INVESTMENT OPPORTUNITIES IN THE NIGERIAN POWER SECTOR

A Publication of the Federal Ministry of Power
"Our commitment is to bring an end to our nation's stunted growth and usher in the fresh air of prosperity by pursuing a new era of sector-wide reform which is driven by improved service delivery to every class of customers in the Nigerian electricity sector."

- His Excellency, Dr. Goodluck Ebele Jonathan, GCFR, President, Commander-in-Chief of the Armed Forces of the Federal Republic of Nigeria
His Excellency, Dr. Goodluck Ebele Jonathan, GCFR
President, Commander-in-Chief of the Armed Forces
of the Federal Republic of Nigeria
His Excellency, Arc. Mohammad Namadi Sambo, GCON
Vice President, Federal Republic of Nigeria
Investment Opportunities in the Nigerian Power Sector

Prof. Chinadu Ositadinma Nebo, OON, NDOM
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### List of Selected Acronyms/Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPE:</td>
<td>Bureau of Public Enterprises</td>
</tr>
<tr>
<td>CEB:</td>
<td>Benin-Togo Communauté Electrique du Bénin (Transmission Company of Benin and Togo)</td>
</tr>
<tr>
<td>DisCos:</td>
<td>Distribution Companies</td>
</tr>
<tr>
<td>EPSR:</td>
<td>Electric Power Sector Reform</td>
</tr>
<tr>
<td>FGN:</td>
<td>Federal Government of Nigeria</td>
</tr>
<tr>
<td>GACN:</td>
<td>Gas Aggregation Company of Nigeria</td>
</tr>
<tr>
<td>GDP:</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GenCos:</td>
<td>Generation Companies</td>
</tr>
<tr>
<td>GW:</td>
<td>Gigawatts</td>
</tr>
<tr>
<td>GWE:</td>
<td>Gigawatts of Energy</td>
</tr>
<tr>
<td>GWh:</td>
<td>Gigawatts hour</td>
</tr>
<tr>
<td>KV:</td>
<td>Kilovolts</td>
</tr>
<tr>
<td>KWh:</td>
<td>Kilowatts hour</td>
</tr>
<tr>
<td>Mmscfd:</td>
<td>Million standard cubic feet per day</td>
</tr>
<tr>
<td>MW:</td>
<td>Megawatts</td>
</tr>
<tr>
<td>NAPTIN:</td>
<td>Nigeria Power Training Institute</td>
</tr>
<tr>
<td>NBET:</td>
<td>Nigerian Bulk Electricity Trading Plc</td>
</tr>
<tr>
<td>NDPHC:</td>
<td>Niger Delta Power Holding Company</td>
</tr>
<tr>
<td>NELMCO:</td>
<td>Nigeria Electricity Liability Management Ltd/Gte</td>
</tr>
<tr>
<td>NEPA:</td>
<td>National Electric Power Authority</td>
</tr>
<tr>
<td>NERC:</td>
<td>Nigerian Electricity Regulatory Commission</td>
</tr>
<tr>
<td>NESI:</td>
<td>Nigerian Electricity Supply Industry</td>
</tr>
<tr>
<td>NIPP:</td>
<td>National Integrated Power Project</td>
</tr>
<tr>
<td>PACP:</td>
<td>Presidential Action Committee on Power</td>
</tr>
<tr>
<td>PHCN:</td>
<td>Power Holding Company of Nigeria</td>
</tr>
<tr>
<td>PRG:</td>
<td>Partial Risk Guarantee</td>
</tr>
<tr>
<td>PTFP:</td>
<td>Presidential Task Force on Power</td>
</tr>
<tr>
<td>REA:</td>
<td>Rural Electrification Agency</td>
</tr>
<tr>
<td>TCN:</td>
<td>Transmission Company of Nigeria</td>
</tr>
<tr>
<td>WAPP:</td>
<td>West African Power Pool</td>
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Images from a Reforming Nigerian Power Sector 19
Prior to Nigeria’s return to democratic governance in 1999, its power infrastructure had decayed to an unprecedented level. This resulted in epileptic power supply to the nation, which impacted severely on its economy. It forced some companies to close down, while some that could afford to relocated to neighbouring countries.

The democratic era began to address the decay by putting in place structures to reduce the impact of a severely incapacitated power sector. The present administration of His Excellency, President Goodluck Jonathan, GCGR, raised the tempo with its remarkable, unprecedented transformation of the power sector, having launched the Roadmap for Power Sector Reform on August 26, 2010.

The road map was not only meant to refocus the sector. It was also an expression of the president’s belief that Nigerians deserve a new deal with power as an engine of development, whose constant availability will improve industrialisation, create more jobs, bring all-round sustainable development to Nigeria, and improve the living standard of its citizenry.

The road map sets out the president’s vision for realising the goal of providing adequate power sustainably in Nigeria in line with the provisions of the Electric Power Sector Reform (EPSR) Act of 2005, the legislation from which the reform drew its impetus. The main focus of this vision is to fast-track structural reform, improve power infrastructure, build capacity, and enhance supply sustainability and availability. These are the essential conditions in preparation for the privatisation of the power sector and building a robust private sector-driven market for power. The aim is to evolve to an efficient post-privatisation era that will be profitable to all stakeholders, including local and foreign investors, while delivering power reliably and affordably to the Nigerian people.

This was not seen as an easily realisable vision. But with the strong commitment of the government and other stakeholders, the sector has steadily replaced the old order of infrastructural neglect with a new order of infrastructural development and all-round capacity building.

Thus, the launch of the road map and its implementation infused a fresh breath of commitment to progress into the power sector, with attendant chain reactions that anticipate extensive socioeconomic development. The country is making progress; but we recognise that a lot still needs to be done.

This publication presents the progress made so far in implementing the EPSR Act and the road map, and other related developmental landmarks in the sector. It also presents the opportunities that await investors in the Nigerian power sector.

Ironically, the low level of power availability in Nigeria compared to its huge population of nearly 170 million people, its vast natural endowments and steadily growing economy, makes the country the most attractive market for investors in the power business. This can be compared to taking the business of a restaurateur to where there is a rich supply of cooking ingredients and a huge market and appetite for cooked food. There are millions of Nigerians with high purchasing power and a deep, insatiable hunger for electricity.

- The huge gains from the liberalisation of Nigeria’s telecom sector will be far less compared to the potential economic gains for investors in its power sector, since power is the engine that drives all other sectors of the economy. Therefore, the investment opportunities in the power sector should be seized enthusiastically while they last. Nigeria is an investment paradise for the savvy, and its power sector makes it doubly so. We invite investors to consider and indeed take up the opportunities now available in the sector. The attendant processes are configured to conform to international best practices.

Finally, let me reaffirm the commitment of our President, His Excellency, Dr. Goodluck Jonathan, GCGR, to ensure that the investments of those who accept the invitation are secure and profitable.

Prof. Chinedu O. Nbo, OON, NPOM
Hon. Minister of Power
Chapter 1

NIGERIA: DEMOGRAPHY AND GROWTH POTENTIALS

1.0 Population and Potentials
Nigeria’s population is the seventh largest in the world. It is estimated at 170 million with an annual growth rate of 3.2 per cent. By United Nations projections, Nigeria’s population will be nearly 230 million in the next 20 years.

Nigeria also has the largest population among African countries. Its population accounts for nearly half the total population of West Africa and more than 15 per cent of the total population of the entire African continent.

More than 40 per cent of Nigerians are below age 20. Functional illiteracy is placed between 30-40 per cent of the entire population, and above 65 per cent for those between 18-45 years. This signifies a strong, adequate and effective manpower base.

Nigeria also represents over 65 per cent of the active West African market and remains the most competitive destination for the establishment of medium and large manufacturing industries.

1.1 Building Blocks for a Viable Power Sector
Fortunately, Nigeria already has important building blocks for developing a strong and viable power sector. These include:
• **Natural Resources:** Nigeria has vast reserves of fossil fuel such as coal and natural gas for power generation. Its advantageous location in the tropics translates into huge potentials for the generation of solar power. The country also boasts a vast supply of rivers, most notably River Niger and River Benue, for sustainable hydropower generation. This is in addition to the huge prospects of harnessing wind power to produce electricity, especially from the vast plains of its northern region.

• **Demographic and Technical Capacity:** Nigeria has a strong youth population. 60 per cent of its population are below age 30. It has several reputed federal and state-owned tertiary institutions. These include the Federal University of Technology, Owerri; the Federal University of Technology, Minna; the Federal University of Technology, Akure; and the Federal University of Technology, Yola. The rest include Yaba College of Technology, Lagos, and the Rivers State University of Science and Technology, Port Harcourt. Such institutions are focussed on producing quality and adequate technical manpower to support the country’s expanding power sector.

• **The Power Roadmap:** Nigeria has a well-articulated road map for performance and growth in the power sector. In addition, its president, Dr. Goodluck Jonathan, has continued to demonstrate strong political will in ensuring the strict implementation of the road map.

1.2 **Nigeria’s Standing among Peers**
Nigeria currently generates about 40 kilowatts of electricity per one thousand inhabitants compared to 120 kilowatts by Indonesia, 145 kilowatts by India, 190 kilowatts by Morocco, 270 by South Africa, and 530 by Brazil. (See the chart below). These figures clearly illustrate the inadequacy of power available/supplied in the country. It seeks to reverse this situation through rapid investments in the power sector and by reforming the sector with a view to its privatisation.

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**Power Generation: Installed Capacity**

Nigeria’s standing among peers (kW/one thousand inhabitants)

<table>
<thead>
<tr>
<th>Country</th>
<th>Installed Capacity (kW/one thousand inhabitants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>40</td>
</tr>
<tr>
<td>Indonesia</td>
<td>120</td>
</tr>
<tr>
<td>India</td>
<td>145</td>
</tr>
<tr>
<td>Morocco</td>
<td>190</td>
</tr>
<tr>
<td>South Africa</td>
<td>270</td>
</tr>
<tr>
<td>Brazil</td>
<td>530</td>
</tr>
</tbody>
</table>

N/B: Capacity estimate based on consumption per capita average of Brazil and South Africa and with capacity utilisation of 70%
To attain the level of Brazil's GDP per capita (i.e. $10,000) by 2030, Nigeria needs to generate 135 gigawatts of electricity for a projected 230 million inhabitants. This amounts to an increase 15 times higher than the current generation value. It also means that the country needs to build power plants at the rate of 7 gigawatts per year for the next 18 years. Only two countries – the United States and China – have achieved this in the past.

1.3 Nigeria and the West African Power Pool (WAPP)
Nigeria currently serves as the Chairman of the West African Power Pool (WAPP) and a member of its Executive Board. It has a power sale obligation of 150 megawatts to the Transmission Company of Benin and Togo (CEB) with a potential for its upward review to 200 megawatts. It also has gas supply obligations through the West African Gas Pipeline which currently supports power production in Ghana, with plans for its extension to other West and North African countries. Nigeria's success with its Power Sector Reform will guarantee the sustainability of its economically and strategically important obligations to the West African Power Pool.

See the following chart for a fuller graphic picture of the relationship between some West African countries under this power sale obligation in which Nigeria plays the leading role.

Source: www.ecowapp.org
Chapter 2

THE NIGERIAN POWER SECTOR BEFORE REFORM

The sector was a government-owned monopoly with the Federal Ministry of Power at the apex of a vertically integrated structure under the then National Electricity Power Authority (NEPA) and later the Power Holding Company of Nigeria (PHCN).

2.1 Major Characteristics
The monopoly was characterised by:

- Chronic systemic inefficiency and leakages which resulted in severe capital drain annually from the federal budget.
- Poorly coordinated/lopsided investments in generation, transmission and distribution.

(The first chart on the next page is a graphic illustration of this poorly coordinated/lopsided investment pattern which the Nigerian Power Sector Reform seeks to redress.)

- Poor delivery of projects.

2.2 Results
The monopoly resulted in:

- Huge and ever widening gaps between power demand and supply and massive industrial flight which worsened unemployment.
- High suppression of power demand throughout Nigeria.
- The grounding or relocation of large...
2.3 Nigeria and the Cost of Power Outages

By a recent appraisal, power outages cost Nigeria about 3.9 per cent of its GDP annually. The power sector reform equally aims to redress this situation. Nigeria’s GDP is currently growing at the rate of about seven per cent per annum. With adequate electricity, the annual growth rate is expected to rise above 10 per cent.

(The second chart below is a comparative presentation of the impact of power outages between Nigeria and other African countries.)
Chapter 3

THE NIGERIAN
POWER SECTOR REFORM

3.0 The Goals of the Reform
The Nigerian Power Sector Reform has two major goals, namely:

- **Improvement in Service Delivery:**
  This will be achieved by relying mostly on the completion of the new NIPP projects and the recovery of installed capacities from the up, mid- and downstream sectors of the electricity value chain to improve the availability, supply and reliability of electricity in Nigeria to an appreciable short-term level during the divestment period under the reform.

- **Reform:**
  This entails moving the sector from a position of government ownership/management of the composite assets to a private-sector driven Nigerian Electricity Supply Industry (NESI) in line with the provisions of the Electric Power Sector Reform (EPSR) Act of 2005.

3.1 The Presidential Roadmap on Power: A Summary of the Journey
Launched on August 26, 2010, by President Goodluck Jonathan, the Roadmap for Power Sector Reform is a well-articulated document that underscores strong presidential backing for the reform of the Nigerian power sector. In relation to the roadmap, the history and progress of the reform can be viewed under the following periods.
Before May 2010
The following major developments occurred under this period:

- The Electric Power Sector Reform (EPSR) Act of 2005 was enacted
- The National Electric Power Authority (NEPA) was unbundled into 18 successor companies with the Power Holding Company of Nigerian (PHCN) as the holding company
- The Nigeria Electricity Regulatory Commission (NERC) was created and later suspended
- A multi-billion dollar National Integrated Power Project (NIPP) was commenced and later stalled
- The reform stalled until President Goodluck Jonathan assumed office in May 2010

After May 2010
The following major developments occurred under this period:

- President Jonathan chose power as one of his cardinal programmes
- The stalled NIPP programme resumed in earnest
- President Jonathan inaugurated the Presidential Task Force on Power (PTFP) and the Presidential Action Committee on Power (PACP) with the broad mandate of fast-tracking the realisation of the goals of the power sector reform
- President Jonathan launched the Roadmap for Power Sector Reform (on August 26, 2010)
- The board of the Nigerian Electricity Regulatory Commission (NERC) was reconstituted

3.2 Strategy of the Reform: Changes in Ownership and Control

As reflected in the first table on the next page, the current configuration of the Nigerian power sector is one in which the ownership of the processes of gas production is “mixed”, or shared between the federal government and private sector entities, while gas transmission, power transmission and distribution are the sole responsibility of the federal government. Also, power production is largely by the federal government, with private entities having minor stakes in the process. With regard to operational control, gas production is largely private, gas transmission is fully a federal government concern, power production is largely a federal government concern, while power production and distribution are fully federal government concerns.
Current Configuration

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Gas Production</th>
<th>Gas Transmission</th>
<th>Power Production</th>
<th>Power Transmission</th>
<th>Power Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed</td>
<td>Mixed</td>
<td>FGNC</td>
<td>Largely FGNC</td>
<td>FGNC</td>
<td>FGNC</td>
</tr>
<tr>
<td>Operational Control</td>
<td>Largely Private</td>
<td>FGNC</td>
<td>Largely FGNC</td>
<td>FGNC</td>
<td>FGNC</td>
</tr>
</tbody>
</table>

However, as the following table shows, the required configuration, which the reform seeks to achieve, is one in which the ownership of the processes of gas production remains “mixed”, with the same condition applying to gas transmission. Then power production will be controlled largely by private entities, power distribution fully by private entities, and power transmission fully by the federal government. Under this arrangement, the operational control of gas production and transmission will largely be in the hands of private entities, while power production, transmission and distribution will be operationally controlled fully by private entities.

Required Configuration

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Gas Production</th>
<th>Gas Transmission</th>
<th>Power Production</th>
<th>Power Transmission</th>
<th>Power Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Largely Private</td>
<td>FGNC</td>
<td>Fully Private</td>
</tr>
<tr>
<td>Operational Control</td>
<td>Largely Private</td>
<td>Largely Private</td>
<td>Largely Private</td>
<td>Fully Private</td>
<td>Fully Private</td>
</tr>
</tbody>
</table>

One of the long-term goals of transitioning from the current configuration to the required one is to ensure that the Nigerian power sector attains such stability as to have switched into a willing-buyer, willing-seller mode by 2015. The other is to ensure that all the stakeholders and structures of the Nigerian Electricity Supply Industry (NESI) are working together to deliver qualitative, reliable and efficient electricity to consumers at reasonable prices that are commensurately profitable to investors and operators in the industry.
4.2 Projections for Increased Available Capacity

Nigeria plans to have increased its available capacity from 4.0 gigawatts in 2010 to 20.3 gigawatts by 2016, with ranges of between 5.1 gigawatts of available capacity to 14.4 gigawatts between 2011 and 2015. However, it has a preferred target of 40 gigawatts of available electricity by 2020 as part of its vision to become one of the twenty most industrialised nations by that year. It plans to generate 80 per cent of this increase in available electricity from gas, 10 per cent from hydro, six per cent from coal, and four per cent from renewables (wind, biomass, etc). The following chart graphically illustrates these projections.
4.1 Projected Gains of Increased Available Capacity

Compared to the present situation, realising 40 gigawatts of available capacity by 2020 will undoubtedly move Nigeria to a much more stable socioeconomic position, as conceived under its Vision 20:2020 agenda. Part of the broader intents of its power sector reform is to fast-track the realisation of this vision of improving power availability and socioeconomic conditions in the country. Commensurate with the rise in available capacity, Nigeria's power consumption is projected to rise from 153 kilowatts hour per capita in 2012 to 1,159 kilowatts hour per capita in 2020. Under this projection, the value of its consumption will be 447, 771 and 948 kilowatts hour per capita in 2014, 2016 and 2018 respectively. This projection compares favourably with what obtains in other emerging markets such as Kenya, India, Brazil and South Africa, as reflected in the following pair of charts:

Source: NERC, McKinsey analysis

1 Assumes 2.5% population growth per annum, 80% load factor and approx. 4.3 GW of new capacity per annum to achieve 40 GW by 2020
Chapter 5

PROGRESS UNDER THE REFORM

The Nigerian Power Sector Reform has already achieved many successes. The successes have materialised as putting policies in place (in the pre-2010 era) to enable the realisation of the reform’s objectives, and turning those policies into action (in the post-2010 era). Among the indices of the successes (in the pre-2010 era) are:

- The approval of the Electric Power Sector Reform (EPSR) Act of 2005 and the establishment of the Nigerian Electricity Regulatory Commission (NERC)
- The transformation of the National Electric Power Authority (NEPA) into the Power Holding Company of Nigeria (PHCN), marking the unbundling of the former and the commencement of the National Integrated Power Project (NIPP)

The indices in the post-2010 era include:

- The launch of the Roadmap for Power Sector Reform by President Goodluck Jonathan
- The reestablishment of the Nigerian Electricity Regulatory Commission (NERC)
- The establishment and operationalisation of the Nigerian Bulk Electricity Trading (NBET) Plc. or the Bulk Trader, the Nigeria Electricity Liability Management Ltd/Gm (NELMCO) and the Nigeria Power Training Institute (NAPTIN)
• The nearly full resolution of the labour issues associated with the reform
• The signing and operationalisation of the management contract for the Transmission Company of Nigeria (TCN) with Manitoba Hydro International of Canada
• Provision of World Bank Partial Risk Guarantee (PRG) for Independent Power Projects (IPPs)
• Signing of MOUs for equity investment in power generation projects with General Electric, Siemens, Daewoo, Electrobras, etc.
• Receipt of 25 per cent of the bid values for 15 of the 18 PHCN successor companies comprising 10 distribution companies (DisCos) and five generation companies (GenCos)
• Approval by the National Council on Privatisation (NCP) of the constitution of Transition Committees for the 15 PHCN successor companies whose preferred bidders have paid 25 per cent of the bid value, and the inauguration of the committees
Chapter 6

PLANS FOR INFRASTRUCTURAL EXPANSION

Nigeria has made extensive plans for infrastructural expansion under the power sector reform and beyond. The plans embrace power generation, transmission and distribution, in addition to support services to ensure the sustainability of the improved running of these core aspects of the power production and delivery value chain.

Currently, Nigeria’s thermal and hydro power plants have an installed capacity of 6.6 and 1.3 gigawatts respectively, while its pilot wind project has an installed capacity of 10 megawatts (MW). Among the goals of the Nigerian Power Sector Reform is to redress the insufficiency of these “legacy assets” and its negative impact on power production and availability in the country. This is being done by encouraging massive investment in the power sector to enable the construction of new power infrastructure to meet the growing need for power across the country.

At present, Nigeria has an on-going projects the 3.1 gigawatts Mambila hydro power plant and the 0.7 gigawatts Zungeru hydro power plant, in addition to several small and medium hydro power projects across the country.

Nigeria has also launched an initiative to sale its power plants built under the National Independent Power Project (NIPP) with a total generating capacity of 4775 megawatts. It is also planning to establish new Independent Power Projects (IPPs) with a total generating capacity of 2.6 gigawatts, in addition to various projects for power generation through coal and renewables.
The country has also signed MOUs for generating 30 gigawatts of electricity with General Electric, Siemens, Daewoo, etc., and has initiated the revival of its rural electrification programme.

Also, Nigeria’s current gas-to-power consumption averages 650 million standard cubic feet per day (mmmscf/d). Various projects are on-going to increase this consumption level with an attendant increase in power production. They include the 50mmmscf/d Shell Petroleum Development Company (SPDC) gas-to-power project, the 30mmmscf/d Oben gas plant, etc. Other new initiatives in this direction include efforts by various reputable companies such as the Shell Petroleum Development Company and Chevron Nigeria Limited (CNL) to build new power infrastructure with a total gas consumption rate of 880mmmscf/d.

In the transmission axis, various projects have been flagged off to boost Nigeria's grid capacity which currently stands at 4.3 gigawatts of energy (GWE). Various grid expansion projects have also been initiated to complement the grid stability projects, with the goal of raising the grid capacity to 10.4 gigawatts of energy under the reform. The country also plans to build a Super Grid that will further boost its grid capacity to 40 gigawatts by 2020.

Among the support services being structured with the above plans for infrastructural development in the power sector are:

- Provision of specialised training for electricity industry technicians and managers
- Building of assembly plants for intermediary power equipment and accessories, including meters
- Establishing consultancies in regulatory and consumer education initiatives
- Provision of power-sector-specific equipment testing, calibration and logistics services
- Setting up ventures for manufacturing energy efficiency products
The huge gap of power availability and the infrastructure to generate, transmit and distribute power in Nigeria presents commensurately huge opportunities for investment in the country's power sector. The opportunities are as exciting as they are lucrative. For a country of over 100 million inhabitants that is working at quadrupling its power availability in less than a decade, the excess power to be generated anticipates a ready market for which even that additional power will be inadequate in the light of the anticipated growth in socio-economic and industrial activities.

The benefits for investors that are able to take advantage of this opportunity are already evident from the huge profits that accrue to investors in the Nigeria telecommunications sector, whose earlier privatisation has created cash cows for various companies who had the foresight to take up the investment opportunities it presented a little over a decade ago. Since power is a more essential and widespread need that telecommunication, it is expected that its higher and more widespread consumption will generate far greater income for willing investors than the telecommunications sector.

So far, various multinationals like General Electric, Siemens AG, Electrobras, Daewoo E&C, EDF/ETDE, etc., have signed MOUs with the Nigerian government to build new power plants and contribute in various ways to improving the Nigerian power sector. Also, various local and foreign investors have submitted bids for the PHCN successor companies and those whose bids were successful have paid 25 per cent of their bid values to indicate active interest in taking over the companies. Then, most of the successful
bidders have subsequently paid the full (75 percent) balance of their bid values in readiness to assume active ownership of the companies.

So far, the need to develop the power sector under the reform has necessitated huge expenditure by the Nigerian government. There are many projects to show for the expenditure. They include the NIPP thermal power stations located nationwide with a total capacity of 4775 megawatts, which have cost the government approximately US$3.8 billion. However, a total of about US$207.93 million is required to develop various small and medium hydropower projects nationwide with a total capacity of 83.25 megawatts, as shown in the following table:

<table>
<thead>
<tr>
<th>Name of State</th>
<th>State/Location</th>
<th>Capacity (MW)</th>
<th>Estimated Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oyo</td>
<td>Oyo</td>
<td>10</td>
<td>7,000,000.00</td>
</tr>
<tr>
<td>Ikere Ijebi</td>
<td>Oyo</td>
<td>6</td>
<td>13,000,000.00</td>
</tr>
<tr>
<td>Badei</td>
<td>Ondo</td>
<td>3</td>
<td>2,975,000.00</td>
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<td>Challawa</td>
<td>Kano</td>
<td>7.5</td>
<td>33,500,000.00</td>
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<td>Tiko</td>
<td>Kano</td>
<td>10</td>
<td>44,562,500.00</td>
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<td>Kogi</td>
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<tr>
<td>Oko</td>
<td>Ondo</td>
<td>0.48</td>
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<td>Zube</td>
<td>Safarawa</td>
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<td>Jibua</td>
<td>Katsina</td>
<td>4</td>
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**TOTAL**

81.25

359,936,750.00

Developing the small and medium hydropower projects requires funds from investors for construction and other purposes. Such investment will create profit-oriented opportunities for the investors for full or partial ownership of the projects, or other forms of stake-holding. The funds the investors provide will also give them a foothold in the sector.

Furthermore, the Niger Delta Power Holding Company (NDPHC), the parent company of the NIPP projects, plans to divest its holdings in the NIPP generation assets. This will create an opportunity for investors to acquire the stakes and secure a strong foothold in the Nigerian power sector. The assets comprise 39 gas turbine generators in ten power plants located at Calabar, Egbeima, Isiobu, Gbarakhi, Sapele, Omoko, Alagbali, Omorhodua, Omotosa and Geregu. Collectively the plants have a total capacity of 4775 megawatts and have cost the Nigerian government over US$3.8 billion. The number of turbines in each station and its generating capacity are listed in the following table:

<table>
<thead>
<tr>
<th>The Stations</th>
<th>Calabar</th>
<th>Egbeima</th>
<th>Isiobu</th>
<th>Gbarakhi</th>
<th>Sapele</th>
<th>Omoko</th>
<th>Alagbali</th>
<th>Omorhodua</th>
<th>Omotosa</th>
<th>Geregu</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Turbines</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td>Generation Capacity (MW)</td>
<td>561</td>
<td>338</td>
<td>461</td>
<td>225</td>
<td>451</td>
<td>225</td>
<td>961</td>
<td>836</td>
<td>411</td>
<td>434</td>
<td>4775</td>
</tr>
</tbody>
</table>
The Nigerian government has also made considerable investments towards improving the country's transmission and distribution infrastructure nationwide, so as to cope better with the increasing demand for power, the improvement in power generation, and the expansion of generation infrastructure. The investments are geared towards ensuring an all-round upgrade of the interface which transmission systems provide for generation and distribution systems in the power production value chain, and making the sector generally more attractive for privatisation.

However, the Nigerian transmission network still needs an infusion of about US$ 5 billion in the next five years. This excludes the projected cost of building the planned 765 KV Super Grid to improve the stability of the network. The projected sources for the funding include:

- International development banks
- Multilateral funding sources
- Public private partnership
- The Nigerian capital market

III

Nigeria also plans to undertake pre-feasibility and feasibility studies for remote and off-grid locations, the development of a commercial framework for the establishment and utilisation of remote and off-grid power, etc. Such facilities are potential sources of considerable mutual benefits for the Nigerian electricity customer and any interested investor, in the forms of service delivery and profitable revenues respectively. The funding for these projects is expected to come from similar sources as those for improving the transmission network.

Among the main goals of the reform is to create a sustainable, private sector-driven power sector as an alternative to what obtained before the reform/privatisation, when the sector was almost entirely a government-owned monopoly. To achieve this, investment is required from foreign and local investors, and the Nigerian government is willing to ensure that such investors profit from their investments.

Investors from all parts of the world have shown keen interest in the Nigerian power sector, thanks to the clarity of the programme set out by the Nigerian government. These include investors from Europe (such as Siemens), North America (such as General Electric), Asia (such as Daewoo E&C), and South America (such as Electrobras). Some of the investors (such as Eskom) have also come from Africa.

IV

Huge investment opportunities still exist in the Nigerian Electricity Supply Industry. Local and international
Since power is a greater necessity than telecommunication, it is apparent that the gains that will accrue to investors in the Nigerian power sector will far outweigh those from the telecommunications sector.

Investors are encouraged to take advantage of the opportunities during the on-going power reform and beyond. The Nigerian government will continue to provide a level playing ground for all investors and an environment that is conducive to the growth of their investments.

Nigeria's population of over 180 million is undoubtedly a huge market for electricity, the largest electricity customer base in Africa by numerical value. With such a population, a current forecast of power demand of 13,070 megawatts and a projection to generate 25,000 megawatts by 2020, up from the current value of about 4,000 megawatts. Nigeria is a veritable investors' haven for the profitable production and development of power.

The potentials locked in such figures have already manifested in the Nigerian telecommunications sector whose privatisation has seen local and foreign investors like Glo, MTN, Airtel and Etisalat recover their investments in and reap huge profits from the sector in very short periods of doing business in Nigeria, with impressive annual turnovers for good measure.

Since power is a greater necessity than telecommunication, it is apparent that the gains that will accrue to investors in the Nigerian power sector will far outweigh those from the telecommunications sector.

With such a fertile ground for producing power in Nigeria and huge prospects for its profitable consumption, the time to invest is now.
Chapter 8

WORK IN PROGRESS: IMAGES FROM A REFORMING NIGERIAN POWER SECTOR

This chapter illustrates, through photographs, the wide range of projects making progress under the Nigerian Power Sector Reform - most of the projects are now at the commissioning stage - in the areas of generation, transmission and distribution, with the contributions of the following agencies playing various roles in the Nigerian power sector:

<table>
<thead>
<tr>
<th>Agency</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Ministry of Power</td>
<td>Policy formulation and monitoring</td>
</tr>
<tr>
<td>Nigerian Electricity Regulatory Commission (NERC)</td>
<td>Issuance of licences to operators in the sector and regulation of their activities</td>
</tr>
<tr>
<td>Transmission Company of Nigeria (TCN)</td>
<td>Management of the national grid</td>
</tr>
<tr>
<td>Nigerian Bulk Electricity Trading (NBET) Plc</td>
<td>Formulation and execution of Power Purchase Agreements (PPAs)</td>
</tr>
<tr>
<td>Gas Aggregation Company of Nigeria (GACN)</td>
<td>Allocation of gas for domestic use</td>
</tr>
<tr>
<td>Nigerian Gas Company (NGC)</td>
<td>Management of gas infrastructure and gas transportation</td>
</tr>
<tr>
<td>Rural Electrification Agency (REA)</td>
<td>Management of remote and off-grid power projects</td>
</tr>
</tbody>
</table>
Installation of new equipment at Omotosho power plant

A construction site at the switch yard of Kaduna power plant
A rehabilitated turbine (Unit 3) at Sepele power station

A site view of Calabar NIPP plant
Minister of Power, Prof. Chinadu Nebo (2nd from left), leading an inspection tour at Olorunsogo power plant

Rehabilitation work on 1G5 and 1G12 units at Kainji hydro power station
Side view of the Gas Turbine Hall under construction at Omoku NIPP power plant.

Geregu power plant awaiting commissioning.
A view of a 330KV transmission station switch yard in Lagos

A view of Egbeima NIPP power station
Construction stage of the switch yard at Gbarain NIPP power plant.

A construction site in the transmission wing of Kaduna power plant.
A transmission line tower of the new LOT 15 Gwagwalada 330KV substation and Gwagwalada-Eastmain-Apo 330KV-132KV transmission lines

A construction site view of Kashimbia Dam
A view of Kanji Dam

A turbine at the Geometric independent power plant at Osisioma