FEDERAL REPUBLIC OF NIGERIA
FEDERAL MINISTRY OF POWER (FMOP)
in Collaboration with
INFRASTRUCTURE CONCESSION REGULAORY COMMISSION (ICRC)

OUTLINE BUSINESS CASE_ JIBIYA

Development of Small & Medium Hydro-electric Power Plants through the Public Private Partnerships (PPPs)

GREENSTRATOS CONSULTING PRIVATE LIMITED

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Abbreviations and Glossary

PPP	Public Private Partnerships
FMOP	Federal Ministry of Power
FGN	Federal Republic of Nigeria
MW	Mega Watt
MDA	Ministries, Departments and Agencies
EPSRA	Electric Power Sector Reform Act
NERC	Nigeria Electricity Regulatory Commission
NEPA	National Electric Power Authority
PHCN	Power Holding Company of Nigeria
HEPP	Hydro-electric Power Project
OBC	outline business case
ICB	International competitive bidding
PPA	Power purchase agreement
IPP	Independent Power Producers
BOT	Build, Operate, Transfer
BOOT	Build, Own, Operate, and Transfer
GDP	Gross domestic product
EPCAF	Electric Power Consumer Assistance Fund
GWh	Giga watt hour
Kw	Kilo watt
Kv	Kilo Volts
C	centigrade
Km	kilometers
MU	Million Units
m	Meters
A	Amperes
mm	Milli meters
MSL	Mean Sea Level
ICRC	Infrastructure Concession Regulatory Commission
FBC	Full Business Case
EPC	Engineering, Procurement and Construction
EIA	Environmental Impact Assessment
FBOOM	Finance Build Own Operate and Maintain
BOOM	Build Own Operate and Maintain
FBOOTT	Finance Build Own Operate Train and Transfer
QCBS	Quality and Cost Based Selection
QBS	Quality Based Selection
FBS	Selection under a Fixed Budget
LCS	Least Cost Selection
CQS	Selection Based on Consultant's Qualifications
SSS	Single Source Selection
CP	Commercial Practices

Executive Summary

FMOP with the support of FGN has embarked on initiating Development of Small & Medium Hydro-electric Power Plants through the Public Private Partnerships (PPPs) for 4 Hydro-electric Power Plants and entrusted GreenStratos to serve as the Transaction Advisor for concessioning of the projects to potential private sector investors.

Project Objective

The objective of this Study is to assess and evaluate the energy potential, establish the techno-economic viability of the energy output and outline the business case for the execution of the hydro power projects through PPP.

The following are the key Issues elaborated after the study:

- **Project Background**
- **Strategic Needs Assessment, Demand Assessment and Project Scoping**

  The demands are analyzed and a final assessment is made so and why the project is to be developed and the scope of the project is put into place for a clear overview of the project.
- **Impact of the Proposed Projects**

  A total combined capacity of around 20MW would be made available in order to fill the gap between generation and demand. Many advantages were observed with respect to the proposed Projects.
- **Market Assessment**

  A detailed market assessment has been carried out to establish the case for the development proposed hydro power projects and limitations have been studied individually.
- **Technical Feasibility**

  Technical feasibility summary has been provided for each of the projects. Detailed updated feasibility reports are provided along with this Outline Business Case.
- **Economic Feasibility**

  Financial Modeling has been carried out for each of the projects and the analysis has been provided in an excel model.
- **Environmental Impact**

  A detailed list of factors that have an effect on the environment are elaborated in order to have an understanding of the environmental impacts due to the proposed projects.
- **Legal Framework**

The legal framework related to concessioning, power project development and policy appraisals have been presented in the document.

- **Risk Assessment**

  Identification of all the material risks associated with the project, specifying the external and project development risks for the FMOP, the project risks to be allocated to the Private Sector and those to be retained by the FMOP. Risks identified and mitigants for the current project have been elaborated and discussed in how to overcome the issues

- **Option analysis, Value-for-money and recommendations**

  As part of the OBC, various models of concessioning have been analyzed for the development of the project and recommendations with respect to the preferred option has been presented

- **Evaluation Criteria for selection of Private Sector Investor**

  As part of this section, the various methods for the selection of consultants as provided under the World Bank's guidelines have been taken into consideration. Eligibility criteria and selection criteria will be based on Eligibility, Historical Contract Non-Performance, Financial Situation and Experience.

- **Implementation Plan**
- **Conclusions**

Section 1: Project Background

Background

Nigeria is one the largest country in Africa in terms of population, which is growing at a rapid rate. Though the power sector in Nigeria is over a century old, slow development and poor management of assets have impacted the social and economic growth of the country. The major factors affecting the power sector are

- Inadequate capital expenditure
- Inadequacy of fuel
- Irregular maintenance of facilities
- Outdated equipment
- Low private sector participation
- Threat from Vandals

The Federal Government has passed the Electric Power Sector Reform Act (EPSRA) in 2005 to reform the country's power supply. The EPSRA provided for the establishment of the Nigeria Electricity Regulatory Commission (NERC) and the liberalization and privatization of the power sector by removing the monopoly held by the National Electric Power Authority (NEPA). The Government has provided the Legal and Regulatory Framework as well as Market and Institutional restructuring enabling environment for private sector participation.

Nigeria's Hydro-power installed capacity of the three major dams is only 1,402 MW. It is FGN's intention to overhaul and rehabilitate existing power plants including the hydro power projects. For the hydro-electric power plants, the overhaul and rehabilitation program is expected to generate additional 346.4MW of electricity as shown in the table below.

Station	Available Capacity (MW)	Expected Additions (MW)	Total MW
Kainji	470	100	570
Jebba	482	96.4	578.4
Shiroro	450	150	600
Total	1,402	346.4	1,748.4

Source: Power Holding Company of Nigeria (PHCN)

The development of other hydro-plants is also being considered. These include:

- Construction of 2,600MW Mambilla Hydro-electric Power Project (HEPP);

- Construction of 700MW Zungeru Hydro-power Project
- Small and Medium Hydro-power Plants – this project will include the construction of turbines with all the associated equipment on existing Dams to generate electricity.

The rehabilitation of the existing power plants and construction of new ones require huge investments. These sums cannot be funded and directed by the FGN alone because the massive investment required to close the yawning gap is beyond the means available to it. The Federal Government intends to attract private sector to play an important role in providing some of this new investment through PPPs. The private participation in infrastructure development through PPP will enhance efficiency, broaden access, and improve the quantity and quality of electricity power supply.

Keeping in line with this objective, there is a plan to develop small to medium hydro-electric power using the many rivers in the country, through the PPP arrangement.

The FGN recognizes that private financing of infrastructure will provide value for money when compared to funding the investment through government borrowing. The financing of PPP projects therefore needs to be efficient and well structured so that the returns to investors reflect the risks that they take and contingent fiscal liabilities are well minimized.

Based on these assumptions, the FMOP in association with the ICRC has appointed GreenStratos to serve as transaction advisor for concessioning the development of below small hydro power plants at existing dam facilities in the country:

1 JIBIYA DAM
2 ZOBE DAM
3 TIGA DAM
4 CHALLAWA DAM

The main objective of this Assignment is to establish the technical, economic and financial viability of the hydroelectric projects (Project Preparation) and to successfully concession the hydroelectric projects to competent Private Sector Operators (PPP Transaction). Thus our scope is to provide requisite advice to FMOP as follows:

- Undertake a due diligence of the proposed Hydro Power Projects with a view to establishing their legal, operational and financial conditions prior to PPP. This is referred to as Project

Preparation and includes updating the feasibility studies report and preparation of an outline business case (OBC) in line with the National Policy on PPP (N4P) as well as Market sounding to confirm decisions on scope, structuring, and timing of transaction. This will provide FMOP with information it requires to take decision on the Concessioning strategy for the Hydro Power Projects. It will also provide potential investors with the information / analysis that they would require to assess investment opportunities in the projects.

- Conduct Concessioning of the Power Projects to competent Private Developer and Operator through international competitive bidding (ICB) and ensure that all legal, contractual and social obligations connected with the Project are adequately addressed from preparation of the bidding documents to negotiating Concession Agreements and the achievement of financial closure on each transaction.

The following sections outline the business case for the four projects that are being prepared for Concessioning.

Section 2: Strategic Needs Assessment, Demand Assessment and Project Scoping

This section justifies the need for the Concessioning of the current projects and also outlines the scope of the current assignment.

Existing or envisioned service gaps

As per a survey by the Nigerian Electricity Regulatory Commission, only 35% of Nigerian households are legitimately connected to the grid and metered. Per capita electricity consumption is less than 150KWh per annum. Rural areas suffer the most electricity deprivation.

There is a clear North and South energy access divide. In Lagos State virtually all the 1.7 million households are connected to the grid. At the other extreme, over one million households in Kano are not connected to the grid and the situation in the State of Katsina is almost similar.

The four projects that are proposed to be concessioned as a part of this assignment are in the states of Kano and Katsina and will contribute to addressing the gap in electricity connectivity in the northern states of the Country.

FMOP intends to involve the private sector to address the ever-growing energy needs through the implementation of infrastructure projects that will provide basic amenities to the poor and lift them socially and economically. The four projects will initiate the exploitation of the abundant renewable energy sources across the country to increase the foot print of the households with access to electricity in Nigeria.

Project Scoping

The most common form of PPP in the power sector is based on the power purchase agreement model (PPA). Under this model, private investors would build a power generation plant and generate electricity, which in return is sold to the power utilities. The viability of these projects is established based on the tariff that is offered to the project for the electricity generated by Independent Power Producers (IPPs)

The PPP scheme will be made feasible for the investor based on mechanisms to have tariff charges paid by the utility company to the investor. Also, such power purchase agreement should be made bankable so that the investor is enabled to raise the required debt from financial institutions.

Thus a scheme, where the investor would build, own and operate the plant, and supply the power generated to the distribution utility for an agreed per KWh tariff for a period long enough to recover costs and earn a return before transferring ownership of the infrastructure to FMOP would be appropriate. It is critical for the tariff schedule to be adjusted upwards to allow electricity generation to become profitable.

Therefore, a variant of the Build-Operate-Transfer scheme shall be worked out to ensure that the projects are properly executed and the vision outlined will be achieved through PPP.

Key stakeholders and their requirements

Concessioning of an infrastructure project involves many parties, including the government, investor, power off-taker, EPC Firm, financiers and other parties. The main stakeholders are – Government; promoter/concessionaire; Power Off-taker, lenders/financiers and the public.

I. FMOP/Government

The Government's vision to encourage private partnership for infrastructure projects is to ensure that money has been spent economically, efficiently, and effectively. The overarching objective of the project should be to use private sector's innovation and skills in asset design, construction techniques and operational practices and also to transfer key risks in design, construction delays, cost overruns, finance and insurance to private sector entities for them to manage.

II. Private Investor

Private investor will focus on structuring the project to achieve stable revenues from the project to cover the operating costs, financing charges and an appropriate return for the capital employed.

II. Power Off-Taker

The Federal Government of Nigeria has established the Nigerian Bulk Power Trading Company (NBET) with the objective to ensure a stable mechanism to procure power from power generation companies. NBET ensures uninterrupted payments to the power generation firms with adequate guarantees. Thus a power purchase agreement (PPA) offered by the NBET is bankable. However, NBET offers PPAs to power generation projects with an installed capacity of over 20 MW. Therefore, the proposed hydro power projects would have to offload the power generated to the local power distribution utility. All the 4 projects proposed to be concessioned fall under the Kano Electricity Distribution Company that is in-charge of power distribution in the states of Kano &

Katsina. FMOP and ICRC shall support in developing a mechanism to ensure bankability of the power off-take arrangement so that the investor is enabled to raise the required debt from financial institutions.

III. Lenders / financial Institutions

The key principle for PPP projects is to achieve a structure that provides the necessary comfort to the lenders with respect to the credit risks. The lenders will assess the power-offtake arrangement and the relevant guarantees that ensure project cash flows to cover their risks in addition to the collateral that the promoter would offer.

IV. The Public

Across the entire project execution spectrum, the biggest beneficiary of these projects will be the public. They will have access to improved infrastructure at affordable costs.

Section 3: Impact of the Proposed Projects

According to Kano State Handbook, the current demand for power in Kano State stands at approximately 500MW. The average daily dispatch is much lower at between 80-100MW, leaving a huge power supply gap of over 400MW. The projected demand by 2020 is approximately 2,000 MW-and a substantial part of this is expected to come from Independent Power Projects proposed to be initiated in the State. Similarly Katsina is also a power hungry state with similar deficits.

The projects that are envisaged to be concessioned in the course of this assignment will add a capacity of close to 20 MW. This will improve the power scenario of the state, especially for businesses suffering due to the lack of stable and continuous power.

As the power generation infrastructure is at a very nascent stage in the northern states of the country, it makes it increasingly important for the government to execute such projects so that there will be a stable mechanism that will reduce the dependence on wheeling power from the southern regions of the country.

Demonstrating the ability to execute such projects will only increase the confidence of the investors not just in the power sector but also across all industry segments that are dependent on power being a primary ingredient in their processes.

Section 4: Market Assessment

The Vision document by the Nigerian Government states that Nigeria has an installed generation capacity of 8,644MW of which 6,905MW is government owned. As per the Federal Government data, population has increased to 150 million, with an average GDP growth rate of 6.66%, over the last 5 years. Within this period, power generation capacity has stagnated. These factors, combined with inadequate maintenance of existing power generation stations, have given rise to severe generation shortages.

It is estimated that 26,561MW will be required to meet demand as envisioned in the Vision 20: 2020 target. Thus, in order to bridge the gap between the supply and demand, generating projects will have to be planned and executed.

The generation capacity of Federal Republic of Nigeria (FGN) is predominantly from the conventional energy sources of thermal with an increasingly wide gap between generation and actual demand for power. This has resulted in massive load shedding, voltage and frequent system collapse. To address this problem, Federal Republic of Nigeria (FGN) has taken a number of medium term initiatives such as the diversification of the energy mix sources, which includes the development and rehabilitation of hydroelectric power plants.

There are multiple issues facing the Nigerian economy which have been clearly identified during policy reviews and formulation

- Limited access to infrastructure
- Inadequate power generating capacity
- Inefficient usage capacity
- Lack of capital for investment
- Ineffective regulation
- High technical losses and vandalism
- Insufficient transmission and distribution facilities.
- Inefficient use of electricity by consumers
- Inappropriate industries and market structure
- Unclear description of roles and responsibilities.

In order to address these issues, many steps have been taken by the federal government

- Unbundled NEPA through 18 separate successor companies incorporated in PHCN
- Privatized the unbundled entities
- Established a regulatory Agency (The new Nigerian Electricity Regulating Commission (NERC))
- Established a rural electrification agency and fund (the same infested with corruption to the tune of N52billion causing its suspension between 2006 and 2009)
- Established Electric Power Consumer Assistance Fund

Despite heavy measures from the government to improve the all round effectiveness and efficiency of the power sector in Nigeria, it has seen a very slow growth. The following table reflects the generation capability and consumption patterns in over the last few years

Year	Total Generation Capacity (GWh)	Average Generation Capacity (MW)	Per Capita Consumption (kW)
2009	18,817	2,148	139
2010	24,872	2,839	179
2011	23,652	2,700	167
2012		4,100	

Source: Vision 2020 Document

The sudden increase in capacity in the 2012 has resulted in a grid breakdown due to its inability to wheel the additional power generated. Such systemic deficiencies are to be addressed through coordinated efforts to address the following issues

- Slow growth in Generation Capacity
- Market Deregulation Process Delay and interference by Government
- Power Lines and Equipment vandalism
- Poor Maintenance of Existing Power System

  Corruption

A comprehensive solution should not only address the current challenges but also plan for the future roadblocks and issues. One major step to address these issues is the involvement of private sector which will bring in efficiency and accountability. The issues and challenges mentioned above will form the foundation on which our PPP strategy is designed. Also, the scenario is ideal for development of small scale hydro power projects as power evacuation will not be a major challenge for smaller capacities.

Section 5: Technical Feasibility

Technical feasibility studies have been conducted by International consultants, which have been reviewed and updated by our team of technical consultants. A brief technical feasibility summary is given below for each of the projects. Detailed updated feasibility reports are provided along with this Outline Business Case

As a part of the privatization initiative, the identified projects have been separated into lots, which are ready to be awarded to private developers for execution. The Federal Ministry of Power has awarded Lot 3 of the projects to our consortium which include the following projects:

1. Challawa
2. Tiga
3. Zobe
4. Jibiya

Jibiya

The climate in the region is semi-arid. The investigation area is far enough from the equator to experience a single rainy season and a long intense dry season. Rainfall is the most important climatic element for this area. Rainfall distribution varies from year to year and month to month. The average annual rainfall of 716mm has been recorded for the Jibiya station. The mean annual temperature is 26^0C, the lowest recorded minimum is 15^0C and the recorded maximum is 42^0C.

The dam was designed in 1987 and completed in 1989, and was built to support irrigation and water supply. The landscape at the dam site is sub-desert except in the rainy season. Dam is located in a semi arid part of Nigeria where rainfall hardly extends beyond four months with most water courses and rivers dry for eight months in the year.

The Gada River flows for only about four months each year, with a catchment area at Jibiya of over 400 km^2. Due to the loose sandy nature of the surface soil, a flexible impervious liner was used that could adapt to settling or deformation of the embankment

The Latitude and Longitude are 13°4'18.00"N and 8°30'0.00"E.

The water power studies are carried out by collecting the discharge and design parameters for Head and Discharges are arrived as:

Head : 16.7 meter

Discharge : 10.88 cumecs

It is proposed with an installed capacity of 2 x 800 kW for utilizing the discharges let out for irrigation supply and Domestic water supply.

Hydrological Studies

The dam was constructed for the purpose of irrigation and flood control as well as water supply. It is an earth dam, sand fill with central core. Recent visual inspection reveals that the dam is in good condition, though some of the dam structures, particularly those under water could not be inspected visually to determine their integrity. These include the intake structures such as the Existing pipe, sand traps, headrace, filters etc. Flow discharges from the dam are actually controlled by outlets to irrigation fields and the spillway. The Valve chamber at tail water of dam equipped with:

- ✓ Irrigation supply main 1400 mm (dia)
- ✓ Domestic water supply main and gravity irrigation 900 mm (dia)
- ✓ Bottom outlet to stilling basin 2×1400mm (dia)
- ✓ Branch to leading over water to Niger 1200 mm (dia)

Here only the discharges from the Irrigation supply main 1400 mm (dia) and Domestic water supply main & gravity irrigation 900 mm (dia) pipes have been considered for power generation.

Power Potential:

Power potential studies are carried out to estimate the power that can be exploited economically from the proposed scheme. After detailed studies, the design parameters are finalized as follows

Installed capacity

From the studies, it is found that the optimum installed capacity of the project is 1.6 MW. As the design discharge is 10.88 m^3/s, 2 units of 0.8 MW capacities each are proposed to utilize the discharges available from the Irrigation supply pipe and Domestic water supply pipe.

Design Head & Design Discharge

The rated head on the turbines is 16.7m. And the design discharge of 10.88 m^3/s has been taken based on analysis.

Annual generation

The annual generation based on an installed capacity of 2 x 0.8 MW units is 6.9 MU @ 49% PLF.

E & M Equipment

The installed capacity of the power station is 1.6 MW, the installed number is two so the capacity of one unit is 0.8 MW and the rated head is 16.7 m

Sl. No.	Particulars	Design Parameters

1	Type of Turbine	Kaplan
2	Number of units	Two
3	Horizontal/Vertical	Vertical
5	Rated head	16.7 m
6	Gross head	17.6 m
7	Rated discharge	Qe=10.88 m^3/s
8	Turbine Output	0.8 MW
9	Efficiency η	75 %
11	Generators	2
12	Rated voltage	11 kV
13	Rated output	1 MVA
14	Total Installed Capacity, MW	1.6 MW

Power Evacuation

The power generated from the proposed Jibiya Dam SHEP will be evacuated to the existing 33kV substation at Jibiya town through a 33 kV line of 2 KM long.

Section 6: Economic Feasibility

The economic viability of the four projects has been assessed based on the following parameters:

- Capital Cost & Cost of Generation
- Access conditions & Proximity to Grid
- Expected Return on Equity
- Levelized tariff with respect to expected Return on Equity (ROE)

The following key assumptions have been made in the financial model

- A Project Capital Structure comprising Debt and Equity in the ratio of 70:30
- Installed Capacity as finalized from power potential studies
- Interest on Long-term debt of 15%
- Debt repayment period considered as 10 years
- A Construction period of 2.5 years
- Depreciation as per SLM method considering a residual value of 10%
- Power evacuation costs for complete transmission till grid have been considered
- Life of Project has been taken as 35 years
- Interest on long term Debt is assumed at 15% as per the Industry standards
- Expected Return on Equity (ROE) for the investors is assumed as 16%
- Interest on working capital is assumed as 15% per annum as per the standard practice in the Country
- Escalation of O&M expenses are assumed at 5.72 % per annum based on standard O&M inflation data from equipment suppliers

Project costs have been estimated based on the detailed BOQs that have been prepared for each individual projects. A detailed financial analysis has been done based on the estimated projects costs and the parameters outlined above.

Jibiya

The estimated project cost for Jibiya is outlined below

S.no	Particulars	(Amount in Naira)
1	Pre-project studies, Operation & Maintenance Cost and Supervision Cost	38,678,400
2	Civil Works	253,388,850
3	Machinery Works	126,400,000
4	Electrical Works in Power Station & 350m long 33kV line	10,112,000
	Sub Total I	**428,579,250**
5	Add: 5% contingency	21,428,963
	Sub Total II	**450,008,213**
6	Add 5% VAT	22,500,411
	Sub Total III	**472,508,623**
7	Interest During Construction (IDC)	26,230,564
	Grand Total Cost	**498,739,187**

The following table presents the summary of economic evaluation

S No.	Parameter	Value
1	Project Capital Cost (Million Naira)	499
2	Access to Site including Material Movement	Yes
3	Power Evacuation Cost (in Million Naira)	10.11
4	Return on Equity	16%
5	Levelized tariff with respect to ROE (Naira /KWh)	19.04

Investment Parameters

Parameter	Value
Project IRR (%)	16.23
Equity IRR (%)	19.29
Payback Period (Years)	5
Levelized Tariff Considered(Naira/kWh)	19.04

Sensitivity Analysis

Following tables presents Sensitivity Analysis, taking into consideration different levels of Tariff

Tariff (Naira/Kwh)	IRR (Project)%	IRR(Equity)%	Payback Period (years)
18.25	15.59	17.89	6
19.04	16.23	19.29	5
19.83	16.87	20.70	5
20.63	17.50	22.13	5

Section 7: Environmental Impact

All the projects in scope are dam based with the preliminary infrastructure already in place. The projects entail construction of additional infrastructure to exploit the power generation potential resulting from the storage of water in the dams. Therefore, there is minimal impact on the surrounding environment due to new constructions. There is no requirement for resettlement of population around the project. As the projects are of smaller capacity (10 MW and less), environmental impact is minimal.

Actual impacts needs to be identified on project & site specific basis and the same needs to be monitored during project implementation stage by the PMC contractor so as to ensure minimal impacts to environment. However, whatever impacts the project might have are analyzed below.

From a hydro power project perspective, the environmental aspects are broadly divided into 2 categories i.e., during construction and post commissioning of the project. The major environmental issues during construction phase include: Construction of access roads, temporary shelter of construction workers and managerial staff, tunneling resulting in water, air and noise quality concerns, Water diversion impacts, Change in slopes and drainage, conflicts due to large construction force, Change in downstream water quality (reducing dissolved oxygen), Barriers to aquatic life. Some of the post construction social and environmental concerns that can arise due to hydro power project include:

- Low dissolved oxygen levels in the water
- Fish injury and mortality from passage through turbines
- Seismic activities
- Lack of monitoring of in stream flows can have adverse impacts on receiving flora & fauna

Since there are no habitations nearby the proposed project site, hence community displacement and Rehabilitation and resettlement issues are not of concern. Similarly the possible cultural conflict and health impacts on local population are also not envisaged due to this project.

Section 8: Legal Framework

Legal Considerations

One of the most important considerations by prospective participants in a PPP project is whether there exists sufficient legal authority and flexibility to structure the PPP model to address the interests of all stakeholders. Without adequate legal authority and flexibility, PPPs cannot be used to expedite delivery of the concessioning program.

Legal framework for power project development

The principal legislation regulating the establishment and operation of power projects in Nigeria is the Electric Power Sector Reform Act (ESPA), 2005. The ESPA Act establishes the Nigerian Electricity Regulatory Commission (NERC), which has amongst others the function maintaining, improving and regulating the electricity sector in Nigeria.

Sections 64 (1), (2), (3) of the ESP Act empower NERC to engage the private sector in performing its statutory functions which include to construct, own, operate and maintain a generation station for purposes of generation and supply of electricity in accordance with the Act. The holder of a generation license may sell power or ancillary services to any of the classes of persons specified in the license. The NERC may issue generation license to any of the successor companies of NEPA or other entities known as the Independent Power Producer

In similar vein, Section 1(1) of the Infrastructure Concession Regulatory Commission Act, 2005 (ICRC Act) provides a framework for Ministries, Departments and Agencies (MDA) of the Federal Government of Nigeria to enter into contracts or grant concessions to duly pre-qualified private sector participants for the financing, construction, operation or maintenance of any infrastructure that is financially viable or development facility of the Federal Government of Nigeria. The ICRC Act establishes the Infrastructure Concession Regulatory Commission which is charged with providing the regulatory and institutional framework by which MDAs of the Federal Government of Nigeria will effectively enter into PPPs for infrastructure development.

It is important to note that Section 71 of the ESP Act requires that a license shall be valid for a period of up to, but not exceeding ten years, provided that the NERC may extend the period of a license taking into account the nature of the undertaking or business, for an additional period not exceeding five years at a time it determines that it is in the public interest to do so

Policy appraisal

The prevailing policy of the Federal Government with respect to infrastructure development is the utilization of Public Private Partnerships. This focus on PPPs, in addition to the Federal Government's adoption of the PPP model has made NERC the regulating body for the power sector.

Actions and decisions to be taken

The principal governmental agencies which will be involved in any PPP arrangement for the development of the four projects are NERC, FMOP and ICRC. ICRC has issued the National Policy on Public-Private Partnerships (NP4) which provides the process and procedure to be adopted by Federal Government MDAs in carrying out all aspects of PPP project development and implementation.

Pursuant to the provisions of the NP4, a detailed investment appraisal is required to be conducted for any infrastructure project for which investment is needed. The engagement of external advisers to carry out the investment appraisal and prepare an OBC for the project is a key component of this process. Following approval of the Outline Business Case, procurement of the private sector participant is undertaken with the assistance (if required) of the ICRC PPP Resource Centre.

The procurement stage of the PPP process requires the preparation of an information memorandum and bid documentation, market consultation and conduct of a competitive and transparent procurement.

Section 9: Risk Assessment

This section identifies all material risks associated with the project, specifying the external and project development risks for the MDA, the project risks to be allocated to the Private Sector and those to be retained by the MDA.

Much of the risk of a PPP project comes from the complexity of the arrangement itself in terms of documentation, financing, taxation, technical details, sub agreements etc involved in a major infrastructure venture, while the nature of the risk alters over the duration of the project. For example, the construction phase of the project will give rise to different risks from those during the operating phase.

At least nine risks face any infrastructure project:

1. Technical risk, due to engineering and design failures.
2. Construction risk, because of faulty construction techniques and cost escalation and delays in construction.
3. Operating risk, due to higher operating cost and maintenance costs,
4. Revenue risk, e.g. due to traffic shortfall or failure to extract resources, the volatility of prices and demand for products and services sold.
5. Financial risks arising from inadequate hedging of revenue streams and financing costs.
6. Force majeure risk, involving war and other calamities and acts of God.
7. Regulatory/ Political risk, due to legal changes and unsupportive government policies.
8. Environmental risk, because of adverse environmental impacts and hazards.
9. Project default, due to failure of the project from a combination of any of the above.

The following tables lists out some of the risks identified and mitigants for the current project

Risk Identification, Allocation and Mitigation

Country Risks			
Risk	Generating Factor	Risk Allocation	Mitigation
Legal and institutional risk	Change in law and regulatory environment	• Concessionaire • Insurers • Contractor	• Change in law clauses • Compensation mechanisms and risk and indemnities • Insurance policies and government guarantees covering the risk of change in taxation • Renegotiation and termination clauses in the concession agreement
	Change in general legal framework directly and specifically affecting the project company	• Government • Insurers	• Comprehensive and rigorous concession agreement covering as many potential events as possible • International arbitration in the concession agreement • Insurance policy covering sovereign and/or sub-sovereign risk
Monetary Risk	Inflation	• Concessionaire	• Indexing the terms and conditions to be linked with Inflation
	Interest rates fluctuation	• Concessionaire	• Hedging of Interest Rate Risks
	Exchange Rate Risk	• Concessionaire • Government • Customers	Hedging Instruments Matching Revenue Currencies with Expense Currencies
		• Concessionaire	• Government backed guarantees

	Non-convertibility or non-transferability	• Insurers	• Hedging of risks through external insurance policies
Political risk	Breach or cancellation of contract, expropriation, creeping expropriation, failure to obtain or renew approvals, terrorism	• Concessionaire • Insurers	• Compensation arrangements from the government
Force Majeure	Flood, earthquake, riot, strike, etc.	• Concessionaire • Insurers • FMOP AND ICRC	• Insurance policy covering floods, earthquake and other similar risks • Risk of riot, war and hostilities usually borne by the concessionaire, unless Government is directly responsible or involved

Project Risks			
Risk	**Generating Factor**	**Risk Allocation**	**Mitigation**
Risks incurred prior to financial close			
Delay in project preparation and implementation	Strong opposition from local community, interest groups	• FMOP & ICRC	• Consultation with stakeholders and comprehensively addressing their concerns
	Delay in developing a business case	• FMOP & ICRC	• Careful planning of project preparation schedule • Strong commitment from and coordination between all government entities involved

			• Selection of competent and experienced advisers to bring in lacking skills
Unsuccessful tender	• The project does not attract bidders • The project does not attract the targeted bidders in terms of development policy, experience, financial clout, etc.	• FMOP & ICRC	• Thorough upstream preparation of feasibility studies, tender documents, concession agreement, etc. • Submission of a bankable Outline Business Case to the market • Roll-out of a real project marketing campaign • Inclusion of minimum requirements in terms of experience and/or financial solvency of bidders • Setup of a very precise, clear and transparent tendering process • All information available to be transmitted to the bidders in order to avoid adverse selection • Bidders to be granted sufficient time to prepare a proposal
Incapacity of the concessionaire to raise funding	• The concessionaire cannot find funding with the adequate terms and conditions.	• Concessionaire • FMOP & ICRC	• Submission of a bankable Outline Business Case to the market • Inclusion of minimum requirements in terms of experience and/or financial solvency of bidders • Availability of FMOP and ICRC to provide assistance to the concessionaire and comfort to potential lenders as required

Risks incurred during construction period			
Cost overrun	Within the concessionaire's control (inefficient construction practices, etc.)	• Concessionaire • EPC contractor	• Careful planning and project management • Selection of a seasoned and competent project manager • Choice of a reputable and internationally recognized EPC (Engineering, Procurement and Construction) contractor • Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) • Clearly described indemnification mechanism in the EPC contract • Equity participation of the EPC contractor in the concessionaire consortium
	Outside the concessionaire's control: change in the overall legal framework (taxes, laws, etc.)	• FMOP & ICRC	• Adequate protective provisions in the concession agreement
	Seismic and Geotechnical Risks	• FMOP & ICRC	• Proper Technical Studies and Tests to be conducted
	Miscommunication between the parties	• Concessionaire • FMOP & ICRC	• Proper Communication and Coordination Plan to be drafted

Delay in completion	Wrong construction time estimations by suppliers	• Concessionaire • EPC contractor	• Careful planning and project management • Selection of a seasoned and competent project manager • Choice of a reputable and internationally recognized EPC contractor • Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) • Clearly described indemnification mechanism in the EPC contract • Equity participation of the EPC contractor in the concessionaire consortium
	Unexpected events outside the concessionaire's control	• Concessionaire • EPC contractor	• Proper Insurance for unforeseen risks
Failure of project to meet performance criteria at completion	Quality shortfall, construction defects	• Concessionaire • EPC contractor	• Careful planning and project management • Selection of a seasoned and competent project manager • Choice of a reputable and internationally recognized EPC contractor • Turnkey contract with solid commitments from the EPC contractor (deposits, holdbacks, performance bonds) • Clearly described indemnification mechanism in the EPC contract

			• Equity participation of the EPC contractor in the concessionaire consortium
Environmental risk	Negative impact on fauna and flora	• Concessionaire	• Detailed Environment Impact Assessment and checks and balances in place
Risks incurred during operating period			
Operating cost overrun	Delay in Permits	• FMOP and ICRC	• Coordination with all relevant government stakeholders to ensure timely approvals
	Escalation of Prices of Spares	• Concessionaire	• Long-term procurement contracts • Hedging of price risks
	Increase in Compensation for Staff	• Concessionaire	• Transfer of risk to customers
Revenue risk	Change in Tariff	• Concessionaire	• Financial regulation and renegotiation clauses in the concession agreement
	Lower Generation	• Concessionaire	• Proper Sensitivity analysis to be done to reflect lesser generation
Technical risks	Incorrect Valuation of Assets	• FMOP & ICRC • Concessionaire	• Protection Clauses for each of the parties
Environmental risks	Negative impacts on fauna and flora Negative Impact on	• FMOP & ICRC • Concessionaire	• Environmental Impact Assessment (EIA) study to be completed • Project monitoring in compliance with local

	Fisheries		environmental regulatory framework
Risks incurred upon termination			
Litigation on assets to be transferred	Unamortized assets upon termination	• Concessionaire	• Concession agreement to clearly specify the assets to be retained by the concessionaire and those to be transferred to FMOP, and at what cost, if any
Operating interruption	No private operator interested in taking over and FMOP & ICRC left without the human and financial resources to do so	• FMOP & ICRC	• Exit clauses in the concession agreement to allow sufficient time for alternatives to be designed and implemented

Section 10: Option analysis, Value-for-money and recommendations

This section identifies delivery options available for the development of the project, provides evaluation of these options and recommends the preferred one, based on the evaluation criteria specified.

The term "BOT" is used mainly in the area of infrastructure projects financed by the private sector. The economic environment today is suitable enough for the private sector to invest in infrastructure projects for the following reasons:

- Government policy aiming to increase the private sector participation.
- Modification in legislation and laws that encourage investments.
- Decrease in inflation rates.
- Availability of cheap and experienced work force.

A BOT model can be defined as any of the below

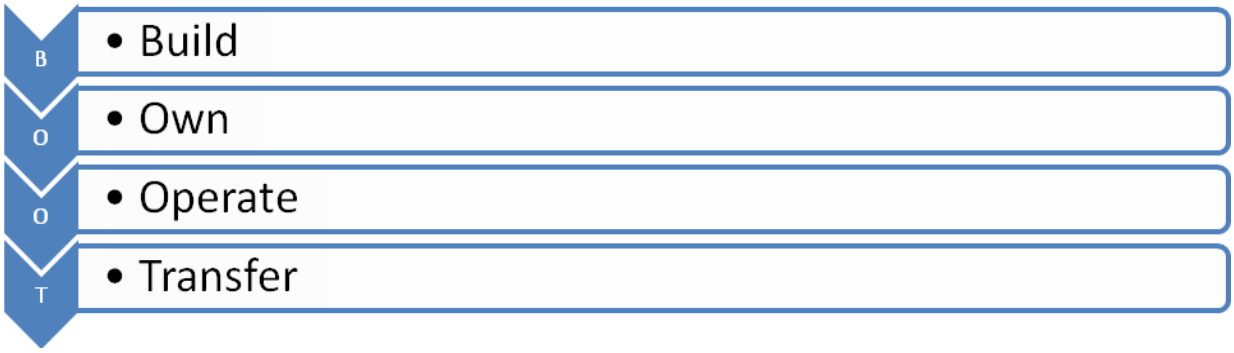
- A model that entails a concession company providing the finance, design construction, operation, and maintenance of a privatized infrastructure project for a fixed period, at the end of which the project is transferred free to the host government.
- The granting of a concession by the government to a private promoter, known as the concessionaire, who is responsible for the financing, construction, operation, and maintenance of a facility over the concession period before finally transferring the fully operational facility to the government at no cost.
- A model or structure that uses private investment to undertake the infrastructure development that has historically been the preserve of the public sector
- A type of project financing whereby the government grants a concession to a private entity (project company) to build and operate a project, such as infrastructure of resource extraction, that would be operate by the government.
- Essentially a form of project financing whereby a government awards a group of investors (hereafter referred to as "Project Consortium") a concession for the development, operation, management, and commercial exploitation of a particular project.
- A contractual arrangement and a new legal concept to encourage private enterprises and entrepreneurs to help the government in its development effort

There are various methodologies involved in the Concessioning of a project. These are defined by the roles played by each of the stakeholders (Government & Promoter to be specific)

BOOT (build, own, operate, and transfer)

BOOT (build, own, operate, transfer) is a public-private partnership (PPP) project model in which a private organization conducts a large development project under contract to a public-sector partner, such as a government agency.

The public-sector partner contracts with a private developer - typically a large corporation or consortium of businesses with specific expertise - to design and implement a large project. The public-sector partner may provide limited funding or some other benefit (such as tax exempt status) but the private-sector partner assumes the risks associated with planning, constructing, operating and maintaining the project for a specified time period. During that time, the developer charges customers who use the infrastructure that's been built to realize a profit. At the end of the specified period, the private-sector partner transfers ownership to the funding organization, either freely or for an amount stipulated in the original contract. Such contracts are typically long-term and may extend to 40 or more years.



Advantages

- The majority of construction and long-term operating risk can be transferred onto the BOOT provider.
- BOOT allows the hydro power development to happen seamlessly. The scheme is not constrained through a lack of funding, a lack of expertise or project management capability. Also, there are strong financial incentives for the BOOT operator to complete the construction and get the scheme operational as soon as possible.

- Involving a BOOT operator gives the scheme certainty and makes it more believable for electricity users. This in turn encourages interest in the scheme from an early stage.
- No upfront cost for electricity users frees up more capital for on-farm development to occur quickly. This is also positive for the scheme, as users are able to come faster.
- Using an output based purchasing model, the tender process will encourage maximum innovation allowing the most efficient designs to be explored for the scheme. This process may also be built into more traditional tendering processes.
- Accountability for the asset design, construction and service delivery is very high given that if the performance targets are not met, the operator stands to lose a portion of capital expenditure, capital profit, operating expenditure and operating profit.
- BOOT operators are experienced with management and operation of infrastructure assets and bring these skills to the scheme.
- Corporate structuring issues and costs are minimal within a BOOT model, as project funding, ownership and operation are the responsibility of the BOOT operator. These costs will however be built into the BOOT project pricing.

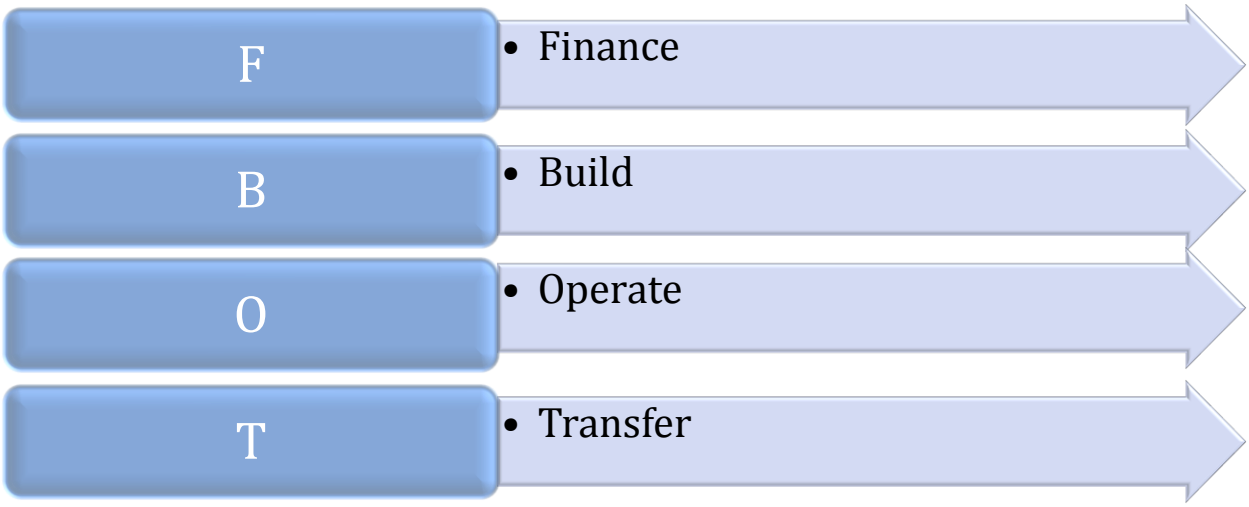
Disadvantages

- BOOT is likely to result in a higher cost of hydro electricity for the end user.
- Community and particularly hydro electricity users may have a negative reaction to private sector involvement in the scheme, particularly if the private sector is an overseas owned company.
- The full benefits of economic development may not be realized if the BOOT provider is a sole source entity as local business are not as likely to provide materials and services to the BOOT provider, particularly during the construction phase. Although local providers may be able to compete on an individual component of a scheme, sharing the whole project margin within the sole source entity will make it more difficult for local businesses to complete.

FBOT (Finance Build Operate and Transfer):

The Finance-build- operate and transfer (FBOT) approach, the public-sector partner contracts with a private developer - typically a large corporation or consortium of businesses with specific expertise - to finance build operate and transfer of a large project. The private-sector partner assumes the risks

associated with financing, constructing, operating and transferring the project after a specified time period.



Advantages

- Maximise use of private sector skills
- Public sector only pays when services delivered
- Promotes innovation, not only in technical and operational matters, but also in financial and commercial arrangements
- Fosters the development of a private sector road-operating industry in the country; and
- Minimizes the financial contribution required from the public sector.

Disadvantages

- The full benefits of economic development may not be realized if the FBOT provider is a sole source entity as local business.
- Requires a project team with clear understanding of the FBOT delivery method Limited "checks and balances"
- Further reduction of owner control over the operation of the project for the government entity
- Requires all round planning and development from the private sector developer

BOOM (Build Own Operate and Maintain)

where a single entity is vested with the responsibility for designing, constructing a facility, and operating and maintaining it for a specified period prior to handing it over to the client or principal.

Advantages

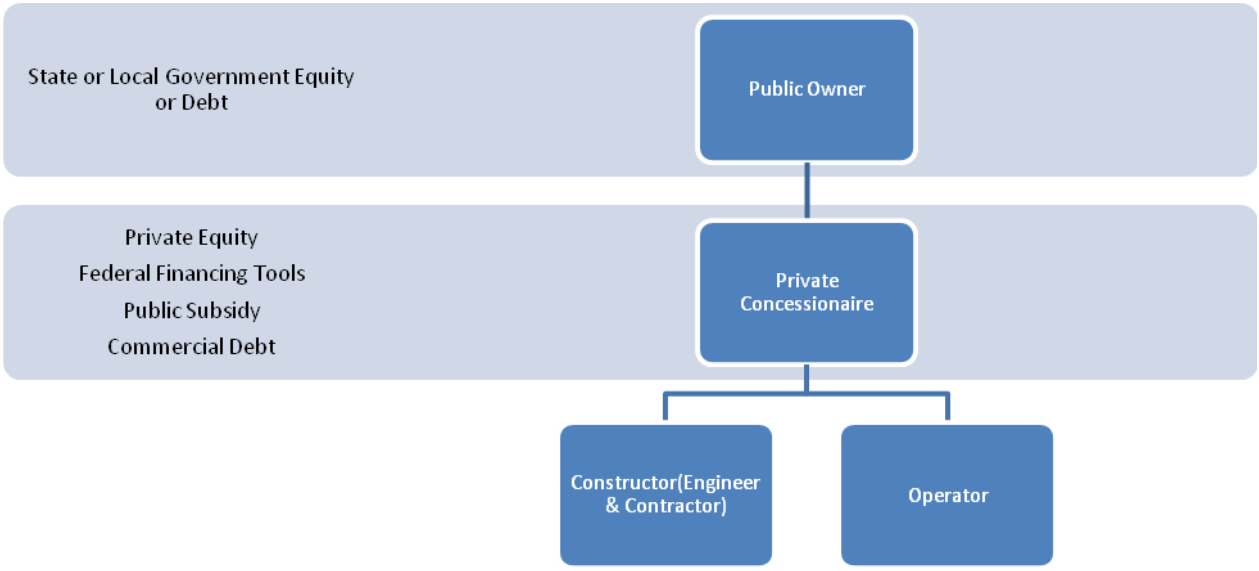
- Maximise use of private sector skills
- Public sector only pays when services delivered
- Quality of service has to be maintained
- Accountability

Disadvantages

- Further reduction of owner control over design and operation of the building
- Requires additional planning from the owner in the conceptual stage
- Requires a project team with clear understanding of the BOOM delivery method Limited "checks and balances"

FBOOM (Finance Build Operate and Maintain)

The finance-build-operate-maintain (FBOM) approach, the responsibilities for financing, building and operating are bundled together and transferred to private sector partners. There is a great deal of variety in FBOM arrangements, and especially the degree to which financial responsibilities are actually transferred to the private sector. One commonality that cuts across all FBOM projects is that they are either partly or wholly financed by debt leveraging revenue streams dedicated to the project.



Advantages

- Ensures that the project is designed, maintained and operated safely and satisfactorily
- Shall minimize adverse impact on the environment and maximize benefit to electricity users
- Will transfer the appropriate level of risk to the private sector
- Will promote innovation, not only in technical and operational matters, but also in financial and commercial arrangements
- Will foster the development of a private sector in the country; and
- Will minimize the financial contribution required from the public sector despite its ownership of the project

Disadvantages

Perceived loss of "control" –Reality: In most FBOM projects, Public Sector owns assets and controls policy. These in turn can discourage some investor interest. This needs to be mitigated by using appropriate guarantees and insurances.

Recommended Structuring Option

Following our analysis of the aforementioned PPP options, our recommended structuring option involves a synergy of different PPP options. It is advisable that FMOP retains a supervisory and regulatory role instead of sharing responsibilities with the private player for the execution and

the operation of the projects. The crucial stages of Finance, Own and Operate must be handled by the private operator to give them more freedom in terms of execution and operation and apart from these aspects there exists a need to ensure that the project is handed over to the FMOP and ICRC after proper technical & operational knowledge transfer. We therefore suggest that Finance-Build-Own-Operate-Train-Transfer is the most suitable option for the Concessioning of these projects.

Section 11: Evaluation Criteria for selection of Private Sector Investor

This section details the evaluation criteria for selection of the Private Sector.

Seven methods for the selection of consultants are provided under the World Bank's guidelines. They include the following methods:

- Quality- and Cost-Based Selection (QCBS)
- Quality-Based Selection (QBS)
- Selection under a Fixed Budget (FBS)
- Least-Cost Selection (LCS)
- Selection Based on Consultant's Qualifications (CQS)
- Single-Source Selection (SSS)
- Commercial Practices (CP)

Given the nature, size and complexity of the projects, the evaluation of the bidders shall be done using the QCBS method.

Selection Criteria

Concession of hydro power projects might raise strong interest from a range of private investment groups. It was therefore deemed useful to establish a list of criteria in order to assist decision-makers' in their choice of the appropriate promoter

There are multiple factors under which the evaluation of a firm is carried out. The following list showcases the crucial elements of evaluation

- Eligibility
    - Nationality
    - Conflict of Interest
    - Bank Ineligibility
    - Government Owned Entity
    - Eligibility based on Host Country Status
- Historical Contract Non-Performance
    - History of Non-Performance
    - Pending Litigation
- Financial Situation

    - Historical Financial Performance
    - Average Annual Turnover
    - Financial Resources
- Experience
    - General Experience
    - Specific Experience
- Personnel
- Equipment
- Sub-Contractors

Many other factors can influence a firm's capability in handling such long term projects. However, these are the primary areas of concern as far as the evaluation for award of project in concerned

Section 12: Implementation Plan

This section details the activities and timelines during the project development period.

PROJECT IMPLEMENTATION SCHEDULE																															
	Months	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Activities																															
SELECTION OF IMPLEMENTING AGENCY																															
Finalizing the OBC																															
Preparation of Tender Documents																															
Call of Expression of Interest																															
Evaluation of Expression of Interest																															
Pre-Qualification of Bidders																															
Call for Tender																															
Evaluation of Bids																															
Selection of Preferred Bidder																															
Negotiation with Preferred Bidder																															
Signature of Concession Agreement																															
PROJECT FINANCING AND IMPLEMENTATION																															
Arrangement and Negotiation of Funding																															
Financial Closure																															
Detailed and Complete Design																															
Civil Works																															
Electro-Mechanical Works																															
Hydro-Mechanical Works																															
Transmission Infrastructure																															
Testing and Commissioning																															

Section 13: Conclusion

The present Outline Business Case study seems to indicate that the envisaged project concept, is economically, technically, legally and financially viable for all the four sites Challawa, Tiga, Zobe and Jibiya. From an economic perspective, the projects could contribute to reducing the power deficit of the country, especially in the states of Kano and Katsina. It would provide a new economic thrust to these states, which should eventually leave all economic stakeholders in a better position.

From a technical perspective, the projects seems perfectly feasible and would greatly contribute to improving the overall power sector infrastructure in these two states. The extent of the works to be conducted and the impact of those works on the environmental condition of the area remain to be confirmed by means of more advanced technical feasibility studies.

From a legal perspective, the institutional and regulatory framework seems favorable with FMOP and ICRC fully committed to the implementation of the project.

From a financial perspective, the project seems extremely profitable at the assumed tariffs and should not require any government subsidy. The main questions lie with the nature of the future concessionaire(s) and their ability to execute and operate the project

While it is anticipated that the project shall generate strong interest, a detailed market engagement exercise will result in a clear picture.

Further steps involved in the completion of this entire exercise are outlined in the implementation plan. Looking at various developed and developing nations and their privatization plans for the power sector and their impact on the respective economies' developments leave us with little doubt that the selected implementation model and the outlined future path is the most perfect fit for a power hungry and a dynamic economy like Nigeria.