# ILLUMINATE NIGERIA PROJECT

AN EMERGENCY SOLUTION TO THE NATION'S POWER PROBLEMS

# Introduction

NIGERIA - The Giant of Africa and home to some 170 million people of differing ilk and creed - is on the threshold of history.

On March 28, 2015, the Nigerian electorate voted massively to elect the duo of General Muhammadu Buhari (GCFR) and Professor Yemi Osinbajo (SAN) to power the reins of government for the next four years.

For the populace, it is a new dawn and their expectations from the freshly minted government are beyond compare.

Whatever could have been the development strides attained or recorded by the government of Former President Jonathan, it is obvious to all that the Nigerian

nation needs to significantly reduce unemployment, tackle insecurity, solve the seemingly intractable electricity problems, revamp education, fix the parlous economy, offset outstanding salaries to workers (both at the federal and state levels), guarantee free flow and steady supply of petroleum products, address the domestic and international debt burden of more than US$60 billion to mention a few.

Given the scenario enunciated above, the new government is expected by all and sundry to hit the ground running in its bid to fulfill its campaign promises (and mandate) to the teeming masses who bought into the change mantra unfettered; and in which they believe will give birth to a new Nigeria - one of their age-long dream.

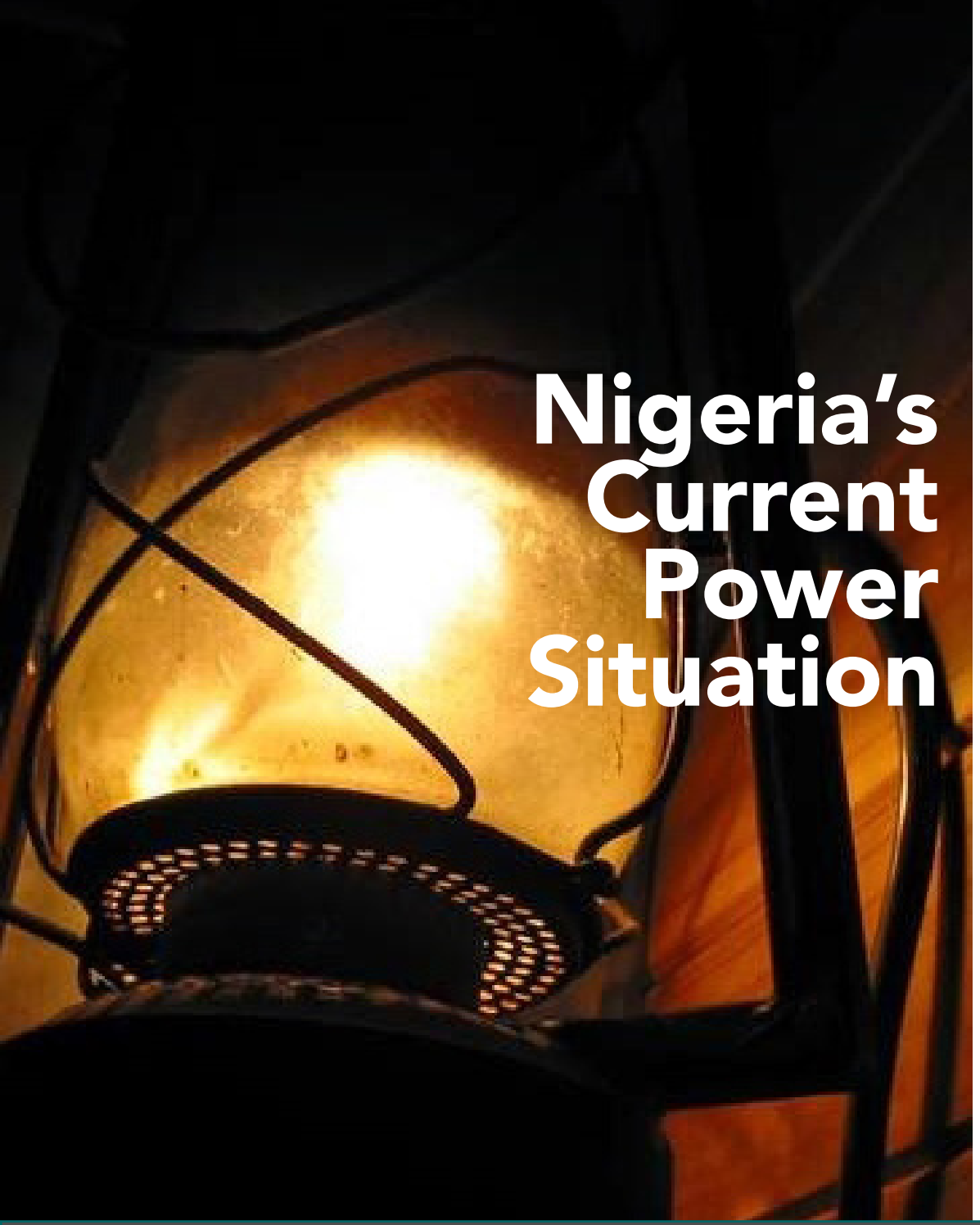
In so much that a lot of work needs to be done to get Nigeria properly afoot, one area that most agree should engage the attention of the new government and quickly to boot is the need to largely improve, the nation's electricity provision for the use of the citizenry. Steady power supply has the inherent capacity to galvanize the economy in a variety of ways apart from improving the quality of lives of the nation's inhabitants.

For Beligetto, the paucity of electrical power in Africa's biggest economy has always been a source of fascination. This has led the company into conducting an exhaustive study into unearthing the myriad problems militating against the

government's desire to providing constant power over the years with a bid to fashioning a solution that can be deployed in the very short term for a nation, in a hurry and hungry for development.

Speaking at a Townhall meeting in Ikorodu, Lagos State, in February of this year on behalf of the Buhari/Osinbajo joint ticket for the 2015 Presidential Election, the Vice-President, Professor Yemi Osinbajo reiterated thus "*…our focus is also going to be on power to help our economy to grow. Ikeja, which is the capital of Lagos state is consuming 40% of the power generated alone. We are going to decentralize power plants all over the country. If we do that there will be no need for all the power going to the grid which requires gas …*"

In effect, all are on board on the need for an emergency intervention in Nigeria's power sector.



# Nigeria's Current Power Situation

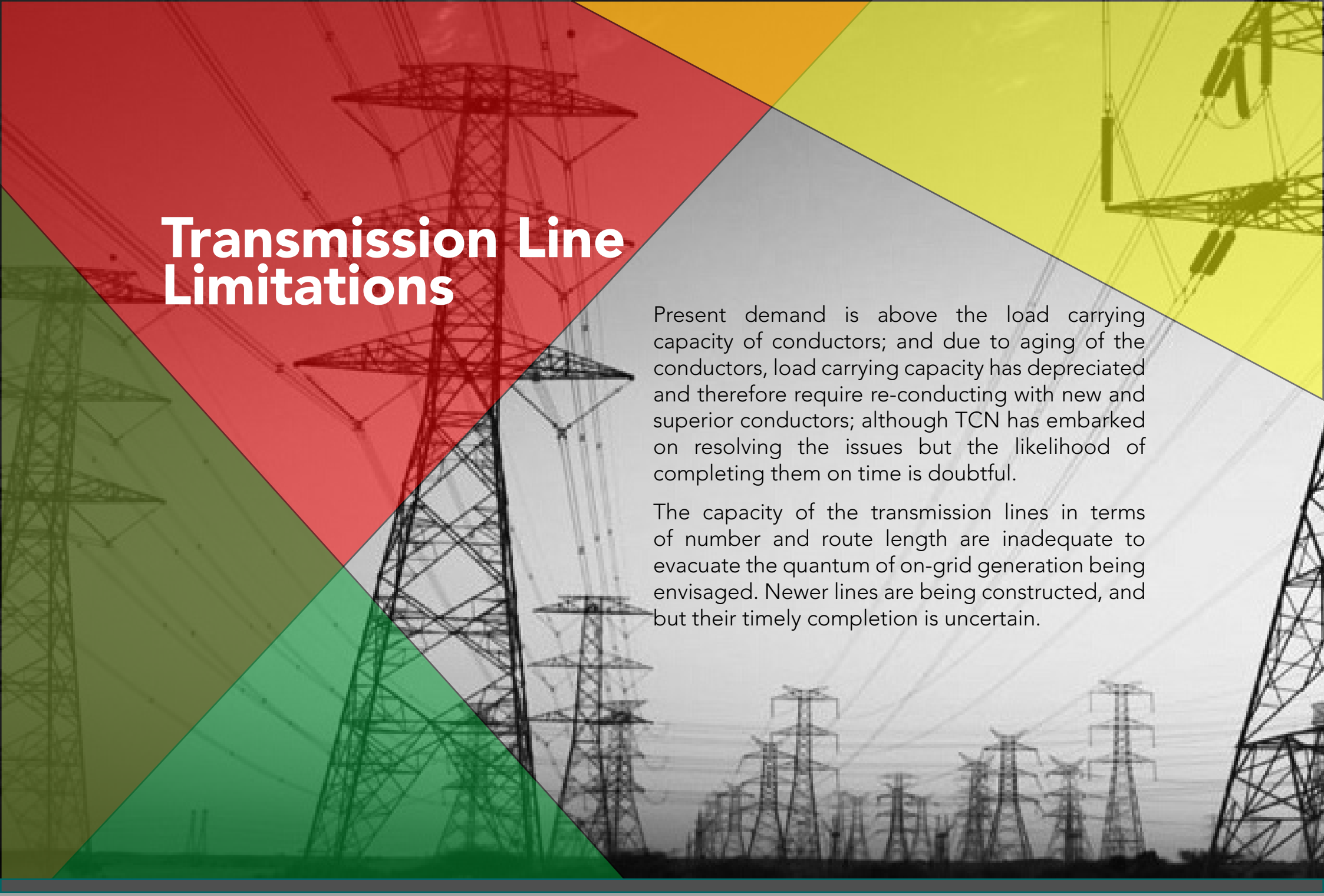
Former President Goodluck Jonathan (GCFR), in a bid to tackle the nations power problems head- on, instituted the Presidential Task Force On Power (PTFP) and charged the members to take a holistic view of the power sector and come out with workable solutions that would ensure that the Nigerian citizenry gets to enjoy improved power in the short to the medium term; while also in the main, planning for the longer term.

The PTFP fashioned a salutary Reform Package for the power sector which is being implemented. To go further, the Reform Package gave timeline(s) in getting the power infrastructure repaired or erected (as the case warrants). In truth, some efforts have been channeled into the power sector but some bottlenecks still exist in the generation, transmission and distribution sub-sectors that stand as impediments to full implementation of the reform package and its attendant timeline(s) for achievements.

# Generation Limitations

Natural gas supply to thermal power plants supplying about 70% of electricity in Nigeria has been the Achilles heel of the power sector and the fundamental problems include inadequate production and supply, enforcing domestic supply obligations, lack of requisite regulatory regime for gas transportation in line with that of electricity and vandalization of pipelines.

A major bottleneck to be singled out is the inadequate gas supply to the western axis. The Nigerian National Petroleum Corporation (NNPC) has said that it was making significant progress with the execution of the East-West gas pipeline tagged as "Obiafu-Obrikom and Oben (OB3) gas pipeline project". NNPC expects to start regular supply of gas to end users within the eastern part of Nigeria through its East-West gas pipeline in early 2017. Going by their past records, this deadline is not feasible!



# Transmission Line Limitations

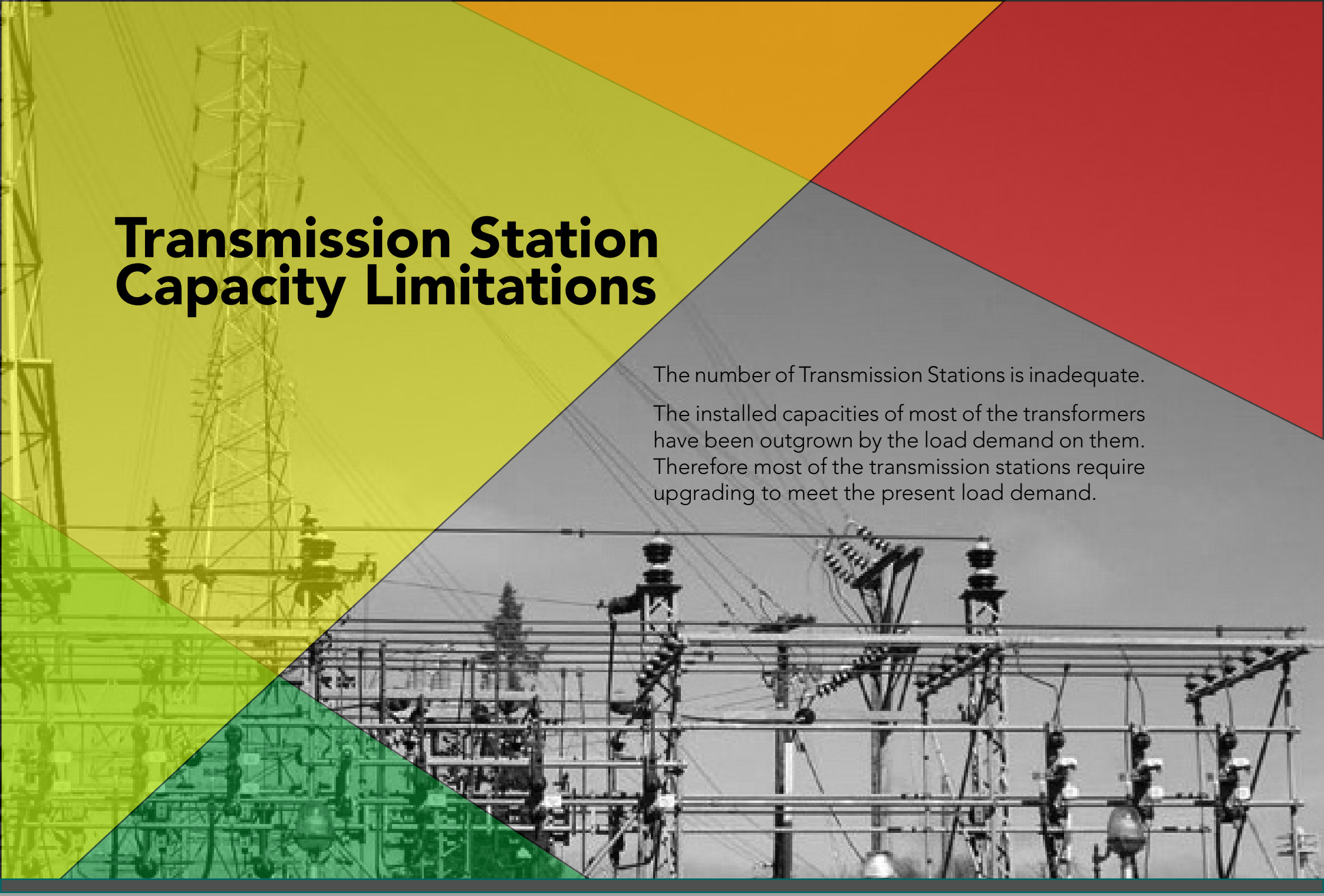
Present demand is above the load carrying capacity of conductors; and due to aging of the conductors, load carrying capacity has depreciated and therefore require re-conducting with new and superior conductors; although TCN has embarked on resolving the issues but the likelihood of completing them on time is doubtful.

The capacity of the transmission lines in terms of number and route length are inadequate to evacuate the quantum of on-grid generation being envisaged. Newer lines are being constructed, and but their timely completion is uncertain.

# Transmission Station Capacity Limitations

The number of Transmission Stations is inadequate.

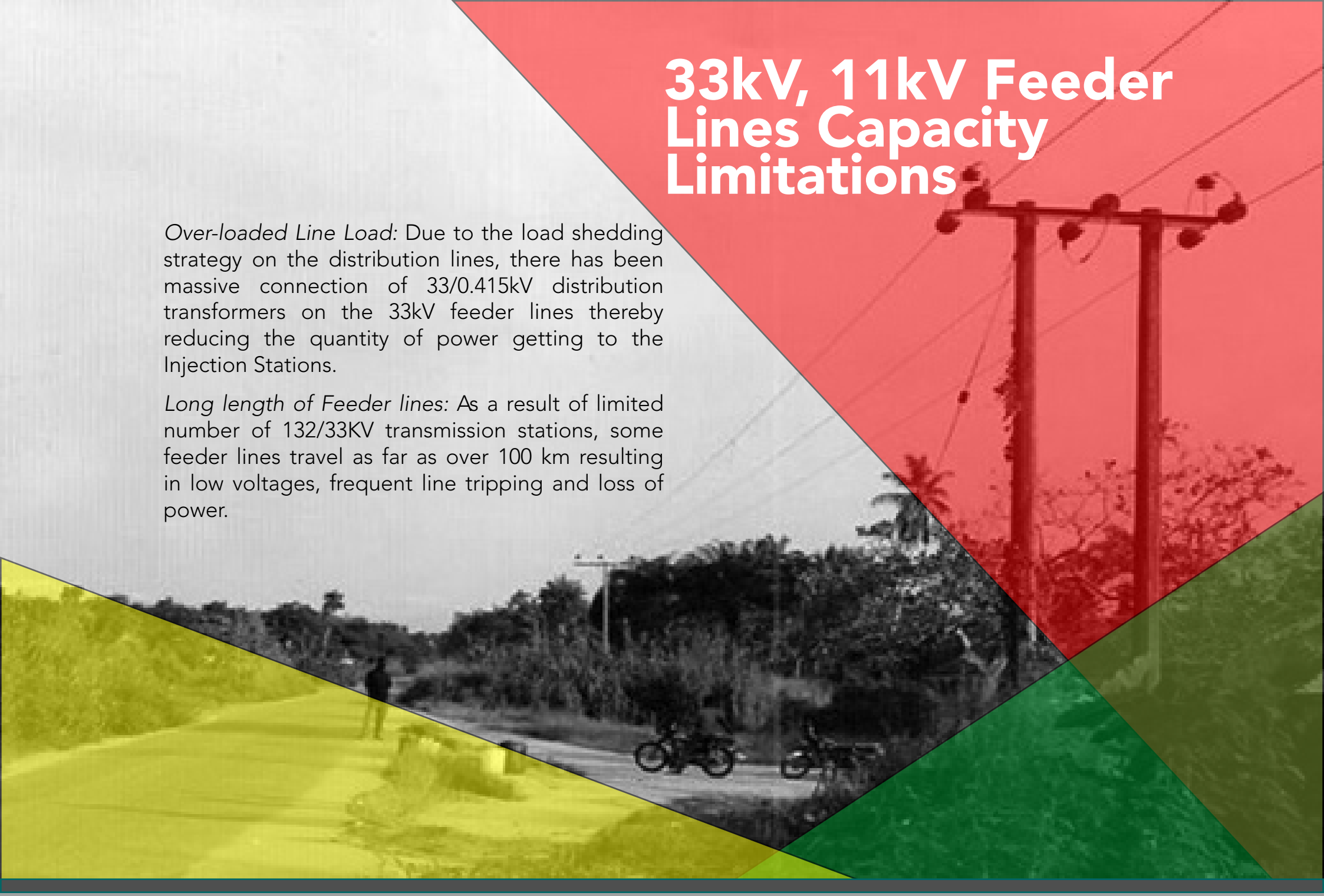
The installed capacities of most of the transformers have been outgrown by the load demand on them. Therefore most of the transmission stations require upgrading to meet the present load demand.



# 33kV, 11kV Feeder Lines Capacity Limitations

*Over-loaded Line Load:* Due to the load shedding strategy on the distribution lines, there has been massive connection of 33/0.415kV distribution transformers on the 33kV feeder lines thereby reducing the quantity of power getting to the Injection Stations.

*Long length of Feeder lines:* As a result of limited number of 132/33KV transmission stations, some feeder lines travel as far as over 100 km resulting in low voltages, frequent line tripping and loss of power.



# Injection Station Capacity Limitations

Statistics have shown that most of the Injection Stations in the country are hooked up to loads far above their installed capacities. This is the reason for rotating feeder connection thus resulting in load shedding. For example a certain injection station with an installed capacity of 15MVA (12MW) may be feeding an area of load demand of 50MW.

Most of the injection stations are off the grid more than 50% of the time due to frequent tripping of the 33KV feeder line.

# About the INP

(Illuminating Nigeria Project)

It is in filling the gaps created by the identified bottlenecks, that we have conceived a win – win emergency solution to the nation's power paucity.

The INP is hinged on providing up to 3600MW renewable energy through embedded generation for all the states utilizing our hybrid solar generator, a unique renewable energy power generating system for Utility Grade Power Plants, Micro-Grid, Commercial, Industrial & Residential power needs.

At Beligetto Energy Systems LLC, our conviction is that Nigeria needs to deploy modular plants all over the nation and our belief ties succinctly with the views expressed by the Vice-President. We developed a concept christened Illuminate Nigeria Project (INP) a short while back and we unequivocally recommend its addition into the nation's power system. INP is one carefully conceived and tailored towards ensuring that the new government delivers quickly on a key promise; a significant improvement in power supply in the very short term.

# A Case for EMBEDDED GENERATION

Embedded generation is the term used for any electricity generating plant that is connected to the regional electricity distribution networks. These networks are owned and operated by the Electricity Distribution Companies (DISCOs). Beligetto Energy Systems LLC will work with the DISCOs in ensuring that the locations of the embedded generating plants are best suited and geared towards creating the desired impact speedily.

Embedded generation plant has the potential to reduce overall costs to the consumer by providing a more efficient electricity system that generates and delivers power close to the point of use. A contributory factor to this is the fact that embedded plant generally has lower capital costs and can be sized to match a particular level of demand. However, in the short to medium term, the national grid will remain a key component in the overall electricity distribution system in the country. Adapting the grid to operate alongside significant quantities of embedded generation will be an important issue in delivering any long-term cost reductions.

The Nigerian electricity market forces at present favour, modular power technologies that can be installed quickly and connected to the distribution grid in response to market dictates. Embedded generation strategically applies relatively small generating units (typically less than 25 MW) at or near consumer sites to support economic operation of the existing power distribution grid.


Harnessing the
Power of the Sun

# The Revolutionary Hybrid Solar Power Generator

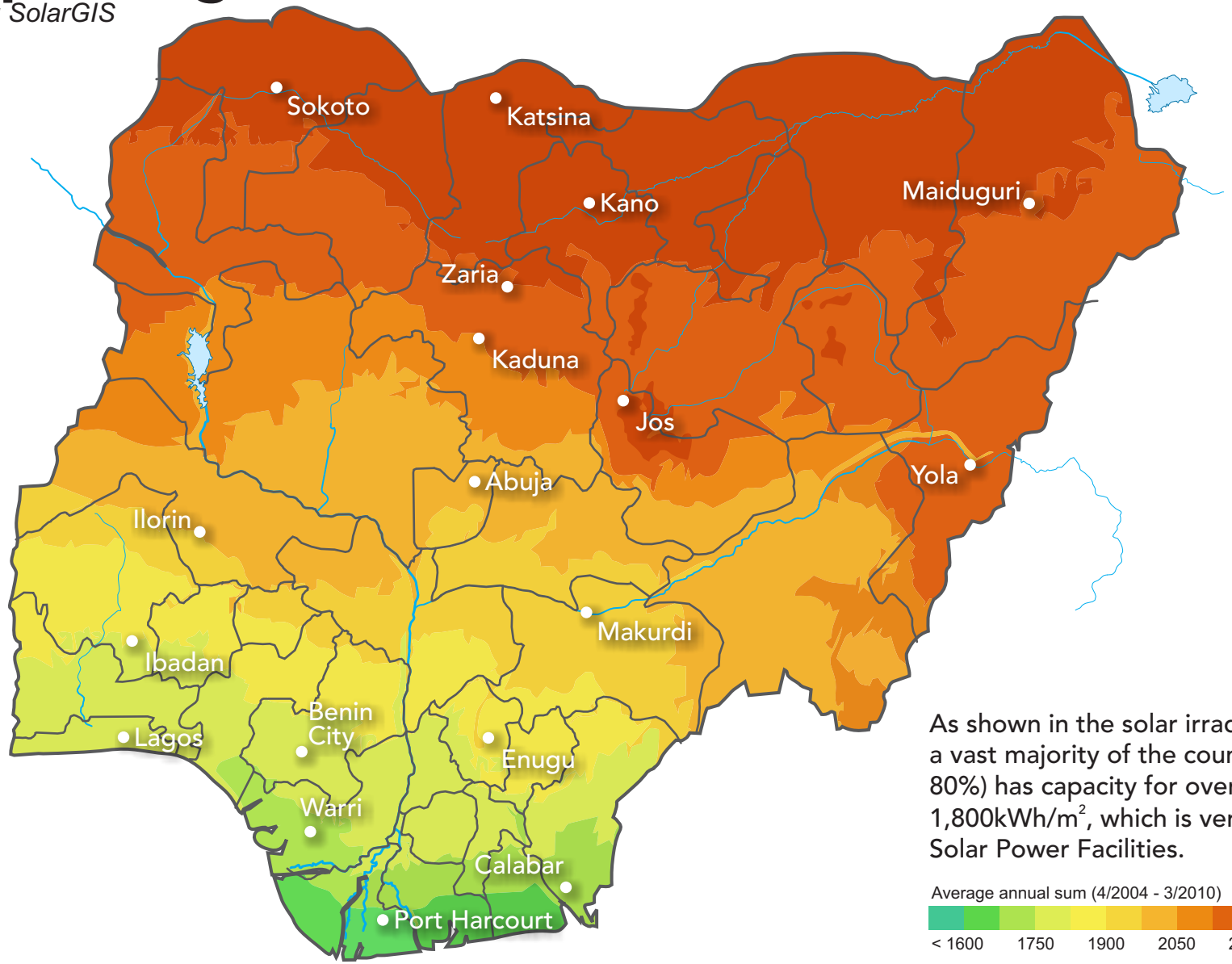
Our Hybrid Solar Power Generator is a unique renewable energy power generating system that provide better efficiency and return-on-investment. They use a fraction of the land of traditional PV-solar systems and can be rapidly deployed all over the country in a matter of a few months.

## 100% Clean Green Renewable Energy

- No Fuel of Any Kind Required.
- Zero Emissions.
- No Pollution.
- 24x7x365 Reliable Baseline Power.
- Quiet Power Production, no noise pollution
- More efficient than a comparable sized Solar PV Panel system:
  - Land requirements are less than 1% of a Solar Panel farm.
  - Produces 6x the power output of a solar plant per 24 hour

# Horizontal Irradiation Map of Nigeria

*Source: SolarGIS*



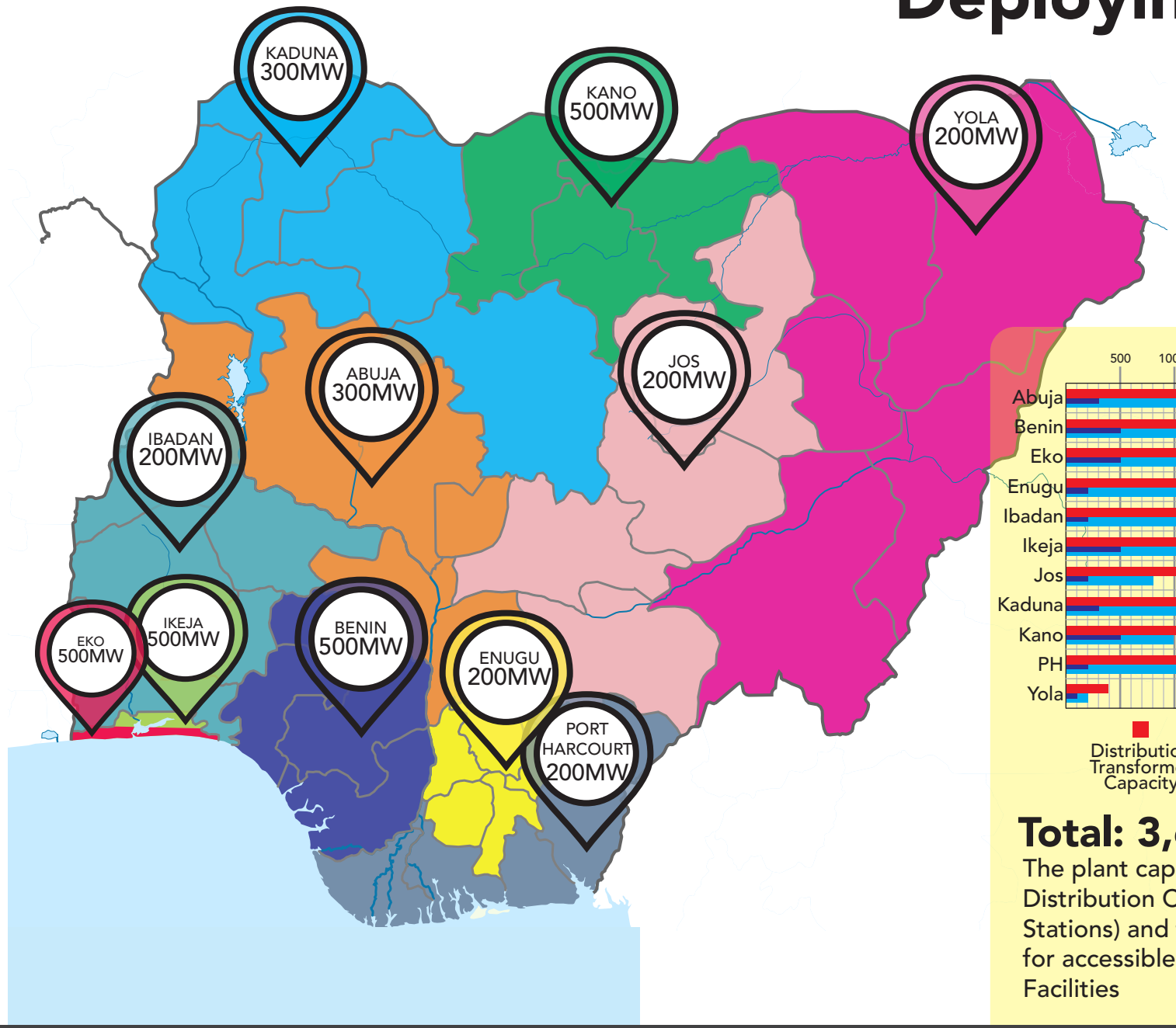

As shown in the solar irradiation map, a vast majority of the country (over 80%) has capacity for over 1,800kWh/$m^2$, which is very good for Solar Power Facilities.

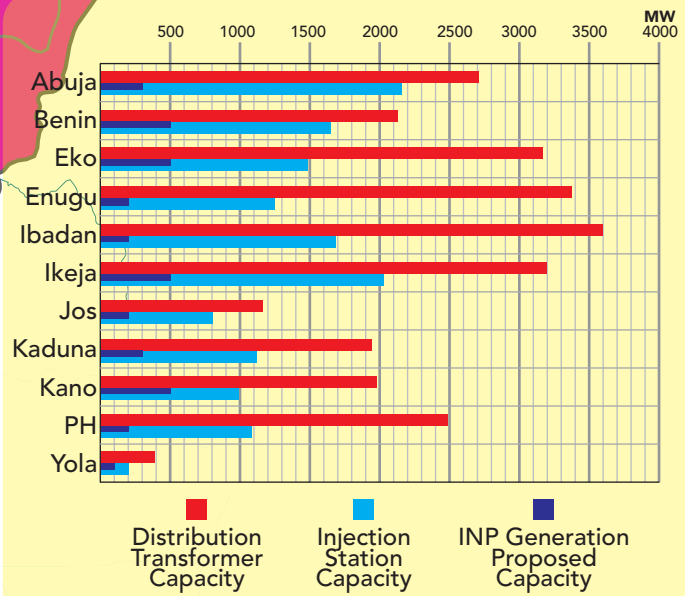
# Deploying the INP
## ANALYSIS

| Distribution Company | *Capacities as at Feb 2012* | | *Estimated 2015 Capacities* | |
|---|---|---|---|---|
| | **Distribution Transformer Capacity (MW)** | **Injection Station Capacity (MW)** | **Distribution Transformer Capacity (MW)** | **Injection Station Capacity (MW)** |
| Abuja | 2,081.00 | 1,660.00 | 2,705.30 | 2,158.00 |
| Benin | 1,637.00 | 1,266.00 | 2,128.10 | 1,645.80 |
| Eko | 2,434.00 | 1,137.00 | 3,164.20 | 1,478.10 |
| Enugu | 2,592.00 | 958.00 | 3,369.60 | 1,245.40 |
| Ibadan | 2,770.00 | 1,296.00 | 3,601.00 | 1,684.80 |
| Ikeja | 2,456.00 | 1,556.00 | 3,192.80 | 2,022.80 |
| Jos | 894.00 | 614.00 | 1,162.20 | 798.20 |
| Kaduna | 1,491.00 | 862.00 | 1,938.30 | 1,120.60 |
| Kano | 1,518.00 | 757.00 | 1,973.40 | 984.10 |
| PH | 1,914.00 | 835.00 | 2,488.20 | 1,085.50 |
| Yola[1] | 297.00 | 160.00 | 628.00 | 337.00 |
| **Total** | **20,084.00** | **11,101.00** | **26,351.10** | **14,560.30** |

* Sourced from presentations delivered at the Uyo Power Summit, February 24 -25, 2012
* 2015 capacities estimated based on a 30% increase in distribution facilities across all Distribution Companies (except Yola Distribution Company)
  [1] The 2015 figures for Yola Distribution Company are not estimates but as obtained from their website
* Distribution Transformer and Injection Station capacities shown above (usually quoted in MVA) are in MW for ease of understanding

# Deploying the INP
## CHARTS




**Total: 3,600MW**

The plant capacities were deduced from Distribution Capacities (at Injection Stations) and the perceived requirement for accessible Industrial & Commercial Facilities


# The Economic Approach

Due to the nature of the project, the Fair Market Value (FMV) tariff for the electricity generated will compare favorably to the ones as established by the Nigerian Electricity Regulatory Commission (NERC).

In effect, the INP target market of eligible customers will include (but not limited to) industrial and commercial consumers, banks, residential estates and Government facilities who will be expected to execute a tripartite Power Purchase Agreement (PPA) with the Discos.

## PPA Strategy

**Contract Strategy:**

As the Embedded Power Generator, our strategy is to connect to the Distribution Licensee's facility in order to supply generated power to the Eligible Customer under a tripartite agreement.

**Payment Strategy:**

The PPA terms will make room for guaranty of payment by the Distribution Licensee for power metered and delivered to the Distribution Licensee grid. Otherwise, payment made by eligible customers shall be made directly to the bank accounts of the Embedded Power Generator.

The Federal Government shall ensure the legislation of the arrangement as it may apply to the NERC procurement guidelines and codes.

# The Market Focus

Beligetto focuses at meeting customer needs in the following market segments:

**Utility Installation (Distribution Grids):** Our Hybrid generators can be stacked and housed in substations at or near locations where energy is needed. These facilities can range from as little as 1MW to 100+MW. The limited footprint, 24/7/365, 100% renewable energy is unlike any other renewable energy technology. Direct delivery of energy limits the additional infrastructure needed to quickly and efficiently supplement existing grid energy or develop new utility facilities. The systems are ready fit for embedded generation licensing.

**Industrial & Commercial Installations:** Public and private industrial and commercial facilities ranging from 5kW to 100+MW. Systems are custom designed to maximize available space and provide sustainable 24/7/365 electrical output utilizing the Hybrid Generator Solution. Applications include industrial estates, office buildings, water treatment facilities, cell phone towers, etc.

**Community Energy (Residential Estates):** Neighborhood and residential community substations allow individual homeowners, business owners and public officials to elect to purchase electricity from renewable sources. A direct alternative to individual solar systems developed and built on a single dwelling or home or commercial structure. Applications include residential estates, recreational parks, bank facilities, hotels, supermarkets, etc.

# About Beligetto

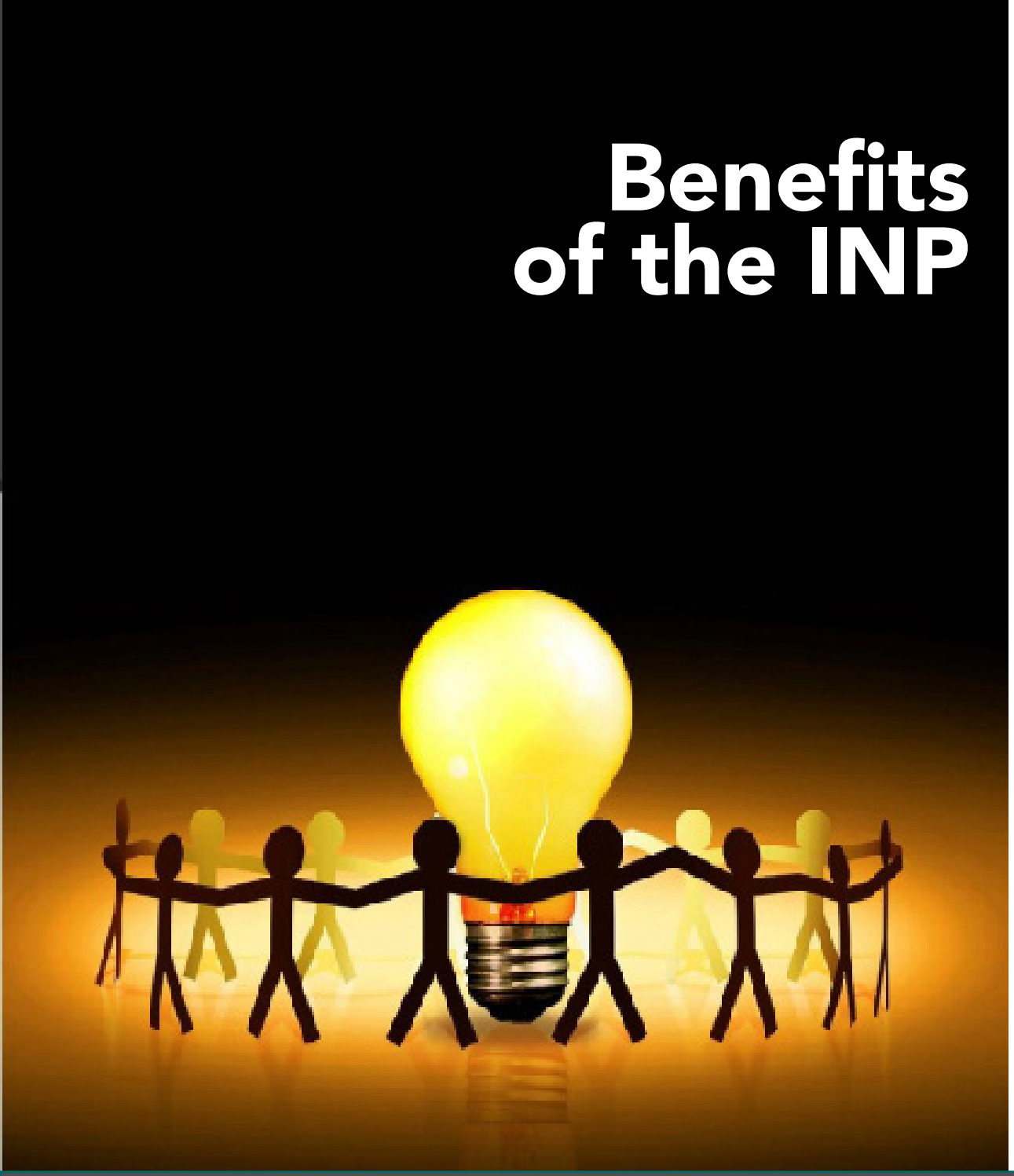
The Beligetto Group is an international, yet fully integrated, conglomeration of corporate entities, operating out of the United States, Europe, Africa and The Middle East.

We are currently in advanced stages of developing Public-Private Partnerships with several government departments across Africa, for investments across various commercial, industrial, technological and financial sectors, with a strong focus on key emerging economies of Nigeria, Ghana, Cameroon, Ivory Coast and Guinea (Conakry), and strategic plans to incorporate others in the short-to-medium term.

The Executive and Advisory Board of Beligetto are drawn from a diverse array of professional, technical, industrial and financial backgrounds, including but not limited to investment Bankers, Economists, Scientists, Engineers, Architects, and Experts in Oil & Gas, Technology, Agro-Economy, Science and Research.

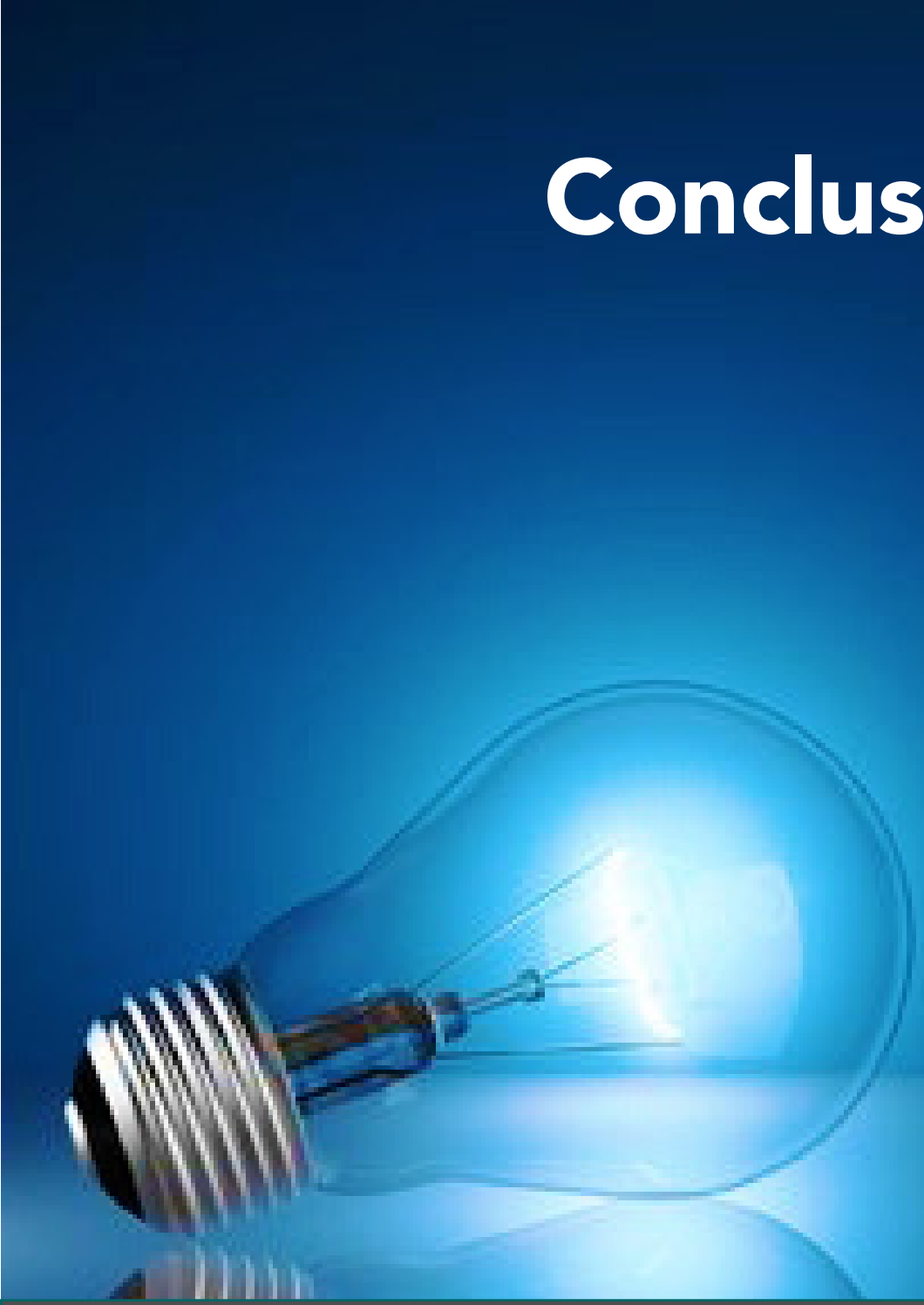
With access to the capital markets of New York, London and Zurich, the Beligetto team brings to every undertaking, a keen sense of purpose, propelled by the uncanny ability to deliver on-time projects backed by adequate financial muscle via the Africa Investment Fund (AIF).

# Benefits of the INP



- INP – living up to its name; Illuminating Nigeria. The quantum effects and spin off of businesses that would spring up on the provision of steady power in major Nigeria cities can only be left to imagination.
- The INP will provide direct employment for over ten thousand (10,000) Nigerians who will be engaged in the erection, operation and maintenance of over two hundred and thirty installations dotting all the states of Nigeria.
- The Nigerian economy will receive a boost and more taxes will accrue to the Government(s) from various businesses (hitherto, near comatose due to spiking energy costs) now rejuvenated.
- The INP guarantees uninterrupted power when the big plants go off for whatever reason.
- The quality of life of the citizenry is further enhanced and the Federal Government would be seen as delivering on one of its core mandates.

# Conclusion



It is expected that these plants will be up and running from six months of executing the various PPA and allocation of the land and issuance of all necessary permits and licenses. A robust plan of project execution will be submitted and followed up with the necessary arms of government. It is our pleasure to have Mr. President observe first hand, the workability/practicality of The INP in solving power situation in some identified Nigeria's cities in the very short term.

The INP on execution, becomes not only the ray of light and hope to the teeming Nigerian populace; it also highlights the "can do" spirit, evident in the average Nigerian of being able to re-invent and commit him/herself unto a path of purposeful attitudinal change and overall developmental processes.