CLEAN TECHNOLOGY FUND

INVESTMENT PLAN FOR NIGERIA

Update Note

July 2014

(Revised)

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List of Abbreviations

AfDB	African Development Bank
APL	Adaptable Program Loan
BP	Bank Policy
BPE	Bureau of Public Enterprises
CO2	Carbon Dioxide
CPS	Country Partnership Strategy
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
DFID	Department for International Development (UK)
DISCO	Distribution Company
DNI	Direct Normal Irradiation
DPR	Department of Petroleum Resources
ECN	Energy Commission of Nigeria
EE	Energy Efficiency
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPSR	Electric Power Sector Reform
ERSU	Environment, Resettlement, and Social Unit
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESW	Economic and Sector Work
EUR	Euro
FGN	Federal Government of Nigeria
FME	Federal Ministry of Environment
FMF	Federal Ministry of Finance
FPM	Financial Procedures Manual
GAC	Governance and Anti-Corruption
GDP	Gross Domestic Product
GEF	Global Environment Facility
GENCO	Generating Companies
GHG	Green House Gases
GHI	Global Horizontal Irradiation
GIFMIS	Government Integrated Financial Management Information System
GW	Gigawatt
HV	High Voltage
HVDS	High Voltage Distribution Systems
IDA	International Development Association
IDB	Islamic Development Bank
IEG	Independent Evaluation Group
IFC	International Finance Corporation
IMF	International Monetary Fund

IOC	International Oil Company
IP	Investment Plan
IPP	Independent Power Producer
JV	Joint Venture
kWh	Kilowatt-hour
L/C	Letter of Credit
LAA	Land Acquisition Assessment
LCOE	Levelized Cost of Electricity
LNG	Liquefied Natural Gas
LUPT2	Lagos Urban Transport Project 2
LV	Low Voltage
MDB	Multilateral Development Bank
MDG	Millennium Development Goals
MIGA	Multilateral Investment Guarantee Agency
mmbtu	million metric standard cubic feet
mmscfd	million metric standard cubic feet per day
MOCA	Market Operator Clearing Account
mscf	thousand standard cubic feet
MV	Medium Voltage
MW	Megawatt
MYTO	Multi-year Tariff Order
NEB	Network Expansion Blueprint
NEPA	National Electric Power Authority
NERC	Nigeria Electricity Regulatory Commission
NEWMAP	Nigeria Erosion and Watershed Management Project
NGO	Non-Governmental Organization
NIAF	Nigeria Infrastructure Advisory Facility
NIPP	National Integrated Power Project
NUTP	National Urban Transport Project
O&M	Operations and Maintenance
PAD	Project Appraisal Document
PAP	Project-Affected Person
PCN	Project Concept Note
PHCN	Power Holding Company of Nigeria
PIM	Project Implementation Manual
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PRG	Partial Risk Guarantee
PV	Photovoltaic
QER	Quality Enhancement Review
RAP	Resettlement Action Plan
REA	Rural Electrification Agency

RES	Renewable Energy Sources
RFP	Request for Proposals
RPF	Resettlement Policy Framework
SCADA	Supervisory Control and Data Acquisition System
SEA	Strategic Environmental Assessment
SIL	Specific Investment Loan
SME	Small and Medium Enterprise
T & D	Transmission and Distribution
TA	Technical Assistance
TCF	Trillion Cubic Feet
TCN	Transmission Company of Nigeria
TFC	Trust Fund Committee
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollar
WB	World Bank
WBG	World Bank Group
WIP	Work In Progress

EXECUTIVE SUMMARY

1. This note provide an update on projects and proposes the first revision to the Clean Technology Fund (CTF) Investment Plan (IP) for Nigeria, which was endorsed by the CTF Trust Fund Committee (TFC) on November 12, 2010 with an indicative envelope of US$ 250 million in CTF funding. The CTF IP for Nigeria comprised of three projects in the Transport, Renewable Energy, and Energy Efficiency sectors. These were: (a) Bus Rapid Transit Lagos (LUPT2), (b) Bus-based Mass Transport Support for Abuja, Kano and Lagos (Nigeria Urban Transport Project - NUTP), and (c) Financial Intermediation for Clean Energy/Energy Efficiency. Recognizing that the resources pledged to the CTF had already been allocated to earlier investment plans, the CTF IP for Nigeria was endorsed subject to the availability of CTF funding for the further implementation of projects. In May 2012, the CTF Trust Fund Committee agreed to an indicative allocation available for Phase II countries, including Nigeria.

2. The Federal Government of Nigeria (FGN) hereby proposes the reallocation of CTF resources in support of the development of the solar PV sector in Nigeria. The proposed reallocation of CTF resources, as well as the tentative allocation for both existing and new projects, is summarized in Table 1 below.

Table 1: Proposed Reallocation of CTF Resources (US$ million)

CTF Program	MDB	CTF Funding (CTF IP Endorsed November 2010)	CTF Funding Reallocation			CTF Funding (CTF IP Revision May 2014)
			WB	AfDB	IFC	
Bus rapid transit Lagos (LUTP2)	World Bank	50	(-) 50			**0**
Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP)	World Bank, AfDB	100	(-) 50			**50**
Financial intermediation for clean energy / energy efficiency	AfDB, IFC	100		(-) 25		**75**
Utility-scale solar PV	World Bank	-	(+) 100			**100**
Utility-scale solar PV	AfDB	-		(+) 25		**25**
Total		**250**	**0**	**0**	**0**	**250**

3. ***Rationale for reallocating CTF resources from transport to energy sector projects.*** Nigeria's Vision 20:2020 aims to position the country into one of the top 20 economies by 2020, with 2,500-3,000 kWh per capita energy consumption, from current 212 kWh per capita, including a competitive and sustainable power sector. Nigeria has approximately 3,600-4,000 MW installed capacity for power generation for an estimated demand of 14,000-20,000 MW. The vast supply-demand gap is currently being met by off-grid solutions (e.g., diesel generators, charcoal, and firewood), which are

emission centric and have resulted in Nigeria ranking among top 3 emitters in Africa for both fossil fuel emissions and emissions from land use change. Given Nigeria's continuing annual economic growth of 6-8%, these emissions are expected to rise exponentially if significant mitigation options are not implemented. Following the National Energy Policy which emphasizes expanding on renewable energy resources to diversify its current fossil-fuel dominated energy sector, Nigeria has determined to exploit its immense solar PV potential. This would allow Nigeria augment its power supply and monetize this rich renewable resource, whilst fulfilling its global obligations towards GHG mitigation. Recent reforms and privatization of the power sector has resulted in the emergence of new institutional landscape and private investments. In order to further attract private sector investment and streamline renewables into new emerging power institutional landscape whilst also reducing and diversifying its dependence on fossil-fuel based power generation, the country finds imperative to demonstrate the development of utility-scale grid-connected Solar PV power plants.

4. The revised CTF IP for Nigeria will help initiate the development of the solar PV sector with private sector participation. More specifically, the revised CTF IP will help demonstrate utility-scale solar PV deployment using Independent Power Producers (IPP) structures under Public-Private Partnership (PPP) frameworks, contribute to knowledge and technology transfer to the country, and promote a conducive enabling environment for renewable in general and solar PV in particular. The reallocation of US$125 million CTF funding to the solar PV sector will catalyze low carbon technologies and business models which are not supported by current Nigerian commercial finance due to bankability and other challenges. The proposed CTF-funded projects will support deployment of solar PV plants across different power plant set-up within the country. The approach will illustrate different configurations of financing-technical models and streamlined institutional mechanisms and processes for the plant set-ups. It is proposed to roll-out the installation of the CTF supported solar PV power plants to different power plant set-up configurations in sizes of 20-100 MW each (i) grid-connected plant(s) in the Northern Region of Nigeria, (ii) co-generation with three main hydro-power plants at Kainji, Shiroro and Jebba, and (iii) embedded generation within Distribution Companies (DISCOs). These different plant configurations, addressing major generation scenarios in Nigeria are trailblazers that will enable future replication and scale-up plus offer co-benefits beyond power generation and emissions reductions. The development of solar PV power plants in Northern Nigeria will also support Nigeria's program for Strategic Initiatives for North East and fostering economic development in the region. Embedded generation within DISCOs (grid-connected, distributed) would help DISCO growth and strengthening in addition to supporting Ministry of Power 'embedded generation' initiative. Co-generation solar-hydro plants (grid-connected, centralized and/or distributed) are an emerging configuration, globally, and the proposed projects would demonstrate and leverage 'storage' viability of solar PV to enhance the resource utilization of hydro plants, driving the costs down for solar-hydro power generation and sector in longer run.

5. ***Private sector participation in solar PV.*** Despite allowing IPPs since 2005, attractive renewables feed-in-tariffs (FiTs), several incentives and abundant sunshine (5.08 x 1012 kWh of energy per day from the sun[1]), there has been limited interest by private investors in renewable energy technologies. At the moment there are no utility-scale solar energy power plants in Nigeria and installed renewable capacity is less than 1 MW (excluding hydro). Specifically to the deployment of Solar PV grid-connected plants in Nigeria, private investors are required to overcome a number of barriers such as high development costs of a non-proven technology in the local market as well as higher first-mover costs. Furthermore, there are a number of country risk factors related to proper

[1] Report of the Vision 2020: National Technical Working Group on Energy Sector, pp 62

legal and regulatory frameworks. These barriers lead to prohibitive risk-return profiles for private investors. These barriers can be addressed in different ways depending on the timing of an intervention but may include providing concessional financing to subsidize development costs via the public sector at a pre-investment stage or directly through the private sector. Given the small share of development costs to the total investment needs of grid-connected solar PV power plants, these projects may still require further concessionality to ensure commercial viability at tariff levels that are, on one side, reasonable to the off-taker, and on the other that allow to cover for capital expenditures, operational and maintenance costs, debt servicing and cash distribution to shareholders. The proposed interventions under the revised CTF IP for Nigeria intends to address value-chain issues, initiate pathways for public-private sector processes, and deploy market-based mechanisms to mitigate risks to attract private sector investors, ensuring the sustainability of the sector and this model of financing over time.

6. The use of CTF funding in solar PV interventions is expected to leverage another US$896 million from other financing sources using PPP structure with IPPs. Furthermore, the use of CTF financial instruments will help: (i) provide risk-reducing instruments or innovative financial products to improve access to commercial financing and its pricing, (ii) guarantee investment recovery associated with renewable electricity, and (iii) enhance the project risk profile for high quality private investors. These can be in the form of grants, senior debt, subordinated debt, guarantees and equity, and will ultimately finance capital expenditures and operational costs. Projects supported by the CTF, would also help develop the much needed local operational, technical and financial capacity for solar PV sectors thereby contributing to bringing this technology to grid parity in Nigeria. In the long run, at Federal and State levels, it is expected to help influence development of renewables planning and policies capacity and development of frameworks to guarantee renewable electricity investment recovery that would deepen renewables sector (e.g. competitive procurement, tariffs, price discovery, energy markets, and sales to med-voltage grids). CTF supported projects and initiatives are identified for their critical impact on energy sector at both Federal and State levels in addition to social and economic development and collateral for climate change.

7. **Update status on projects.** Following the endorsement of the CTF IP for Nigeria in November 2010, the CTF Trust Fund Committee approved the release of two tranches for a total of US$135 million of CTF funding. As of May 2014, US$26 million CTF funding has been approved by the CTF Trust Fund Committee for two AfDB's projects, including US$1 million project preparation grant for *Nigeria Urban Transport Project – Abuja Mass Transit* and US$25 million for project proposal titled *Nigeria: Line of Credit for Renewable Energy and Energy Efficiency Projects*.

Table 2: CTF IP for Nigeria November 2010 – Indicative Financing Plan (US$250 million)

Financing Source → Component ↓	CTF			MDBs			Others	
	WB	AfDB	IFC	WB	AfDB	IFC	Others	Total
Bus rapid transit Lagos (LUTP2)	50			190			140 (Lagos state, AFD + GEF)	**380**
Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP)	50	50		200	82		TBD	**382**
Financial intermediation for clean energy / energy efficiency		50	50		125	125	205 (local banks; sponsor equity)	**555**
Total	**100**	**100**	**50**	**390**	**207**	**125**	**345**	**1,317**

Table 3: Revised CTF IP for Nigeria - Indicative Financing Plan after Reallocation (US$250 million)

Financing Source → Component ↓	CTF			MDBs			Others	
	WB	AfDB	IFC	WB	AfDB	IFC	Others	Total
Utility-scale Solar PV (World Bank)	100[1]			253[3]			400 (private capital)[2]	**753**
Utility-scale Solar PV (AfDB)		25			89		154	**268**
Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP) (AfDB)		50			50		58	**158**
Financial intermediation for clean energy / energy efficiency (AfDB, IFC)[4]		25	50		75	125	299 (commercial banks; sponsor equity)	**574**
Total	**100**	**100**	**50**	**253**	**214**	**125**	**911**	**1,753**

[1] It is intended to process this as a component in proposed Nigeria Electricity Transmission and Access Project, (World Bank).
[2] At this stage, it was not possible to confirm an exact of private financing in the project.
[3] Feasibility study support of US$3M and IBRD/IDA co-financing from the Nigeria Electricity Transmission and Access Project (NETAP) of IBRD US$700 million and IDA US$103 million (portion of the NETAP investments will directly support transmission network development and access enhancement supporting the solar generated power injected to the grid, total WB co-financing estimated at US$253 million).
[4] IFC component is under revision and will be updated at a later stage.

INTRODUCTION

8. This note proposes a revision to the CTF Investment Plan for Nigeria, which was endorsed by the CTF Trust Fund Committee in November 2010 with a tentative allocation of US$250 million CTF funding subject to the availability of CTF resources for the further implementation of projects. Specifically, this note proposes reallocating funds within priority sectors, and assesses the impact of the proposed changes on achieving objectives and targets of the initial investment plan.

9. Energy access is one of key priorities for the country. With a growing population of ~170 million and a GDP of ~US$235 billion, Nigeria is Africa's most populous country and third largest economy. GDP has been growing around 6-8% per annum and for 2014, IMF has projected at ~7%. Currently, Nigeria per capita GDP is 1/7th of world average at US$ 1,900 compared to 1/23 for electricity use per capita[2]. In Nigeria, only 40% of urban and 10% of rural residents have access to electricity and Nigerians' per capita consumption of Energy is about 212 kWh (one-tenth of average for a developed nation). Currently, Nigeria has 3,600-4,000 MW installed capacity for an estimated demand of 14,000-20,000 MW. The supply-demand gap is currently being met by carbon-intensive off-grid solutions which are contributing to the ecosystem unbalance. Current grid energy-mix is primarily dominated by fossil fuels (i.e. oil and gas) and large quantities of diesel and furnace oil are being used by all sectors – industrial, commercial, institutional or residential to make up for electricity supply shortages. Lack of rural electricity is leading to large-scale use of kerosene and biomass/firewood.

10. Nigeria's Vision 20:2020 tends to follow the trajectory that mirrors energy consumption of developed countries, which translates to rise in total demand (grid and off-grid) for electricity by a factor of 5.0 by 2020 and 16.8 by 2035 (relative to 2009). In 2035, this would translate in a per capita consumption of 1,875 kWh (with a per capita income of US$8,226 at 2009 PPP)[3]. Per capita CO2 emissions are expected to rise even faster if energy supply remains based on traditional energy model. Nigeria ranks within top 3 emitters in Africa for both fossil fuel emissions and emissions from land use change. Although, currently, per capita emissions are smaller than those of Africa as a whole, Nigeria may double its current annual emissions by 2025 if [current] population growth rates persist, and even faster if consumptions patterns increase[4], which is expected. The key drivers of CO2 emissions are population growth, rapid urbanization, economic activity, and the CO2 intensity of the economy. Roadmap for Power Reforms lays out strategy for the Power sector and alludes to Renewables having 4-5% generation share.

11. More ambitious renewable goals are being developed by Ministry of Environment under its Renewable Energy programs, still to be endorsed and legislated. The objective of the Renewable Energy program is to develop and implement strategies that will achieve a clean reliable energy supply and establish mechanisms to develop the sector based on International best practices, and showcase viability for private sector participation. It aims to reduce projected energy use by 20% by 2020 and meet 20% of the nation's electricity needs with Class 1 renewable energy sources by 2020. It intends using a combination of energy efficiency, conservation, and renewable energy resources, to meet future demand increases without increasing its reliance on non-renewable resources. The

[2] IRENA 2010 (GDP (US$)- Nigeria: World:1200:9100 and Electricity use (kWh)- Nigeria: World::127:2600)
[3] World Bank – Low Carbon Development in Nigeria 2013
[4] Trends in Greenhouse gas Emissions in Nigeria: 1988-2000. A Canada-Nigeria Climate Change Capacity Building Project (CIDA)

main goals are (1) secure, safe, and reasonably priced energy supplies and services (2) economic growth and development and (3) environmental protection.

12. Nigeria's low-carbon ambition and development are driven in response to the international obligations and incentives, and the imperative to quickly augment power generation exploring clean energy options. As a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Nigeria has made international commitments to promoting low-carbon development. The Renewable Energy Master Plan and the Global Gas Flaring Reduction Initiative are amongst the steps in this direction. Whilst the low-carbon agenda is assisting Nigeria's towards cleaner energy solutions, albeit at slow pace, it will not be sufficient and fast enough to achieve the sector transformation urgently required for climate adaptation and mitigation, and universal energy access. Although no study has been conducted specifically by Nigeria to assess barriers for utility-scale solar PV plants in Nigeria, initial discussions point to obvious financing and technical barriers (e.g. first-mover risk, lack of technology maturity in the country, inappropriate legal and regulatory frameworks, lack of streamlined government-led processes that increase the lead time for project developers e.g. single-window). Hence, in addition to Nigeria's driven policies and legislative frameworks, specific economic incentives are required to attract foreign investment, demonstrate the sustainability of renewable energy, and establish renewable energy specific mechanisms (e.g. procurement-bids, tariffs, dispatch-clearing desks, grid-integration codes). Over time, the deployment of utility-scale solar power plants in Nigeria will demonstrate the financial and technical viability of this technology through the demonstration of positive returns on investments, alignment of institutions and policies, and community and stakeholder acceptance, thereby encouraging further investments in the renewable sector by large private players.

13. The reforms and privatization in the power sector are underway and have achieved credibility and interest both within the country and especially the international investor community. Hence, at this juncture, the re-allocation of funding towards clean energy would help in leveraging the built-up momentum in the power sector to mobilize part of new generation capacity towards solar energy. Investors paid approximately US$2.8 billion towards the 14 Power Holding Company of Nigeria (PHCN) successor companies[5]. Further it is estimated that 40 per cent of the total funds inflow to the power sector in this year will be from Foreign Direct Investment (FDI)[6]. FDI inflows into Nigeria have been approximately US$84.4 billion in 2012[7]. From 2015 onwards, Nigeria estimates that investment in Greenfield IPPs towards generation capacity installation can reach approximately 2,000-3,000 MW per annum, at US$2–3 billion per annum contribution. This is a significant and unprecedented level of non-oil, single-sector investment for Nigeria and is contingent upon investor confidence and an available financial/securitization solution(s) for new investors. The Utility-Scale Solar PV project being implemented by AfDB will play an important role in demonstrating the replication potential of IPP schemes in the context of solar power generation.

[5] Press release – Bureau of Public Enterprises, The Secretariat of National Council on Privatization
[6] Financial Derivatives Company Limited (FDC)
[7] Economist Intelligence Unit (EIU)

STATUS OF ORIGINAL INVESTMENT PLAN IMPLEMENTATION

14. The CTF IP for Nigeria was endorsed in November 2010 with a tentative allocation of US$250 million in CTF funding subject to the availability of CTF resources for the further implementation of projects. Lack of available resources prevented Nigeria from submitting project proposals for funding from the CTF until May 2012, when the CTF Trust Fund Committee agreed to an indicative allocation available for Phase II countries, including Nigeria. As of May 2014, the CTF Trust Fund Committee has committed US$26 million out of US$250 million originally endorsed for Nigeria. These include US$1 million project preparation grant for *Nigeria Urban Transport Project - Abuja Mass Transit (AfDB)* and US$25 million for project proposal titled *Nigeria: Line of Credit for Renewable Energy and Energy Efficiency Projects (AfDB)*.

Table 4: Status of Project Approvals

CTF Program / Project Title	**TFC Approval Date**	**MDB Board Approval Date**	**CTF Funding** (US$ million)	**Leveraged Funding** (US$ million)
Bus rapid transit Lagos (LUTP2) (World Bank) [1]	n.a.	n.a.	n.a.	n.a.
Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP) (World Bank) [1]	n.a.	n.a.	n.a.	n.a.
Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP) (AfDB)	Q3-2014	Q4-2014	50	108
Financial intermediation for clean energy / energy efficiency (AfDB)	Apr-2014	May-2014	25	271
Financial intermediation for clean energy / energy efficiency (IFC)	Q3-2015	Q4-2015	50	228
Utility-scale Solar PV (World Bank)	Q1-2015	Q2-2015	100	653
Utility-scale Solar PV IPP (AfDB)	Q4-2014	Q4-2014	25	243

[1] Nigeria is requesting the reallocation of CTF funding (US$100 million) originally endorsed for World Bank transport sector projects (LUTP2 and NUTP) toward *Utility-scale Solar PV project (World Bank)*

❖ Bus Rapid Transit Lagos (LUTP2) (World Bank)

15. **Description:** The CTF proposed to leverage the early successes of the BRT-Lite system and offer a sustainable alternative for a broad spectrum of Lagosians to use an expanded system to replace and to complement other existing modes of transport.
16. **Rationale:** Lagos has already invested a significant part of its budget resources on BRT-Lite and The World Bank and Agence Française de Développement (AFD), among others decided to finance the LUTP2 project. A financing gap in the expansion of the project was expected to be met by CTF, to enable and accelerate the transformation of the transport market in Lagos. It was expected to add a new component to the planned operation, to include the purchase of highly efficient and CNG/dual fuel buses to demonstrate that the substantially higher initial cost of acquiring efficient buses masks that efficient buses actually cost less to operate and maintain over time.
17. **Progress:** US$50 million CTF funding is proposed to be reallocated to Utility-scale Solar PV project. While the intention had been to co-finance this project with CTF funding, the lack of resources from the CTF within a reasonable timeframe resulted that project preparation and implementation went ahead without CTF financing. The LUPT2 project is due for completion in 2015.

❖ Bus-based mass transport support for Abuja, Kano, and Lagos (NUTP) (AfDB, World Bank)

US$158 million: US$50 million (CTF), US$50 million (AfDB) + additional from states, FCTA, Equity, Commercial Banks

18. **Description:** Within the larger context of the Nigeria Urban Transport Project (NUPT) project, funded by WB and ADF, the CTF was expected to support the institutional development, public transport and traffic management, road network improvements, rolling stock, project support, other investments like solar lighting of bus stops, etc.
19. **Rationale:** CTF investments would have ensured active and early consideration of GHG mitigation in the overall agenda, Kano and Abuja to follow Lagos' BRT-lite bus-based mass transport facilities and services and better integration of urban transport policy into national climate policy.
20. **Progress AfDB:** A US$950.000 Project Preparation Grant has been approved in February 2013 for the Abuja Urban Transport, for which a total of US$50 million in CTF funding has been allocated in the original IP. AfDB is undergoing detailed discussions with the line Ministry with the objective of fast tracking the appraisal of the project and subsequent approval.

❖ Financial Intermediation for Clean Energy/Energy Efficiency Projects (AfDB, IFC)

US$574 million: US$75 million (CTF), US$200 million (IFC, AfDB private sector), US$299 million (commercial banks, sponsors equity)

21. **Description:** The CTF FI initiative in Nigeria is intended to help overcome the financing and market barriers for low carbon investments to support the deployment and application of clean energy and energy efficiency solutions and fuel switching in various industrial and service sectors and in households
22. **Rationale:** Without the CTF financing support for these initiatives, the financing gaps in clean energy investments will not be prioritized by industry and will be difficult to fill. CTF is expected to meet the

needs of jumpstarting the clean energy and energy efficiency market through a combination of financial incentives, risk products or lines of credit, and capacity building programs.

23. **Progress AfDB:** The initial IP agreed funding of US$50 million towards Renewable Energy and Energy Efficiency project. While AfDB has approved to US$25 million in one financial intermediation transaction, the client for the remaining US$25 million have communicated to AfDB they would not be interested in pursuing a CTF Line of Credit any longer. Therefore, US$25 million is proposed to be reallocated to the Utility-scale Solar PV project.
24. **Progress IFC:** The IFC is actively engaged in internal consultations and discussions with potential clients. After recent steps taken by Nigeria, including power sector reforms, IFC perceives some new opportunities and is evaluating market conditions to identify the ways of efficient and impactful use of the CTF funds.

CIRCUMSTANCES AND RATIONALE FOR INVESTMENT PLAN UPDATE

Rising electricity demand implications

25. Nigeria GDP has been growing at 6-8% p.a. for past few years and IMF sees Nigeria's growth at 7.4% in 2014 from 6.2% in 2013, invariably translating to higher demand for energy and pressure on existing infrastructure. From 1990-2011, population grew 71% (to 167 million), in same period energy-use grew 68% (to 721 ktoe) and GHG emissions grew 33% (1990-2010)[8]. Total current energy demand has been estimated to be around 14,000-20,000 MW as compared to extant operational supply capacity 3600-4000 MW and present 212 kWh per capita energy consumption is far short of aspired global average of about per capita 2500-3000 kWh. Industry, transport, commercial, residential and agricultural sectors are prime consumers of energy in Nigeria. Industry and residential demand grew by 3.5 and 2.5 times from 1990-2005 (from 240 to 900 PJ and 700 to 1800 PJ respectively), with steeper growths after 2001[9]. To cope with the unreliable and paucity of power supply, majority of the consumers have resorted to using high GHG-emitting off-grid diesel generators at a higher costs and negative externalities (about 35 Nairas/kWh as compared to the current grid based tariff of 6 Naira/kWh). It is estimated that about 2.6-3.5 million liters of diesel per week is being consumed by residential, small business and commercial consumers[10]. In Nigeria, diesel is primarily being imported and retail prices are comparable to international markets, resulting in considerable foreign exchange exposure and high costs to consumers.

26. Current, energy generation mix in Nigeria is skewed towards fossil fuels: Nigeria's energy consumption mix is currently dominated by oil (53%), natural gas (39%) and hydroelectricity (7%)[11]. Solar and wind energy are currently not part of Nigeria's energy mix, attributed to various factors. Nigeria consumes over 50 million metric tonnes of fuel wood annually, which is a major cause of desertification and erosion in the country, besides GHG emissions. The rural areas are remote from grid and tend to be heavy users of firewood. Due to low power purchase potential, lack of accessibility and absence of good road networks, even with the ongoing power reform and privatization of the electricity industry, for obvious logistic and economic reasons, rural areas will not be attractive to private power investors and would be the last cohort of users to come-off the fuelwood/fossil fuels solutions.

[8] CAIT tool version 8.0, www.wri.org
[9] Clean Energy Investment in Nigeria, www.IISD.org
[10] According to a June 2009 NRECA study.
[11] EIA

27. Despite vast oil reserves, Nigeria imports ~70% of its domestic fuel requirements because of inefficient and ineffective refining capacity. The high oil import bill makes Nigeria vulnerable to globally driven energy market shocks. Nigeria has the 9th largest natural gas reserve in the world and exports large quantities of liquefied natural gas (LNG) to other countries, but the gas-dominated electricity grid still experiences frequent collapse due to inadequate gas supply and obsolete infrastructure. Lack of processing facilities and poor governance has resulted in gas wastage- Nigeria flares 50-70% of its natural gas (amounts to 12.5% of all globally flared gas[12]). The dependence on fossil fuels needs to be reduced, drastically and fast, as it is not only leading to increasing negative externalities (environmental damage and health hazards) but also adding to enormous costs in the form of subsidies, import dependence and energy-security vulnerabilities.

Table 5: Energy Sources[13]

Supply-side potential	Value
Hydropower, large scale	11,235 MW
Hydropower, small scale	3,500 MW
Fuelwood (forest land)	13,071,464 hectares
Animal waste	61 million p.a.
Crop residue	83 million p.a.
Solar	3.5-7.0kWh/m2-day
Wind	2-4 m/s (annual average) at 10m height
Crude Oil	36.5billion barrels
Natural Gas	187.44TCF
Tar Sands	30 billion barrels of oil equivalent

Nigeria's renewable energy plans

28. It is an imperative for Nigeria to tap its vast constantly replenished natural renewable sources (Table 4) to supplement energy generation. Not only will energy supply be augmented but this will also enable Nigeria to monetize its natural resources with minimal deteriorating effects on the environment. Although Nigeria has made policy efforts since 2003, there has not been much traction, and no significant capacity installations.

Figure 1 : Nigeria Policy Evolution

2003 National Energy Policy	2005 Electric Power Sector Reforms	2005 (DRAFT) Renewable Energy Master Plan	2010 Biofuel Policy (B20 & E10)	2013 Revision- Renewable Energy Master Plan

29. Renewable development has been slow due to lack of a comprehensive framework to plan, coordinate and implement a national policy and strategy. However, there have been few sporadic

[12] Community Research and Development Centre (CREDC), 2007
[13] Draft National Energy Masterplan, Energy Commission of Nigeria, June 2007 (As of Dec 2005)

initiatives (Figure 1). (a) National Renewable Energy Masterplan Project, led by Federal Ministry of Environment, as part of Nigeria's obligation on Africa Emissions reduction and (b) Renewable Energy Master Plan (REMP, 2005), led by Energy Commission of Nigeria, articulating Nigeria's vision and road map in achieving sustainable development. The REMP encompasses aims and objectives of the National Economic Empowerment and Development Strategy (NEEDS), National Energy Policy, and Millennium Development Goals (MDGs). The Renewable Master Energy Plan (2005) is being revised (2013) has yet to be ratified and accepted by the legislation. (c) Ministry of Power too has milestones for renewable energy. Its Roadmap Power Sector Reforms Revision (2013) articulates 4-5% renewable generation in future energy-mix, tentative placeholder target of 1000 MW of renewables generation capacity by 2020. Though no national level program(s) have been launched yet, there several mechanisms/incentives purported by various agencies (e.g. NERC, NBET, Ministry of Environment, Energy Commission of Nigeria, Ministry of Power) to help establish awareness and develop the sector based on International best practices, and showcase viability for private sector participation across various renewable technologies. For example, the Nigeria Infrastructure Advisory Facility - a DFID Funded Program - is working to establish the Nigeria Clean Energy Fund (NCEF) that aims to facilitate access to finance for investments in Energy Efficiency and Renewable Energy.

Table 6: Renewable Energy Support Policies / Mechanisms

Current Policy /Mechanisms in Nigeria[14]	**Status**
Feed-in tariff/Premium tariffs for renewable	Yes
Electric utility quota obligation	No
Net metering	No
Renewables obligation/mandate	No
Market based trading instruments /renewable energy certificates	No
Capital subsidy, grant, or rebate	Yes
Investment and/or production tax credits, tax holidays/waivers	Yes
Reductions in sales, energy, CO2, VAT, etc.	Yes
Energy production payment	No
Public investment, loans, insurances or grants	Yes
Public competitive bidding	No
100% Foreign equity investment, BOO	Yes
Accessible standards for technical system integration	No
Power Purchase Agreements, Preferential/Assured evacuation	No
Renewable generation as part of Transmission planning model and forecasts	No

30. The wind map of Nigeria does not present a very favorable wind speed to allow for full exploitation of this form of energy for power generation. However, studies have established Solar as having massive potential for Nigeria. Nigeria lies in high solar radiation belt, with mean average Direct

[14] From Government of Nigeria's documents – NERC, NBET, Min of Environment

Normal Irradiance (DNI) of 1,900 kWh/sq.m per annum[15], (primarily in range of annual average of 1775-2150 kWh/sq.m per annum). Using diluted and diffused radiation metrics (used for solar PV), the average solar irradiation in Nigeria is 2011 kWh/m^2 per year. This radiation is adequate for PV, even in the South, in the range 1,500–2,000 kWh/m^2 per year. Covering just 1 percent of the land area of Nigeria would produce about 1,833 TWh/year of energy with an installed capacity of 1,046 GW. This amount of electrical energy is equivalent to 4.66 million barrels of oil per day. Hence, it is not the lack of renewable resource potential but other factors that are limiting tapping and deployment of this rich resource. However, on a smaller scale, several state governments have embarked on small solar projects for rural water supply, residential lighting and lighting of clinics, schools and community centers.

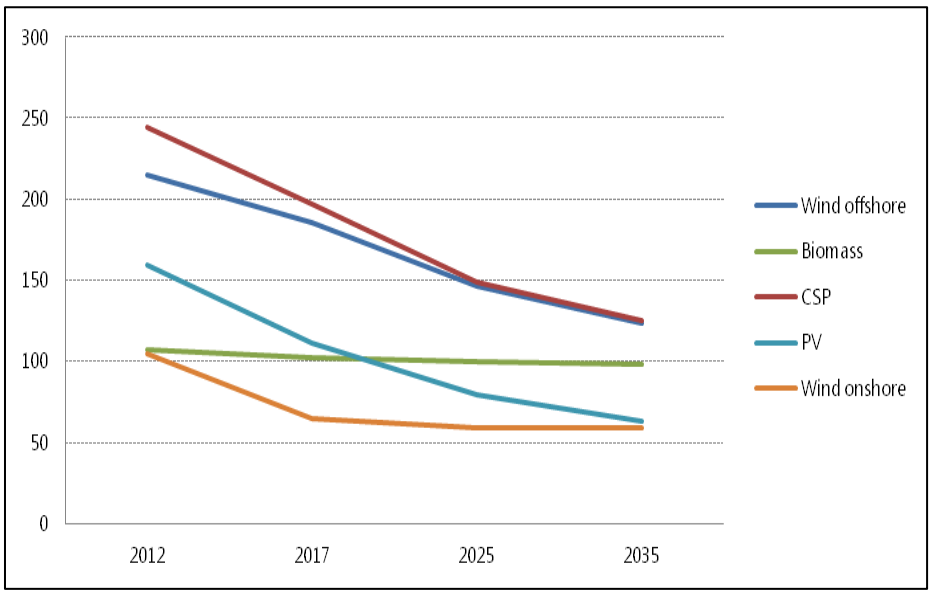
31. Currently, there are no grid connected or large solar PV installed capacity and only about 0.15 MW or less off-grid solar PV capacity[16] installed, unlike neighboring countries that have large Solar PV projects underway (e.g. 155 MW Nzema Project in Ghana, 15 MW in Mauritania, et al). The largest single pilot plant in Nigeria is 7.2kW village electrification project at Kwalkwalawa in Sokoto State, put up by the Energy Commission for Water pumping, health center power supply and village lighting and TV viewing. Nigeria is interested in installing utility-scale grid connected solar PV plants in North-East region of the country, which has higher DNI values. The major limitations to the development of solar technologies include capital costs, institutional, capacity, among others that heighten the overall project-risk and deterring private sector investments.

Rapidly declining costs of solar PV technology

32. The global cumulative installed capacity of solar PV grew by around 70% in 2011. Combined with the high learning rate for solar PV and overcapacity in the manufacturing base, this growth has resulted in significant price declines over recent years. Between Q3 and Q4 2012, crystalline silicon PV module prices have fallen to an average of US$ 0.7-0.75/W, and US$ 0.9-1.1/W for respected Chinese and western manufacturers. In industry characterized by over capacity, the PV module prices (both for crystalline and thin-film) are forecasted to fall further, skewing overall solar PV power plant costs towards the balance-of-system and labor costs now. Globally, price of solar PV-generated electricity, calculated with the Levelized Cost of Electricity (LCOE) method, is expected to become competitive with wind energy by 2035 (Figure 2). Currently, gasoline is heavily subsidized in Nigeria and if the Government follows on its policy path to allow its gas prices to approach global market prices, then, even for Nigeria, Solar PV can become cost competitive and reach grid-parity soon.

[15] ECOWAS - http://www.ecowrex.org. Nigeria receives 5.08 x 1012 kWh of energy per day from the sun and if solar energy appliances with just 5% efficiency are used to cover only 1% of the country's surface area then 2.54 x 106 MWh of electrical energy can be obtained from solar energy.
[16] ECOWAS - http://www.ecowrex.org

Figure 2: Levelized Cost of Energy for solar PV and other RES



Rationale for proposed IP update

33. Nigeria has great expectations from the power sector to underpin the country's future growth, especially non-oil based growth, onto the successful outcome from power sector reforms and privatization[17]. Although Independent Power Producers (IPPs) are allowed since 2005, and reforms were put in place that should have led to an increase in the installed capacity of renewables in the country, so far there is no utility-scale Solar PV IPPs in the country. Power sector current infrastructure, policies, mechanisms, and funding among others are defined, and streamlined towards fossil fuels and 'dispatchable' technologies regime than renewables. There is sizable risk-perception to install utility-scale grid connected solar PV power plants in Nigeria. Development costs borne by private investors at an early stage when risk perception is considerable high are hindering deployment of capital in the sector. The proposed projects under the revised CTF IP are expected to help overcome the above barrier and also contribute to mitigate first-mover risk and setting precedents for private sector IPPs besides contributing to knowledge and technology transfer which shall ultimately lead to a build-up in local capacity and in making easy the replication of solar PV.

34. Initial CTF financing will have positive multiplier effect for initiatives where technology and business models are not currently supported by commercial finance due to bankability and other challenges. CTF intervention has the potential of lowering project costs and levering the risk-return profile to levels capable of unlocking private investment, allowing the government to channel public resources into other sector of the economy. Transformational change is envisaged by changing Nigeria's energy supply portfolio, through market-based financing and incentive mechanisms, rather than regulations. The replication potential of the program is considerable high given the use of standard institutional and administrative procedures that will ultimately provide more comfort for investors.

[17] Mme Okonjo-Iweala, CNBC interview 22 Nov 2013

35. Timing-wise too, given reasonable success of power sector reforms and international investor interest, it is an opportune moment to promote and showcase grid-connected solar PV generation. There is considerable interest within Nigeria to explore renewable generation options and key public stakeholders are willing to work with a view creating the conditions and mechanisms to incentive private investors' participation to build this sector. With the prioritization of power sector and high economic growth expectations from it, juxtaposed with widening supply-demand energy gap, and rapid decline of solar PV technology globally, Nigeria hopes that these projects will ultimately lead to an installed capacity of approximately 200 MW of grid connected Solar PV power plants across different sites. Solar-hydro configuration can help improve the management of water resource utilization of hydro generation – using the existing transmission infrastructure to dispatch solar during day time and reserve hydro generation in other times. Due to high supply-demand gap in Nigeria, at the margin, generation using diesel fuel or similar are utilized at a cost higher than that of solar-hydro. Nigeria's forecasted growth trajectory (GDP- 7-8% and electricity demand) for 2014 and beyond, setting up solar PV power plants would not only add to clean generation capacity but also crowd-out some of the potential diesel-based generators solutions.

36. Process-wise, the proposed reallocation of US$125 million of CTF funds will be channeled as part of the upcoming World Bank *Transmission System Reinforcement Project* as well as part of an IPP being financed by AfDB's private sector arm. In the case of the World Bank, CTF resources will leverage potential synergies (planning, deployment, M&E, project support, procurement, etc.) by being part of this larger strategic transmission project. Once this program is successfully implemented, it can be replicated and mechanisms extended to similar renewable energy projects. In addition to building technical and financial capacity, the project will at a minimum flag the consideration of renewables into power sector planning, investments, and policies and in best case scenario integrate into business-as-usual. In the case of AfDB, a Solar PV IPP project with a total estimated capacity of 100MW is under due diligence and is expected to be approved before the end of 2014. Other investment opportunities are currently being studied and will be considered during the implementation of the revised CTF IP.

37. Overall support from the CTF for grid-connected solar PV interventions will therefore:

    a) Monetize a natural resource that is currently unutilized (solar energy), directly impacting Nigeria's economic growth,
    b) Increase generation capacity to meet the increasing demand for electricity, a basic necessity and Nigeria's national priority,
    c) Utilize renewable energy to generate electricity, creating another sector within Nigeria, leading to socio-economic growth,
    d) Diversify energy-mix for electricity generation in the country, reducing fossil-fuels dependence, increasing energy security and reducing foreign exchange fluctuations,
    e) Assist in reducing global GHG emissions and support climate change initiatives,
    f) Demonstrate large-scale grid-connected solar PV power plant in Nigeria,
    g) Increase the technical and commercial viability of the solar technology, in addition to improving and contributing to reducing electricity costs and mainstreaming renewable energy into power sector policies, mechanisms and institutions at local, state and federal levels,
    h) Indirectly, in the long run, it is expected to set precedent for competitive bidding for independent power producers (IPPs) in renewables space and hopefully help price discovery,
    i) Contribute to demonstrate the commercial viability of IPPs in the national context and correspondent replication effect.

PROPOSED CHANGES TO THE INVESTMENT PLAN

38. This revision note proposes the reallocation of US$125 million out of the initial US$250 million CTF funding endorsed under the CTF IP for Nigeria. Specifically, the proposed changes entail the reallocation of CTF funding originally intended for transport sector (US$100 million) and financial intermediation for clean energy and energy efficiency (US$25 million) projects toward investments in utility-scale solar PV. See Table 1 in Executive Summary for an overview about proposed use of CTF resources.

POTENTIAL IMPACTS OF PROPOSED CHANGES ON INVESTMENT PLAN OBJECTIVES

39. The overall impact expected from the proposed CTF IP revision is comparable to the impact expected in the CTF IP for Nigeria endorsed in November 2010. Table 7 below provides a comparison about impacts on CTF investment criteria for both CTF plans.

Table 7: Assessment of Proposed Changes

CTF Investment Criteria	**CTF IP** (Endorsed November 2010)	**CTF IP** (Revision May 2014)
Transformational Impact	Shift future modal transportation and reducing energy intensity of bus-based mass transportation. Increase efficiency of industries by switching to low-carbon and cleaner fuels and encourage industrial energy efficiency measures.	Shift future modal transportation and reducing energy intensity of bus-based mass transportation. Increase efficiency of industries by switching to low-carbon and cleaner fuels and encourage industrial energy efficiency measures. Introduce utility-scale renewable generation through grid-connected solar PV. The modular nature of the proposed investments will allow for scale-up and replication of similar investments throughout the country and elsewhere.
Potential for GHG Emissions Savings	Estimate for total GHG emissions savings had not been provided, but selected investment aimed at reducing growth trajectories of vehicle km and fuel consumption per vehicle km, as well as decreasing energy intensity of selected industries.	The total CO2eq emissions savings for the revised CTF IP for Nigeria are over 615k tCO2eq per year and over 9.5 mtCO2eq over the lifetime of investments. The estimates are conservative until more precise information becomes available. Also, the estimate does not take into consideration CO2eq savings from AfDB's Abuja Urban Transport project, as the design of the project is not available yet. • Utility-scale Solar PV (WB, AfDB): it is expected that each 100MW solar PV capacity will generate GHG savings of 88.5k tCO2eq

		per year and 1,770 ktCO2eq over a period of 20 years. This is based on assumed load factor of 25% and emission factor of 400 kCO2eq/MWh. The CO2eq savings doubles for 200MW of solar PV installed capacity. • Financial intermediation for clean energy / energy efficiency (AfDB): 158.5k tCO2eq per year and 3,962-5,230 ktCO2eq over a period of 25-33 years. • Financial intermediation for clean energy / energy efficiency (IFC): 280k tCO2eq per year and 1,960 ktCO2eq over a period of 7 years.[18]
Cost-effectiveness	An estimate for cost-effectiveness was not provided.	26 US$/tCO2eq based on CTF financing.
Demonstration Potential at Scale	Demonstrate the operational viability of alternative vehicle and fuel technologies which have the potential to reduce operational CO2 intensity. Catalyze shift of selected industries to cleaner and more efficient energy sources.	Additionally to the original CTF IP, the proposed Solar PV projects will support the deployment of different utility-scale solar PV plant configurations. The design of these plants, transfer of best practices, and deployment of innovative financial structures in the context of Nigeria, and technologies and knowledge from similar sized and configured plants will allow for scale-up and replication of similar investments both nationally and globally. CTF financing will have multiplier effect for initiatives (can be scaled/replicated) where processes, technology and business models are not currently supported by commercial finance due to bankability challenges.
Development Impact	Increased number of passengers using low-carbon public transportation Improved bus transit systems and infrastructure, including road network improvements Enhanced passenger mobility and overall commuting experience – price reduction, faster transits, safety Reduced energy cost per unit of production in selected industries Environmental co-benefits from reduction in exposure to local pollutants	Additionally to the original CTF IP, the proposed Solar PV projects will: • Promote green technology transfer, development of new sector adding to economic growth and potential as a regional hub for Solar PV, due to Nigeria's scale, • Increase potential for industrial manufacturing for Solar PV components Create employment in green jobs, • Increase energy security, • Streamline renewables into power sector processes, and • Foster economic development and reduce income disparity in north-east states (aligned with Nigeria's Strategic Initiatives for North

[18] According to the IFC's guidelines and practices, the calculation of the potential lifetime GHG emissions savings for energy efficiency projects shall be based on the expected tenor of the financial instrument used, rather than the expected life of the financed capital asset. It is anticipated, however, that in many cases the life of the assets will significantly exceed the tenor (estimated at 7 years), leading to noticeably different life-time GHG emissions savings. For example, if the life of the capital assets reaches 25 years, the potential lifetime GHG emissions savings will be about 7,000 ktCO2eq.

		East program) compared to rest of Nigeria. This will also help stabilize the current unrest in this region.
Implementation Potential	For transport sector projects, BRT (LUPT2) would be implemented by Lagos Metropolitan Area Transport Authority (LAMATA), which has been implementing the on-going Lagos Urban Transport Project (LUPT). LAMATA has played an active role in national urban transport planning, organizing workshops on a regular basis to disseminate lessons learned with the participation of staff from both Kano and Abuja Federal Capital Territory. For clean energy developments, the Country's Renewable energy Master Plan will provide a policy framework to encourage these investments. A framework has been developed to address the issue of energy efficiency.	Implementation potential for the proposed Solar PV projects is high owing to the selected 'investment-bid ready' approach which reduces upfront high-due diligence effort and costs. Implementation potential is affected positively by alignment with Government's ambition and prioritization to install renewable generation capacity and support from key stakeholders to ensure prompt clearances, approvals, PPAs, licensing, competitive bidding, etc. AfDB's led project has already made significant progress with regarding to processing generation licenses, negotiating PPA with the national off-taker. Additionally the project has also been nominated by the Government to be one of the projects that will be covered under the country's World Bank PRG program.
CTF Additionality	Ensure timely consideration of GHG mitigation into planning and investments in the transport sector and integrate urban transport policy into national climate policy. Enable and accelerate the transformation of the transport market in Lagos, enabling modal shift of passengers into low-carbon vehicles.. Unlock investment opportunities to catalyze shift of selected industries toward more clean energy sources and energy efficiency practices.	The use of CTF funds under the proposed Solar PV projects will help demonstrate the deployment of grid-connected solar PV IPP power plants in Nigeria. CTF concessional financing structure is required to reduce the risk profile of these projects and incentivize the deployment of private sector investments in the sector in order to make it cost-competitive with comparable alternatives

40. The overall risk of the revised CTF IP for Nigeria is *Moderate*. In addition to the risks and mitigation measures identified in the original CTF IP, the following risks should be considered:

Table 8: Risks and Mitigation Measures

Risk	Risk Description	Risk Mitigation	Residual Risk
Entry Barriers – established fossil-fuel regime	• Current institutional, policy and financial set-up is skewed towards fossil-fuel generation, posing large entry-barriers for grid connected solar PV power plant.	• Aligning and buy-in of key stakeholders, across value-chain, to identify and bridge institutional, technical, fiscal	Low to Moderate

(institutions and infra-structure)	The proposed medium-sized grid connected solar PV power plant is 1st of its kind in Nigeria faces a lack of level-playing field • No single entity for renewables, yet (b) no ratified strategy, roadmap or clear mandates or for Renewables. Hence renewables not integrated into Power sector BAU strategy, planning, and investments	and policy barriers. These key stakeholders also constituents of the steering committee • At Government level, Renewables Master Plan being updated for Parliamentary approval (2) Incentives schemes for Renewables in Draft stage	
Capacity and Technical gaps	• Limited experience with IPPs, no clarity or tested mechanisms for uptake of renewables output, renewable purchase obligations, payment and credit assurances • Difficult enabling environment- e.g. state-level clearances, land, evacuations, & water permits, data paucity, etc • Lack of funding availability from local banks for large scale solar PV plants due to high risk perceptions and absence of risk reducing mechanisms • Lack of technical and engineering standards and capacity for designing, installing and operating grid connected solar PV power plants. • No central entity to support mechanisms for infrastructure-related challenges to ensure coordinated transmission planning and deployment at the transmission and purchase level	• 'Pre-baked' proposal, ready-for-implementation, mimicking 'single-window' clearance. Private Investors get a full Investment Plan and feasibility studies (with pre-approvals, clearance, endorsements in place) and potential use of CTF financing to underwrite risks • CTF project triggering development of PPAs, licensing, special tariffs etc for renewable power plants • CTF funding would help de-risking project profile, lower transaction and capital costs, attracting large regional, international investors with requisite skills	Low to Moderate
Implementation risk	• One of sites under consideration, State of Bauchi, in the North-East, currently facing ethnic and communal unrest	• Nigeria Government recently launched a special initiative for the North-East. CTF funding complements and supports Nigeria's efforts to rehabilitate and rejuvenate that region	Moderate
Post Implementation Gap	• Transmission system capability gap to evacuate generation capacity (In 2017, ~ 5000 MW gap is forecasted between generation and wheeling capacity) • Grid readiness for integrating intermittent, non-dispatch supply from solar PV, plus non-discriminatory open access to the national electricity grid, for renewable power, is not assured	• Developing TCN Network Expansion Blueprint (NEB) – developing strategy to enhance Transmission capabilities (though still work-in-progress). Scheduled funding pipeline of US$3 billion to 2017 • CTF project to initiate grid-integration of renewables	Moderate

MONITORING AND EVALUATION

41. Table 9 below presents the summary of the expected Results Indicators and their target values, comparing the expected results in the November 2010 CTF IP and proposed revision.

Table 9: Results Framework – Nigeria CTF IP after Reallocation (May 2014)

Results	Indicator	Baseline	Expected Results in Nigeria CTF IP (Endorsed November 2010)	Expected Results in Nigeria CTF IP (Revision May 2014)
Avoided GHG emissions	Tons of GHG emissions reduced or avoided - tCO2eq/yr - tCO2eq over lifetime of the project	 0 0	 n.a. n.a.	 0.615 mtCO2eq 9.5 mtCO2eq
Increased finance for low carbon development	Volume of direct finance leveraged through CTF funding (US$ million) - public - private	 0 0	 862 205	 592 [2] 911 [2]
Increased supply of renewable energy	Installed capacity as a result of CTF interventions (MW)	0	n.a.	200 [1]
Increased energy efficiency	Annual savings as a result of CTF interventions (GWh)	0	n.a.	TBD [1]
Increased access to public transport	Number of additional passengers using low carbon public transport as a result of CTF intervention	Xx	n.a.	TBD [3]

[1] *Financial Intermediation for Clean Energy/Energy Efficiency program* (AfDB, IFC) is expected to support a number of EE and RE sub-projects. Specific target of the share of RE and EE sub-projects in the portfolio composition is not set yet. The installed capacity reported of 200MW corresponds to the newly proposed Utility-scale Solar PV interventions (AfDB, World Bank).
[2] The breakdown of leveraged financing from public and private are tentative.
[3] The indicator for increased access to public transport will be completed once the design of AfDB's Abuja Urban Transport project has been completed.

ANNEX I: Utility-scale Solar PV Project (World Bank)

Problem Statement

42. Nigeria has an acute electricity supply-demand gap, which is being met by carbon-intensive off-grid solutions that are contributing to the ecosystem unbalance and large quantities of diesel and furnace oil are being used by all sectors – industrial, commercial, institutional or residential to make up for electricity supply shortages. Off-grid generation is based on fuelwood and diesel as primary fuel. The supply-demand gap is being bridged at a higher cost to consumers, environment and economy - diesel generators, kerosene contraptions, etc. at cost of 35 Naira/kWh, compared to 6-8 Naira/kWh for grid supply, have higher GHG and environmental footprint[19] and diesel, etc. imports increase import dependency and foreign exchange exposure.

43. With GDP forecasted growth rate of 6-8% p.a., the gaps and negative externalities will increase at even a higher rate and further accentuate climate and environmental concerns. Nigeria's base year consumption is estimated at 212 kilowatt-hours (kWh) per capita (of which half is off-grid generation), which is well below the trend line of 300 kWh per capita at the same income of US$ 2,226 per capita (purchasing power parity [PPP]). Nigeria's Vision 20: 2020 aims for per capita consumption of 1,875 kWh/capita in 2035, at a per capita income of US$ 8,226 (2009 US$ at PPP)[20]. Lack of rural electricity is also leading to large-scale use of kerosene and biomass/firewood (Share of population using solid fuels is estimated to be around 79%[21]) leading to issues of desertification.

44. Nigeria ranks within top 3 emitters in Africa for both fossil fuel emissions and emissions from land use change. Although, currently, per capita emissions are smaller than those of Africa as a whole, Nigeria may double its current annual emissions by 2025 if [current] population growth rates persist, and even faster, if current consumptions patterns increase, which is the ambition and expectation. The key drivers of CO2 emissions are population growth, rapid urbanization, economic activity, and the CO2 intensity of the economy. Per capita CO2 emissions are expected to rise even faster if energy supply remains based on traditional energy model.

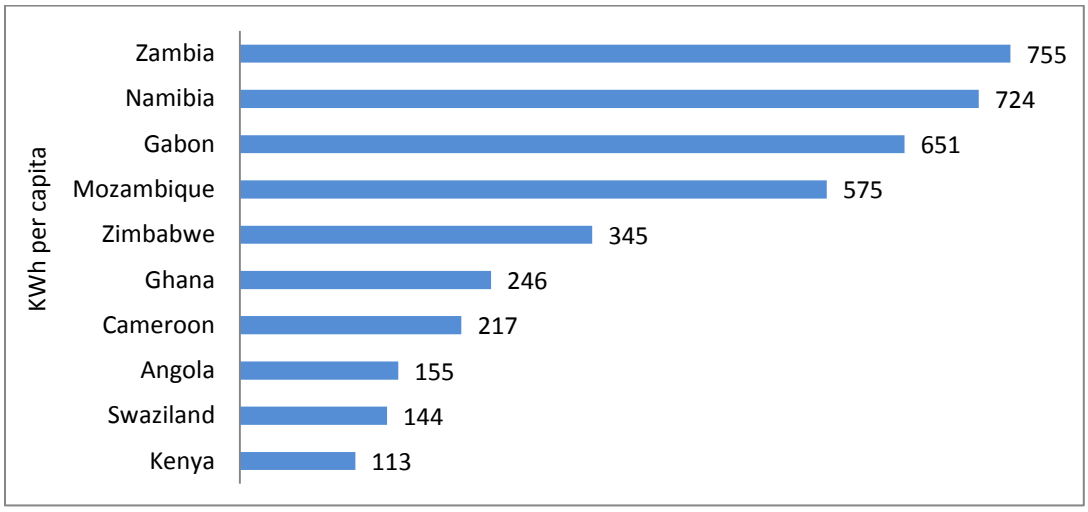
45. Currently, Nigeria's grid electricity supply has lagged far below that of similar countries even within sub-Sahara region and Nigeria seems to be lagging behind renewables generation as well, amongst African nations. Utility-scale plants are being developed in even much smaller neighboring nations like Ghana (155 MW), Mauritania (15 MW), Mali (41 MW), Morocco (>100MW), DESERTEC initiative, Algeria (230 MW), etc. and surprisingly none in Nigeria. In fact, prior to 2011, the majority of utility-scale solar capacity was concentrating solar technology, and not PV. Now large scale Solar PV plants are a norm in this region.

46. Whilst Nigeria is keen to introduce renewables to augment and diversify the energy supply, there is no central vision, strategy or plan for renewables or an agency to push these. For investors, this is still a 'new' sector within Nigeria, trying to create required traction within Nigeria's political landscape. Even though there have been few separate initiatives by Energy Commission of Nigeria (ECN) and Federal Ministry of Environment (FME), the renewable sector development has been slow

[19] It is estimated that about 2.6-3.5 million liters of diesel per week is being consumed by residential, small business and commercial consumers.
[20] Low-Carbon Development opportunities for Nigeria. World Bank Publication, pp 78, 2013
[21] IRENA

due to lack of single institution to champion and further renewables, legislated national targets/quotas for renewables and this is exacerbated due to domination by institutional, policy and financial mechanisms set-up and suited for existing fossil-fuel based generation regime. Renewables-generation sector is typified by lack of a comprehensive ratified strategy and framework, coordinated and implementation of policies and needs for a private grid connected renewable IPP. The transaction costs that are primarily ex-ante, and too prohibitive for any private sector investor, requiring public sector intervention. All these are barriers for solar power from reaching grid parity in Nigeria.

Table 10 : Top 10 countries in electricity generation from renewable sources (1998-2008)[22]



47. Further, not only will lack of competitive financing increase Capex costs of renewable project, the Opex costs also increase due to general unfamiliarity with utility-scale solar PV plants, lack of technical skills and uncertainties over performance requiring additional time and attention to permitting, financing and insurance especially in this sector that still requires interactions with publicly-owned power sector entities that are often perceived to be susceptible to political interference. This translates into higher transaction costs, including for resource assessment, sitting, permitting, planning, developing project proposals, assembling financing packages, negotiating power-purchase contracts with utilities/entities, PPAs bankability and hedging cash-flows/payments from these entities. As a result the costs for a solar PV plant end up being much larger on a per kilowatt capacity basis than for conventional power plants. In addition to the high degree of Capex and Opex risks, there is high perceived country, political, and macro-economic risk. Without CTF financing, a private investor would be unable to finance a renewable solar PV plant from still immature Nigerian capital markets. Hence, bridging to commercial financing is a key challenge, in addition to ensuring the reduction of costs for long-term viability of similar plants.

Proposed Transformation

[22] Financing renewable energy in developing countries – UNEP 2012, pp 21. (Source: United States Energy Information Administration, Country statistics, eia.gov)

48. Although there has been no formal study to identify barriers for grid-connected solar PV, this project intends to address significant gaps that require public sector intervention to maximize returns and help overcome investment inertia for private investors. The CTF-funded solar PV project (Public-Private Partnership), a 1st of its kind, is expected to drive required traction with key stakeholders including the Ministry of Power, and Ministry of Environment, at Federal-State levels, etc. to help serve as flagship program for future similar projects. The identified legislation, institutional, technical and funding gaps, and Federal and State enabling framework and mechanisms for this CTF project are expected to be precedents to help create 'domino-effect' for more renewable IPPs and grid connected Solar PV plants. Additionally, implementation of proposed renewable capacity is also expected to contribute to similar scaled Solar PV off-grid plants and crowd out dirty-fuel off-grid generation, given that in short-medium term off-grid generation is inevitable.

49. The solar PV power plant will leverage CTF funding to maximize returns and help safeguard both Capex and Opex of grid-connected Solar PV plants and alleviate investor risk perception in form of structured public debt (mezzanine, PPAs bankability, etc), risk funds and guarantees, rather than direct lending, to address specific barriers/risks perceived by the equity investor community. Objective is to (a) provide risk-reducing instruments or financial innovations to improve access to commercial financing and its pricing (b) guarantee investment recovery associated with renewable electricity and (c) enhancing the project profile for high quality private investors, with ambition and appetite for similar future developments in Nigeria. Precise financing options and specific investment configuration would be explored with respect to plant sites, feasibility studies, investor profiles and investment options.

50. Globally, PV costs have also been declining, primarily due to excess manufacturing capacity. Module costs alone have fallen by more than 50% within two years. Even the costs for a fully installed utility-scale system are also generally on the decline, due to falling component costs and installation experience learnings. As a result, the costs are getting skewed towards costs from balance-of-system components, labor and risk. While this project will leverage falling global prices, incentives and CTF financing to reduce project costs and risks, in the long run it will help establish technology and economics, for large-medium scale grid-connected renewable projects, besides enabling capacity building for Nigerian planners, engineers, installers, and operators in this technology, thereby contributing to lowering costs of balance-of-systems and labor, further pushing solar PV towards grid parity in Nigeria. Solar PV generation plant will assist Nigeria to monetize its natural resources and minimizing deteriorating effects on the environment and climate.

51. The proposed 100 MW solar PV generation capacity will be configured as solar PV projects in three or four sites, with grid generation near load centers in key regions, showcasing different PPP/PPA IPP configurations. The location of the solar power plants is likely to be in the Northern and Eastern parts of the country (locations contingent on feasibility study recommendations). Three different plant configurations (20-100 MW) are being considered (1) At single-site, allowing for modular scale-up, phased development in the State of Bauchi (2) Co-generation feeder plants adjacent to the Hydro Power Plant (Shiroro, Jebba, Kainji including exploring upcoming proposed Hydro Power Plants) (grid-connected, centralized &/or distributed) and (3) Embedded generation plants within privatized DISCOs (grid-connected, distributed). The Solar-hydro configuration will help better water resource utilization of hydro plants- using same transmission infrastructure to dispatch solar during day time and reserve hydro generation for other times. Due to high supply-demand gap in Nigeria, at the margin, generation using diesel fuel or similar are utilized at a cost higher than that of solar-

hydro. The intention is to develop plants within existing transmission infrastructure set-up, using current policies (e.g. embedded generation, incentives, etc) and market-based mechanisms. For example for co-generation plants with Hydro would entail respective Concessionaires as strategic stakeholders and DISCOs for 'embedded generation'. Also steer is to adopt easy-to-install, modular and scalable architecture whilst minimizing components to keep balance-of-system costs down. One of the proposed plants is in the North-East State of Bauchi, which also lends supports Nigeria's economic agenda for North East *Special Initiative for the Nigerian North East*. So in addition to monetizing a natural resource in this region, the plant also and help incubate private investment in the region, besides improving the quality of supply and grid strengthening in the region.

52. As a nation with Africa's largest population, with substantial revenues from oil and gas and a wide diversity of energy resources, Nigeria has the potential to become a regional leader in the energy technologies of the future, especially for grid-based solar power (PV and CSP). According to the EIA's International Energy Outlook 2011[23] solar power generation will grow 10 percent a year worldwide in the next 20 years, but 24 percent a year in Africa. By investing early enough in renewable energy, Nigeria, with it scale and size, has a good potential to position itself as a regional leader in the fast growing renewables market, and establish itself as a regional hub for technology development and deployment in the rest of Africa. This also creates potential for Nigeria for developing yet another area for Nigerian manufacturing sector. Nigeria is already a manufacturing hub for West Africa for several sectors. Manufacturing has seen strong growth (~8-9% in Q1 2013) due to contribution by indigenous manufacturers, benefiting from the policy support under the Transformation Agenda of President Goodluck Jonathan. Nigeria can develop capabilities for domestically manufacturing balance-of-system components for solar PV. Domestic manufacturing in Nigeria can cause a further drastic fall in costs to bring solar power costs to grid parity sooner besides contributing directly to green job creation and Nigeria's economic development.

Implementation Readiness

53. Nigeria is advancing in its efforts towards power sector reforms and privatization and has achieved credibility and interest both within the country and the international investor community. Hence, at this juncture, the reallocation of funding towards clean energy would help in leveraging the built-up momentum in Power sector, to channelize part of investor appetite and new generation capacity towards solar energy. The Power Sector Roadmap Revision (2013), Ministry of Power has placeholder for 1000 MW of renewables generation and 2015 onwards, Nigeria forecasts a significant investment from greenfield IPPs towards generation capacity installation, to tune of approximately 2,000-3,000 MW per annum, at US$2–3 Bn per annum contribution. This is significant and unprecedented level of non-oil, single-sector investment for Nigeria and is contingent upon available financial/securitization solutions for new investors and building investor confidence. The CTF project is expected to be a catalyst to start this chain reaction to tap potential from private, international investor community to invest in this and other such projects.

54. More ambitious renewable goals are being developed by Ministry of Environment under its Renewable Energy programs, although there are no legislated national level targets. Additionally, there are several incentives, piecemeal though, in place for private investors including allowing IPPs to sell to grid, feed-in tariffs, etc. UNEP FI's survey found that investors find feed-in tariffs (FiTs) to

[23] US DOE 2011

be the most effective incentive instrument but till date, there have been no renewable power plants leveraging the attractive FiTs in Nigeria. Hence it seems that the incentives may have been ineffective, partly due to lack of supporting regulatory frameworks, policies, process and procedural gaps. This project has buy-in and support of steering committee, comprising of key Government stakeholders from NERC, NBET, Ministry of Power, Presidential Task Force on Power, Ministry of Environment committed to help address the technical, financial, institutional and legislative federal and state level gaps (e.g. clearances, approvals, PPAs, Licensing, competitive bidding, etc.) besides streamlining renewables projects processing (e.g. contracting process by simplifying agreements, establishing time limits for processing paper work, representatives to handle grid-connection inquiries, metering, tariffs, etc.)

55. The CTF approach would be instrumental in limiting upfront costs in establishing project feasibility, knowledge and experience for developers and financiers. The CTF intends presenting 'investment bid ready' document that consists of CTF investment plan and feasibility studies of the three plant set-up configurations. This is expected to contribute to reducing risk perceptions and significantly reducing transaction costs due to resource assessment, sitting, permitting, planning, developing project proposals, pre-assembling financing packages, negotiating power-purchase contracts with utilities/entities and hedging cash-flows/payments, thereby attracting investors. Bundling CTF investment plan with feasibility studies assure a greater degree of public acceptance for environmental and social impact studies, getting clearances and increase investor confidence. The proposed Solar PV power plant with 'investment bid ready' Investment Plan approach (combined pre-cooked Investment Plan and site-specific Feasibility studies) will be able to not only attract international investors, and fast disbursement, but also enable construction and operational implementation as per timelines. Also the proposed 'competitive bidding' adopting reverse auction method for awarding projects to qualified bidders would help leveraging the continuous falling price landscape in solar PV.

56. Whilst currently, grid-connected Solar PV plants do not have grid parity with existing generation plants based on gas and off-grid diesel based generators, however, this gap, especially for gas based generation, will narrow when some of negative externalities like subsidies are addressed. In Nigeria, whilst the diesel market is relatively open and prices pegged to global market prices, the natural gas has long been regulated and gasoline subsidized, resulting in prices much lower than global market prices. With Nigeria's policies to reduce gas subsidies and allow prices to approach near global prices, this gap will fast narrow and drive Solar PV LCOE towards grid parity. Additionally, reduction in dependence on imported fossil fuels would ameliorate foreign exchange fluctuations.

57. The CTF solar PV power plant project is proposed to be a component within the World Bank Nigeria Electricity Transmission and Access Project, hence leveraging synergies with that project including monitoring and evaluation.

Rationale for CTF Financing

58. Despite incentives, allowing IPPs, and rapid decline of solar PV capital costs, there is no significant power generation from solar PV projects in Nigeria, despite high and vast areas of solar irradiation. Solar PV generation costs for Nigeria do not have grid-parity and are uncompetitive when compared to fossil-fuels, partly driven by financial, policy and technology gaps besides political and regulatory uncertainty. Thus raising both the Capex and Opex risks and costs for a private investor. The CTF

funding will bring down costs and risks thereby enhancing project profile and making the technology competitive. It will be key for installing and bringing online 1st of its kind, 100 MW grid-connected solar PV power plants in Nigeria. Additionally, this large scale project is expected to be instrumental in introducing renewables into Power sector planning, investments, and policies further creating future conditions for level-playing field for renewables for private investors.

59. Low carbon growth scenarios studies for Nigeria anticipate at least 300 MW capacity from renewables (including PV, CSP, and Wind and excluding hydro) by 2015 and much higher installed base from grid-connected renewable technologies by 2025 and even more substantial capacity by 2035 to bring costs to reach "grid parity". CTF for the 100 MW solar PV plant will consider various financial support options to improve project credit profile, reduce financing costs and extended maturities. Preferably Public Private Partnerships would be used to make projects bankable besides using risk mitigation financial products that would furnish an alternative to concessional loans to attract private equity financing. For example, mezzanine debt, PPA bankability options, underwriting/guarantees (PRGs or PRC[24]s), etc. Whilst the instrument design would depend on individual plant sites and investors, overall intention is to attract private investors' equity participation for long run.

60. Besides augmenting and diversifying generation, these plants will serve demonstration projects to evaluate technical, institutional and economic viability in Nigeria and to build local expertise to foster rapid adoption and replication for similar grid-connected projects. This project will typically address and work with Nigerian stakeholders to find solutions to barriers and common set of issues that a renewables Solar PV Power plant provider would face e.g. financing, connection to the grid, power quality, contracts, metering and rates. The precedents set by this project are expected to enable scaling and investments towards future similar medium-large sized renewable generation projects by private sector operators.

Results Framework

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of GHG emissions avoided - tCO2eq/yr - tCO2eq over lifetime of the project	 0 0	 88.5K 1,770k
Increased finance for low carbon development	Volume of direct finance leveraged through CTF funding (US$ million) [1] - public - private	 n.a. n.a.	 253 400
Increased supply of renewable energy	Installed capacity as a result of CTF interventions -MW	0	100

[1] The breakdown of leveraged co-financing between public and private sources is tentative.

[24] Partial Risk Guarantees or Partial Credit Guarantees

Financing Plan

Financing	Amount (US$ million)	Comments
Borrower (Federal Government of Nigeria)	3	Under NEWMAP (WB-IDA) towards feasibility studies for the identified sites
World Bank- International Bank for Reconstruction and Development	250	Under the Nigeria Electricity Transmission and Access Project (2015)
Clean Technology Fund	100	
Others – Private Sector	400	
Total	753	

Project Preparation Timetable

Milestone	Due Date
Quality Enhancement Review meeting	Q4-2014
CTF Trust Fund Committee approval	Q1-2015
World Bank Board approval	Q2-2015

ANNEX II: Utility-scale Solar PV Project (African Development Bank)

Problem Statement

61. The Nigerian power sector has dramatically changed in the past 10 years with the successful implementation of various reforms and a consolidated drive towards privatization. The legal framework for these reforms was established in May 2005 with the enactment of the Electric Power Sector Reform Act (EPSRA). The EPSRA led to the launch in 2006 of the National Integrated Power Projects (NIPP) initiative, which aimed to add about 5,000 MW to the country's generating capacity by end of 2008.

62. In August 2010 the Roadmap for Power Sector Reform (RPSR) was launched which heralded the sale of the Power Holding Company of Nigeria's (PHCN) assets. This has resulted in the privatization of 11 distribution companies (DISCOs), six generation companies (GENCOs) and the creation of the Transmission Company of Nigeria (TCN) under public ownership.

63. A new institutional framework has been put in place for the Power sector in Nigeria and includes: (i) the Federal Ministry of Power (FMP), responsible for general policy direction and formulation to NERC, including on overall system planning and co-ordination, (ii) the Nigerian Electricity Regulatory Commission (NERC), whose role includes promoting competition and private sector participation, ensuring fair prices to customers and enforcing regulation and market surveillance, (iii) the Bureau of Public Enterprise (BPE), which was established to handle the privatization of state-owned enterprises. It drives the reform and liberalization of the power sector, (iv) the Nigeria Electricity Liability Management Company, mandated to manage legacy liabilities and stranded assets resulting from the reform of the power sector, (v) the Nigeria Bulk Electricity Trading Company (NBET), created as a Special Trader with bulk purchase and resale license to manage existing PPAs and new procurement of power, and (vi) the Transmission Company of Nigeria (TCN), emerged from the defunct National Electric Power Authority (NEPA) as one of the 18 unbundled business units under the PHCN, licensed to oversee electricity transmission, system operation and electricity trading. TCN is being managed by Manitoba Hydro International (MHI) for a period of three to five years.

64. In order to encourage private investors and also protect the consumers, a Multi-Year Tariff Order 2 (MYTO 2) has been established by NERC to regulate the prices to be paid to licensed electricity generation companies (Gencos) in providing electricity to distribution and retailing companies (Discos) for the period 1st June 2012 to 31 May 2017 pursuant to the authority given under Section 76 of the EPSRA 2005. This retail tariff schedule will be reviewed biannually and changes will be made should changes occur in a number of variables that were determinant in establishing the tariffs under the PPA. These variables are: (i) generation wholesale contract prices, (ii) the Nigerian inflation rate, (iii) US$ exchange rate, (iv) daily generation capacity, and (v) Capex and Opex.

65. Although Nigeria has relatively high rates of electrification, around 50%, the nation is significantly impacted by an unreliable power. The country is experiencing an acute shortage in electricity, especially in areas remote from its Capital. With quickly developing industrial sectors and growing population transitioning from agrarian to modern urban communities, Nigeria is expected to demonstrate growing demand for electricity and shortfalls throughout the project's life. Nigeria is likely to continue diversifying its energy mix with emphasis on a larger portion of electricity from renewable sources. Due to inadequate maintenance of existing power generation, the country's

installed capacity has virtually stagnated, which is leading to severe electricity shortages as supply does not keep up with demand. This significantly impact industrial production, consumers and the general economy. Around 35% of the current Nigeria's installed capacity is estimated to be underperforming due to improper maintenance.

Proposed Transformation

66. It is estimated that 26,000 MW of capacity will be required in the next 9 years to meet growing demand forecasts. Currently 34% of Nigeria's electricity is generated using hydropower, 40% natural gas, 25% by diesel and heavy fuel oil thermal generation, 0.4% coal, and the rest from other renewable sources. Furthermore, the Government of Nigeria has declared that a significant proportion of the new energy generation should come from IPP's and renewable energy sources. The proposed project would be a substantial contribution to the Government of Nigeria's plans to increase renewable energy supplies and aid the country's economic growth. When operational, the project is expected to generate around 166,240 MWh of electricity per year and to increase Nigeria's active generating capacity by 2.5%. Furthermore, the project will be one of the first Independent Power Producer project in Nigeria and allow for future replication in the future.

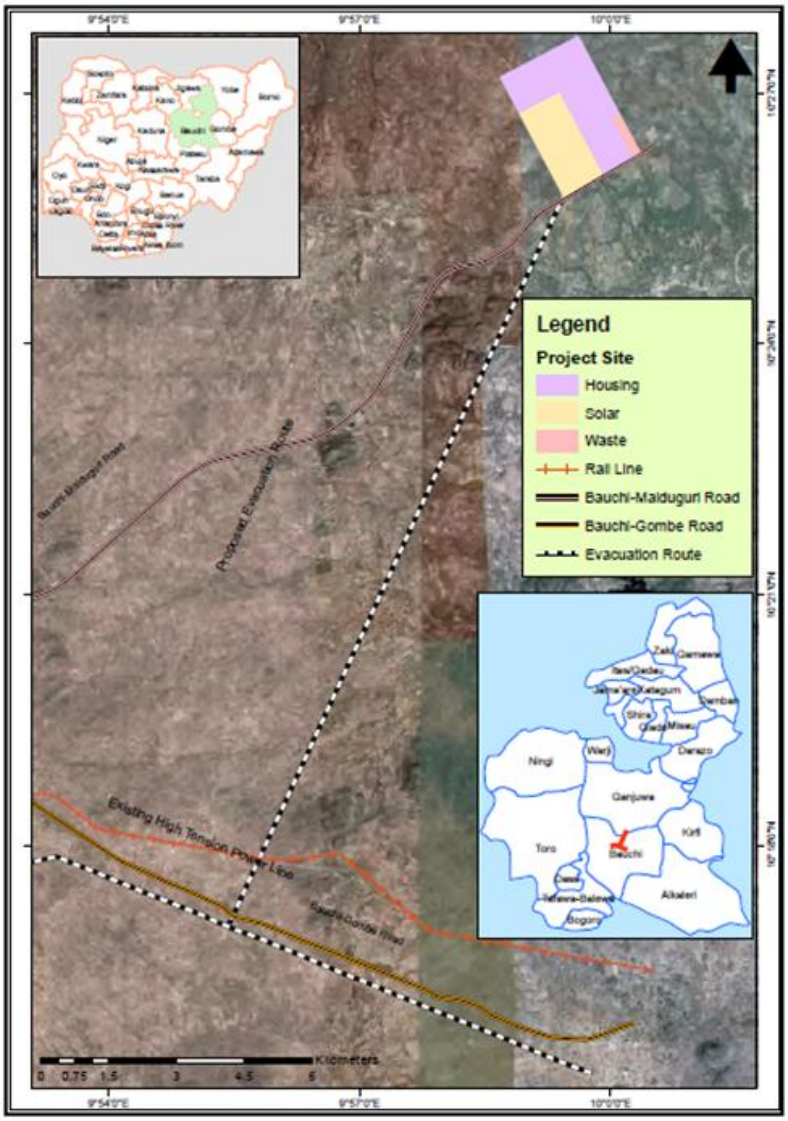
67. Nigeria has strong solar irradiation, and particularly the central northeastern parts of the country have the highest solar irradiation. The Project Sponsor has carried out a number of solar studies using world-class data sources and prediction methodologies like NASA, PVGIS, and METEONORM 7.1. and expects irradiance to be 2122 kWh/m2/year at the horizontal plane. Evaluations in this region and results have shown that the envisaged site provides for an optimum location for the generation of solar PV power.

68. The project consists in the design, construction and operation of a 100 MW solar PV power plant project in the Bauchi State in the Northern part of Nigeria. The project has been identified and is located at around 18km from the interconnection point at the 132KV Gombe – Bauchi 132KV single circuit distribution line. Figure 3 gives the location of the Project.

69. The project includes two main components: (i) construction and installation of solar PV panels, switchyard high, voltage sub-station, inverters' room and control room construction, and (ii) construction of a 18km transmission line to connect to the Bauchi - Gombe 132kV line. As part of the project, a substation will be built on the project site and power production will be measured before the transformer for invoicing purposes. The technical specs of the solar PV panels being proposed to the project site should not pose any challenge with regards to performance but this will be assessed by the lender\s independent technical advisor.

70. Due to a significant lack of investment in power generation and a lack of gas transmission in Northern Nigeria, local populations and industry rely on expensive diesel generators. The local cost of diesel-generated electricity is $0.55-0.60/kWh, well over twice the cost of solar PV generated electricity. Solar power is a natural option for Northern Nigeria due to prolific irradiation levels.

Figure 3 : Project's Site Location

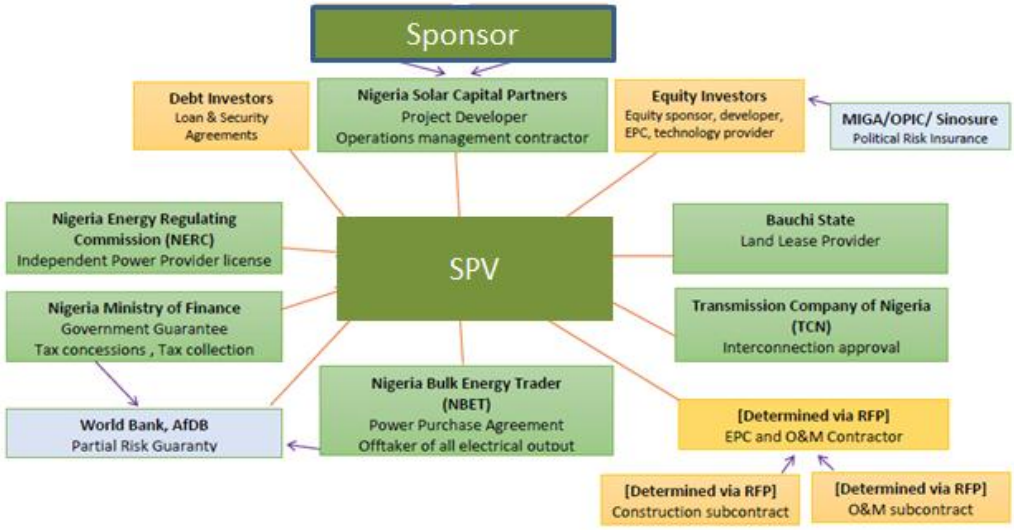


Implementation Readiness

71. Nigeria is advancing in its efforts towards power sector reforms and privatization and has achieved credibility and interest both within the country and the international investor community. Hence, at this juncture, the reallocation of funding towards clean energy would help in leveraging the built-up momentum in the Power sector by stimulating investors' appetite and new generation capacity towards solar technologies.

72. A special purpose vehicle (SPV) will be created to execute the project. The SPV will construct and manage the 100 MW power plant as an IPP. The sponsor's plan is to connect to the national grid in Bauchi State, Nigeria. Figure 4 provides information on the expected contractual structure of the Project.

Figure 4 : Project's Contractual Structure



73. AfDB is currently undertaking a detailed due diligence that consists on an independent technical, financial, insurance and legal assessment of the project to guide negotiations between lenders and the project sponsor that shall result in a bankable project. If successful, the final approval by AfDB's Board of Directors is expected before the end of 2014.

74. Contracts pertaining to the Project and the procurement processes adopted are currently being reviewed by AfDB to ensure that they comply with the Bank's requirements. The main contracts and agreements governing the Project are the following: (i) PPA, (ii) tariff, (iii) EPC contract, (iv) generation license, (v) O&M, (vi) land lease agreement, (vii) power transmission.

75. Conditional on the success of AfDB's due diligence, AfDB expects its Board of Directors to approve CTF financing to this project before the end of 2014. Financial close is estimated at early 2015 and precedes the beginning of the construction period which should last for a period of 18 months.

Rationale for CTF Financing

76. Even though at this stage, a number of relevant project's inputs are not finally determined (e.g. tariffs under the PPA, financing costs, etc.), a preliminary assessment based on estimates of the project's financials suggest that the project requires concessional funding to buy-down costs to reach commercial viability. During appraisal, AfDB shall apply the principle of minimum concessionality to ensure that benefits do not accrue to the sponsor in the form of higher than expected returns and that CTF resources do not crowd out other sources of funding. Given the perceived high risk associated with this transaction, especially as it is the first of its kind in Nigeria, CTF will also contribute to the demonstration of the proposed IPP that shall lead to similar projects in the future.

77. Preliminary sensitivity tests to the financial model show that the senior debt facility needs to match a tenor of 15 years and a grace period of 2 years to ensure the project's bankability. Apart from CTF

resources, AfDB is looking to provide a senior loan of up to USD 80 million but its own rules only allow for tenors beyond 12 and equal to 15 years for private sector projects on an exceptional basis. Terms provided by local commercial banks are not even close of the aforementioned ones. Therefore, CTF concessionality may play a key role in on one side by contributing to unlock AfDB's financing and on the other to allow for the participation of a local commercial bank in the debt facility.

78. Nigeria is a rapidly growing yet energy-starved economy, with a population of around 170 million that is expected to grow to 240 million by 2025. Power failures cause significant direct and indirect costs to utilities, consumers, and the general economy. The World Bank estimates that the direct cost of power outages to African nations is typically about 2% of GDP, or nearly $5.25 billion per year in Nigeria. The country has displayed significant growth since 2008 with average GDP growth of 7.00% and a 6.87% GDP growth in 2013. Rapid growth in electricity generating capacity is required to sustain and maximize Nigeria's fast growth. In 2009 the GoN adopted the Vision 20:2020. The Vision 20:2020 laid the overarching policy framework for Nigeria to become one of the top 20 economies in the world by the year 2020. This would require annual economic growth of 13.8%, and a transformation of the primary products oriented economy (agriculture and crude-oil production) to an industrial, manufacturing and services oriented economy

79. The increase of renewable energy installed capacity in the country will contribute to creating an enabling environment for private sector development through providing cheaper electricity to households, public administration, industries and other commercial purposes. Currently, most of the industry in the North relies on diesel generated electricity at a cost is $0.55-0.60/kWh, well over twice the cost associated with the envisaged project. In addition as the first IPP solar project in Nigeria connected to the national grid, its success will serve as a demonstration project to evaluate technical, institutional and economic viability in Nigeria and to build local expertise to foster rapid adoption and replication for similar grid-connected projects. This project will help the FGN to find solutions to barriers and common set of issues that a renewables Solar PV Power plant provider may experience.

Results Framework

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of GHG emissions avoided		
	- tCO2eq/yr	0	88.5K
	- tCO2eq over lifetime of the project	0	1,760k
Increased finance for low carbon development	Volume of direct finance leveraged through CTF funding (US$ million)		
	- public	n.a.	0
	- private	n.a.	243
Increased supply of renewable energy	Installed capacity as a result of CTF interventions -MW	0	100

Financing Plan

Financing	**Amount** (US$ million)
Shareholders (Equity)	72
AfDB	80
CTF	25
Other DFIs and Financiers	66
Total	243

Project Preparation Timetable

Milestone	**Due Date**
AfDB OPSCOM	September 2014
CTF Trust Fund Committee approval	October 2014
AfDB Board approval	November 2014