimum subsidy tender.

Component 2. Stand-alone Solar Systems for Homes and Enterprises (IDA US\$75 million).

35. **Objectives and targets.** The goal of this component is to significantly scale up the market for stand-alone solar systems in Nigeria in order to provide access to electricity to more than one million Nigerian households and MSMEs at lower cost than their current service, via stand-alone solar home systems provided by the private sector. A market-based approach will be followed based on the conditions in Nigeria as well as experience in other countries.

36. **Component 2.1: Market Scale-up Challenge Grants (IDA US\$15 million).** This catalytic fund will offer performance grants to qualified, large-scale providers to accelerate their sales to households and MSMEs. A rigorous evaluation process and a tranche based payout will be used to manage any risk of non-performance. The main purpose of this instrument is to de-risk private sector investors and help mobilize capital for select well-established firms and potential new entrants that are committed to scaling rapidly.

37. **Component 2.2: Output-Based Grants (IDA US\$60 million).** This fund will provide grants up to 20 percent of the costs of the system to the grantees, for each eligible system installed and verified by the private sector. This support will enable the firms to finance the required investment in people, training, advertising, processes, and logistics inclusive of gender workforce integration and disaggregation as informed by the government gender program. The grant amount will be fixed for each system size/level of service category, and continually reduced over the life of the program as the market grows.

38. **Market assessment.** The Nigerian SHS sales are currently about 13,000 units per month and the market has 14 active SHS distributors of the Lighting Global quality verified solar products in Nigeria. Though the market is dominated by four firms, there are new entrants, prospective entrants and start-ups with the capability and ambition to increase the market size by orders of magnitude.

39. **Two business models.** The solar market in Nigeria currently has two main business models: i) cash sales, typically of smaller and cheaper systems, such as solar lanterns and small plug-and-play solar systems (solar kits), and; (ii) “pay-as-you-go” (PAYG) models, typically for Solar Home Systems (which are larger). These models make the services more affordable to households who cannot pay upfront the relatively large costs of such systems. The component is the supporting the scaling up of both models.

40. **Links to other World Bank supported projects.** This proposed project is coordinated with the proposed Regional Off Grid Electrification Project for West Africa (P160708). The proposed project also builds on the Lighting Africa Nigeria program, in particular the promotion and marketing campaigns and value chain integration.



41. **Technical specification, selection process and operating guidelines.** Only products certified by Lighting Global will be eligible under this project. Larger solar systems and their providers will be subject to more technical pre-qualification, which will be assessed by a technical consultant. Additional pre-qualification criteria will include: business integrity, competence in financial administration, legal compliance, technical delivery, warranty and its delivery. The pre-qualification criteria for the market-scale up challenge fund will be more stringent in that it will look at more specifically whether the firm has capability of scaling rapidly. Further details are provided in the operating guidelines.

42. **Readiness and timeline.** The key tasks to be completed are: (i) updating the Operating Guidelines; (ii) bid documents for the Challenge Fund and Grants Administrator, (iii) organizing a selection committee for evaluation of proposals. It is expected that the bid documents will be available in June 2018.

Component 3. Energizing Education (IDA US\$105M).

43. **Objective.** FGN has launched an Energizing Education Program (EEP) aimed universities and associated teaching hospitals. At present, these institutions do not get reliable power from the DISCOs. The short-run adverse impact of this unreliable supply is that the students are not able to learn and absorb as much they could. The long-run adverse impact is that Nigeria's economic growth is held back by a lower-than-possible level of human capital development. Further, patient care suffers in the hospitals when the power goes out, or the voltage is too low to operate medical equipment. Finally, many of these institutions use expensive back-up diesel-based power generation sets. To avoid these problems, it is important to provide reliable, affordable, and sustainable power to these institutions.

44. **Economic benefits.** This economic benefits of the component arises from the following:

- Improve academic/research outcomes, such as increase in research output
- Improved health outcomes, such as reduction in mortality
- Additional benefits for campus community, such increase in community safety and security

45. **FGN has launched the program.** The overall scope of FGN's program is 37 federal universities and 7 associated university teaching hospitals across the country. It is expected that they will be powered by electricity generation systems of 1 MW to 11 MW that can operate either isolated from the grid or connected to the grid. FGN has launched the program, and REA is currently implementing Phase 1, which will provide reliable power supply to nine universities and one teaching hospital. The power will come from solar hybrid and gas-fired power plants, with the construction to be done by private firms.

46. The component is expected to provide new or improved service to seven universities and teaching hospitals, approximately 120,000 people. This is Phase 2 of the EE program. Phase 1 of the EE program is currently being implemented by REA with exclusively FGN funds. The aim of the EE program is to provide reliable, affordable and sustainable power to Federal universities and teaching hospitals

47. The program will install dedicated power stations, which will be able to serve the campus independently of the DISCO system, with the technical capability to connect to the DISCO system when doing so becomes technically and economically feasible for the DISCO.

48. The EPC contracts are expected to include installation of a full capacity power station including new backup generation, though some existing university-owned generators (mostly diesel) may be



continued to be used. Solar hybrid systems will be preferred, with gas-fired reciprocating engines as the backup option. The system would feature a modular design with the initial investment sized to serve the current electricity demand.

49. **Street Lighting.** A street lighting system will be included to improve quality of campus life, particularly safety. This system will be designed in parallel with the power system design.

50. **Training Facility.** Since the EEP includes a power system training component with an emphasis on renewable energy, the EPC contract for each university site will include the erection and outfitting of a training facility. The aim of this facility is to provide practical vocational level training to improve job prospects in renewable energy and electrical power systems. REA will seek inputs from private firms on their employment needs, and coordinate with the National University Commission as well as universities on the curriculum to be offered.

51. **Existing Equipment.** REA will review the campus' electricity distribution system to assess the need for repairs/upgrades. They will also perform a first-level energy audit to identify major energy savings opportunities. Necessary distribution system repairs/upgrades and energy savings opportunities, as well as the prepayment meters will be included under the Bank-financed program. These may be financed under a separate contract (e.g. energy efficiency).

52. **EPC and O&M Contracts.** The activities related to building and operating the power systems will cover the Engineering, Procurement and Construction (EPC) contract and the Operations & Maintenance (O&M) contract. Under the EPC contract, the developer is responsible for building the power system, street lighting (see below), and constructing and equipping a training centre. Upgrading of the existing campus distribution system may also be included, as needed. REA will own the systems.

53. **University Role.** REA will sign an agreement with each university clearly laying out the roles and responsibilities of the parties. It is expected that universities will provide: (i) suitable land for the power station (with REA responsible for any resettlement and / or livelihood restoration planning and implementation processes and associated costs in accordance with World Bank safeguards requirements, including a suitable Grievance Redress Mechanism); and, (ii) access and security for the EPC and O&M contractor. Universities will also be responsible for maintaining the campus electricity distribution system.

54. **Bid documents and operating guidelines.** Building on the available data about all the 37 sites and Phase 1 experience, Phase 2 will include: (i) more detailed design and engineering specifications, based on a more thorough demand assessment; (ii) strong emphasis on solar hybrid systems, including for sites initially earmarked by REA for gas-fired generation; (iii) emphasis on both supply and demand-side energy efficiency; (iv) a more comprehensive agreement on roles and responsibilities among the parties (Universities, REA, contractors); and (v) full compliance with World Bank procurement procedures and E&S risk management.

Component 4. Technical Assistance (IDA US\$20 million).

55. This component will support project implementation and broad capacity building in MOPWH and REA that will be useful beyond this project. This component will finance project implementation as well as help build a framework for rural electrification and cover TA for implementation of E&S Safeguards under the Framework including explicitly monitoring for gender-based violence. Responsibility for



preventing instances of gender based violence will rest with the contractors implementing a code of conduct and will be included in all contracts. Contracts for supervising engineers will also include responsibility for monitoring and reporting any instances of gender based violence. TA funds have also been allocated to build the capacity with the participating companies.

E. Implementation

Institutional and Implementation Arrangements

56. **Project implementation arrangements.** REA will be the Implementing Agency for all components of the project. REA was established in 2005 as a semi-autonomous organization under the MoPWH. The proposed project is the first World Bank supported project by REA however the sector is very familiar with World Bank supported projects. REA has created a Project Management Unit (PMU) dedicated to the implementation of the proposed project, which the project will finance through Component 4 (Technical Assistance).

57. REA has hired a: (i) manager; (ii) procurement specialist; (iii) commercial/financial management specialist; (iv) environmental specialist; (v) social specialist; and (vi) an engineer with expertise in solar systems. Additional technical experts will be hired on a needs basis. The PMU will continue to hire staff during the implementation of the project to ensure that project fiduciary and safeguard responsibilities are adequately fulfilled.

58. REA's responsibilities will include but not be limited to the following: (a) defining, jointly with the World Bank, the project areas based on technical and policy development priorities; (b) resolving, in consultation with the World Bank, challenges requiring high-level intervention facing the project; (c) monitoring the implementation of the project; (d) consolidating information on progress of implementation and results reporting; and (e) oversight and monitoring of E&S risk management arrangements for the project.

59. **Operating guidelines for Component 1 and 2.** REA has drafted Operating Guidelines covering Components 1 and 2, and conducted public consultations with key stakeholders. The Guidelines will become public by project effectiveness. The section on mini grids of the Operating Guidelines (part 1) includes eligibility criteria for qualification of mini-grid project developers, application and evaluation procedures, verification protocols for disbursement, as well as model contract agreements between REA and the participating companies. The Guidelines also specify the institutional arrangements for the component, along with environmental and social safeguards requirements and monitoring and evaluation arrangements. The section on solar systems (part 2) includes eligibility requirements for prequalification of companies for support under the program, quality certification requirements for products, thresholds for the various level of support based on system size and other criteria and verification mechanism. The award of mini grid grants will require a selection committee for proposal evaluation, as stipulated in the operating guidelines. For the solar component a Grants Administrator will be appointed. The Operating Guidelines are expected to be updated regularly.

60. **Implementation Arrangements for Component 2.** REA will engage a Grants Administrator to implement the operating guidelines. External expertise and delivery mechanism is needed since the design demands the evaluating entity possess: (i) deep technical, financial and commercial expertise in evaluating



and appraising larger and often internationally operating solar businesses; (ii) financial and organizational systems that are aligned with the need for timely feedback on operational/administrational issues as well as just-in-time financial disbursements considering the dynamic cash flow nature of the commercial solar sector; and (iii) regular communication and socialization of the support with private sector companies to attract additional market entrants and build trust on support of the public sector to the private sector.

61. **Implementation arrangements for Component 3.** REA will lead the design, installation, operation, and maintenance of the systems. For Phase 2, REA will contract with competitively selected EPC contractors to build, operate and maintain the power plants at each site, and also build and equip the training center. The procurement will allow for bidders to bid on several sites. Each bidder will also be considered for a ten-year O&M contract for the power station. On behalf of FGN, REA will own the installed equipment and oversee construction and O&M. REA will also arrange for fuel supply. Both the O&M and fuel expenses of the power stations will be financed by the project.



F. Project location and Salient physical characteristics relevant to the safeguard analysis (if known)

Project will be implemented national-wide. Specific physical locations of any of the subprojects under any of the project components are not yet known.

G. Environmental and Social Safeguards Specialists on the Team

Ekaterina Grigoryeva, Environmental Safeguards Specialist
Amos Abu, Environmental Safeguards Specialist
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SAFEGUARD POLICIES THAT MIGHT APPLY

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	Components 1, 2, and 3 (but not 4) will involve physical components and infrastructure that may result in adverse E&S risks and impacts. Since the subprojects are not known, ESMF has been prepared to clarify the roles and responsibilities of REA, private sector mini-grid developers and operators for component 1, SHS companies for component 2, contractors for component 3, and other stakeholders with regard to E&S due diligence/ assessment, management of risks and impacts, and monitoring. ESMF covers step-by-step processes for assessing and managing E&S risks and impacts associated with each component. As part of the design of E&S risk management approach for the project - with ESMF at its core - REA will put in place an integrated process for E&S due diligence fully linked to the key operational documents and processes for each component and the overall project. This includes such instruments like electricity demand surveys, grant proposals, operating guidelines, legal agreements, contractual documents.



Performance Standards for Private Sector Activities OP/BP 4.03	No	This project does not apply OP/BP 4.03
Natural Habitats OP/BP 4.04	No	Based on a sample of potential subprojects visited during initial project preparation, some of the rural mini-grid subprojects under component 1 (and possibly under component 3) may impact natural habitats. Where this is the case, a biodiversity impact screening and assessment will be carried out as part of the overall E&S risks and impacts identification process and mitigation measures identified as part of the ESMP. However, mini-grid subprojects with significant impacts on ecologically sensitive areas, and thus requiring significant investments in biodiversity risk management, would be excluded from financing through Exclusion Criteria for mini-grid site locations as they would not be not only environmentally but also financially viable. Hence, the policy is not triggered.
Forests OP/BP 4.36	No	If impacts on forests in line with the scope of application of OP4.36 (regardless of impacts covered under 4.04 which has different scope of application) are identified during E&S screening and assessment of subprojects (under component 1), such subprojects would be excluded as impacts may be too complex to manage vis-à-vis private developers' capacity. Hence, the policy is not triggered.
Pest Management OP 4.09	No	Project does not envisage use of pesticides.
Physical Cultural Resources OP/BP 4.11	No	Since subprojects under components 1 and 3 will involve work with likely digging, excavation and/or earth displacement sub-activities, impacts on cultural resources may occur. However, significant impacts may need substantial investments in related risk management measures. Hence, such subprojects will be excluded from financing through Exclusion Criteria for mini-grid site locations, as they would not be environmentally, socially, or financially viable. Impact screening and assessment for these issues would still be carried out as part of the overall E&S risks and impacts identification process, in order to be able to exclude this. Hence, the policy is not triggered.
Indigenous Peoples OP/BP 4.10	No	Groups meeting the World Bank definition of Indigenous Peoples are not found in Nigeria.
Involuntary Resettlement OP/BP 4.12	Yes	The policy is triggered since the subprojects to be financed under components 1 and 3 would require



land for mini-grid sites and this may result in displacement of people (both economic and physical). Given that the specific investments under these components are yet unknown, REA has prepared a Resettlement Policy Framework (RPF) in accordance with the Bank Safeguard policy on Involuntary Resettlement (OP/BP 4.12) to address the needs of persons who will be affected by loss of economic activities, land acquisition and/or relocation. This will mainly cover component 1 and 3(component 2 is not expected to have such impacts). The RPF will set out the policies, principles, institutional arrangements, likely categories of affected people, eligibility criteria and categories, compensation rates, methods of valuing affected assets, community participation and information dissemination, Grievance Redress Mechanism, and effective monitoring and evaluation.

Safety of Dams OP/BP 4.37	No	Construction of dams is not envisaged for this project.
Projects on International Waterways OP/BP 7.50	No	Subprojects will not involve impacts on international waterways.
Projects in Disputed Areas OP/BP 7.60	No	Subprojects will not be located in disputed areas.

KEY SAFEGUARD POLICY ISSUES AND THEIR MANAGEMENT

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the proposed project. Identify and describe any potential large scale, significant and/or irreversible impacts:

Key E&S issues are limited and their magnitude is mostly proportionate to the small size of subprojects. However, these risks are systemic and expected to manifest themselves frequently across components. These include most of all safe disposal/ recycling of used batteries (both lead-acid and lithium ion) and land acquisition / land use changes (with the exception of component 2 where this is not expected). Additionally, for components 1 and 3, stress on local water use and supply, construction impacts, waste management (in addition to batteries) and bird mortality can become systemic risks. Community engagement has also been identified as critical to project sustainability.

While risks at the level of individual subprojects are limited, if certain key risks are not properly addressed by the main implementing agency through putting in place and efficiently executing E&S risk management processes tailored to the specific design of each project component, the resulting risk level can be substantial. Even though E&S risks can be considered moderate and are concentrated around a small number of key technical issues, the complexity of project design and differences between components require REA to not only clearly define specific risk management mechanisms internally, but also integrate those into each component’s operational workflows. As REA has limited



experience and capacity in this regard, adopting an E&S management framework at the practical level, strengthening REA's capacity for oversight and monitoring, and building systems and capacity of all key project stakeholders that will assume substantial responsibility with regard to ESMS (mini grid developers, SHS companies, EPC contractors, universities) will be critical to success.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

As part of project preparation, several strategic challenges have been identified, in consultation with multiple stakeholders, that may affect project E&S sustainability in the long term. These challenges are: (i) land/ resettlement/ VLD issues and competing land use challenges for mini-grids; (ii) battery storage and recycling for mini-grids (lead-acid) and SHS units (lithium ion); (iii) need for harmonization of E&S standards among private mini-grid developers, financiers, and government regulators; (iv) consistent and meaningful stakeholder / community engagement. Therefore project design integrates technical assistance - with associated budget - to develop strategic solutions for these challenges during project implementation.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

In consideration of "no project" alternative, while the subprojects' construction and operation are expected to have a number of identifiable environmental and social (E&S) risks, it is also seeking to bring positive outcomes for local livelihoods of communities and also represent a more sustainable and cleaner power source based on renewable energy in places where other sources of energy are not easily available.

In consideration of other / alternative energy sources, the project is a renewable energy project and thus presents positive environmental externalities compared to the diesel-based generation. The proposed project will bring in positive environmental impact, not only by avoiding greenhouse gas emissions but also by reducing local air pollution emissions. An estimated total of 9,735,040 tCO₂ will be avoided over 20 years. This will lead to reduction in local pollution from the use of diesel, kerosene, candles and biomass (firewood) that are used as alternative sources of energy.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

Overall, Nigeria has demonstrated its commitment to mitigating adverse E&S impacts in the implementation of a range of World Bank projects, including category A and B projects in the Energy sector. There are adequate legal and institutional frameworks in-country to ensure compliance with World Bank safeguards policies triggered by projects. Environmental governance commenced in Nigeria in 1988 by the establishment of the Federal Environmental Protection Agency (FEPA). Currently, NESREA has the responsibility of enforcing all environmental laws, regulations, guidelines, and standards under Environmental Impact Assessment Act 2004 and other relevant regulations. In addition, state Environmental Protection Agencies have an oversight as environmental regulators at state level. Both NESREA and State EPAs have basic capacity to fulfil their obligations.

REA will be responsible for overall project implementation. In order to ensure sound E&S risk management of the project in line with the national regulations and World Bank Safeguard policies, REA has prepared and will put in practice an Environmental and Social Management Framework (ESMF). ESMF clarifies the roles and responsibilities of REA, private sector mini-grid developers and operators, SHS distributors, EPC contractors, and universities. RFP has also been prepared as a practical tool to guide the preparation of Resettlement Action Plans (RAPs) for sub-projects during the implementation. ESMF and RFP were consulted upon and subsequently disclosed on 06 April 2018. REA appointed two E&S specialists. Adequate budget for capacity enhancement, monitoring and oversight by REA has been allocated under the project TA component.



SUMMARY OF E&S RISK MANAGEMENT PROCESS BY PROJECT COMPONENT.

(1) For COMPONENT 1, private sector mini-grid developers will assume primary responsibility for assessment and management of E&S risks and impacts of mini-grids constructed and operated by them. In order for REA to exercise efficient and effective oversight of this process, developers will be asked to prepare and submit an institutional Environmental and Social Management System (ESMS) satisfactory to REA as part of qualification criteria for the program. ESMS will ensure that developers have adequate systems and capacity for carrying out E&S measures at the subproject level and cover all key identified risks in a consistent manner using the policy, approaches, and tools as stipulated in their ESMS which must be in line with World Bank E&S requirements. Developers will be provided with training and capacity building, for which funds have been allocated under the project TA component.

(2) For COMPONENT 2, SHS companies would also be required to prepare an ESMS to qualify for the program. This ESMS would focus on key E&S risks identified for this component, and in particular include requirement for adequate HR policy, OHS guidelines; and an articulated approach to used battery units collection, disposal/ recycling. SHS companies will be provided with training and capacity building, for which funds have been allocated under the project TA component.

(3) For COMPONENT 3, ESIA/ ESMPs and, if necessary, RAPs would be prepared by REA, cleared by the World Bank and Ministry of Environment. E&S risk mitigation measures will be included in the bidding documents and contract for the EPC contractor that will construct the solar power systems for the universities. REA, with active participation of universities, will be responsible to prepare and execute the ESIA/ ESMPs and RAPs, including proper stakeholder engagement process. REA will be responsible for the costs of compensation, as required and in line with World Bank OP4.12.

The project will also set up a Grievance Redress and Feedback Mechanism for people to report concerns or complaints, if they feel unfairly treated or are affected by any of the subprojects. Mini-grid developers will also be required, as part of their ESMS, to establish and maintain a grievance mechanism for communities. Additionally, the project has developed a structured approach to addressing gender issues and gender-related actions and tools are integrated into each component.

To ensure that private sector is adequately equipped to fulfil its role in E&S assessment and risk management for the project, REA shall provide guidance and support to the private sector in the form of (i) assistance with developing internal E&S systems and capacity, including training; (ii) required adequate reporting from companies engaged; (iii) risk-based oversight function that will help allocate REA's resources for review, monitoring, and supervision. REA will ensure that budget is available for these activities.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

ESMF and RPF include detailed guidance on stakeholder engagement - including on-going consultations and grievance redress - throughout project implementation. Stakeholder engagement processes are designed in a way that transcend all project levels and key implementing parties. REA will have overall responsibility for stakeholder engagement and oversight, while private sector mini grid developers will integrate stakeholder engagement plans and grievance mechanisms as part of their ESMS, SHS companies will conduct citizen engagement in the course of doing business, and EPC contractors to be engaged in university power systems will have this element as part of their contractual requirements. Stakeholder engagement also integrates a substantive gender component.



B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other

Date of receipt by the Bank 27-Mar-2018	Date of submission for disclosure 06-Apr-2018	For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors
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"In country" Disclosure

Nigeria
06-Apr-2018

Comments

Disclosed by the implementing agency, Rural Electrification Agency of Nigeria, through the Federal Ministry of Environment. Disclosure notices were placed in two newspapers (Daily Trust and Guardian).

The links to the REA website:

ESMF: <http://rea.gov.ng/environmental-social-management-framework-esmf/>

RPF: <http://rea.gov.ng/nep-resettlement-policy-framework-rpf/>

Link to FMEnv website:

<https://ead.gov.ng/public-disclosure-of-esmp-and-rpf-for-the-nigeria-electrification-project/>

Resettlement Action Plan/Framework/Policy Process

Date of receipt by the Bank 28-Mar-2018	Date of submission for disclosure 06-Apr-2018
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"In country" Disclosure

Nigeria
06-Apr-2018

Comments

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Link to FMEnv website:

<https://ead.gov.ng/public-disclosure-of-esmp-and-rpf-for-the-nigeria-electrification-project/>



C. Compliance Monitoring Indicators at the Corporate Level (to be filled in when the ISDS is finalized by the project decision meeting)

OP/BP/GP 4.01 - Environment Assessment

Does the project require a stand-alone EA (including EMP) report?

No

OP/BP 4.12 - Involuntary Resettlement

Has a resettlement plan/abbreviated plan/policy framework/process framework (as appropriate) been prepared?

Yes

If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?

Yes

The World Bank Policy on Disclosure of Information

Have relevant safeguard policies documents been sent to the World Bank for disclosure?

Yes

Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?

Yes

All Safeguard Policies

Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?

Yes

Have costs related to safeguard policy measures been included in the project cost?

Yes

Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?

No

Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?

Yes



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