

The Problems of Low Liquidity in the Nigerian Electricity Industry

ENGR. UZOMA D. ACHINANYA
EMTECH ENERGY SERVICES LTD



Outline

Liquidity Defined

Stakeholder Roles in the Low Liquidity Problem of the NEM

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Addressing the Liquidity Problem

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Liquidity Defined

Liquidity of the electricity market is the market's ability to invest in itself from its own internally generated resources or its ability to borrow for investments in itself.

A liquid market has the ability to generate enough revenue to support investments or support borrowing from any financial institution.

Market liquidity is self-sustaining and can also improve on its own without any external support.

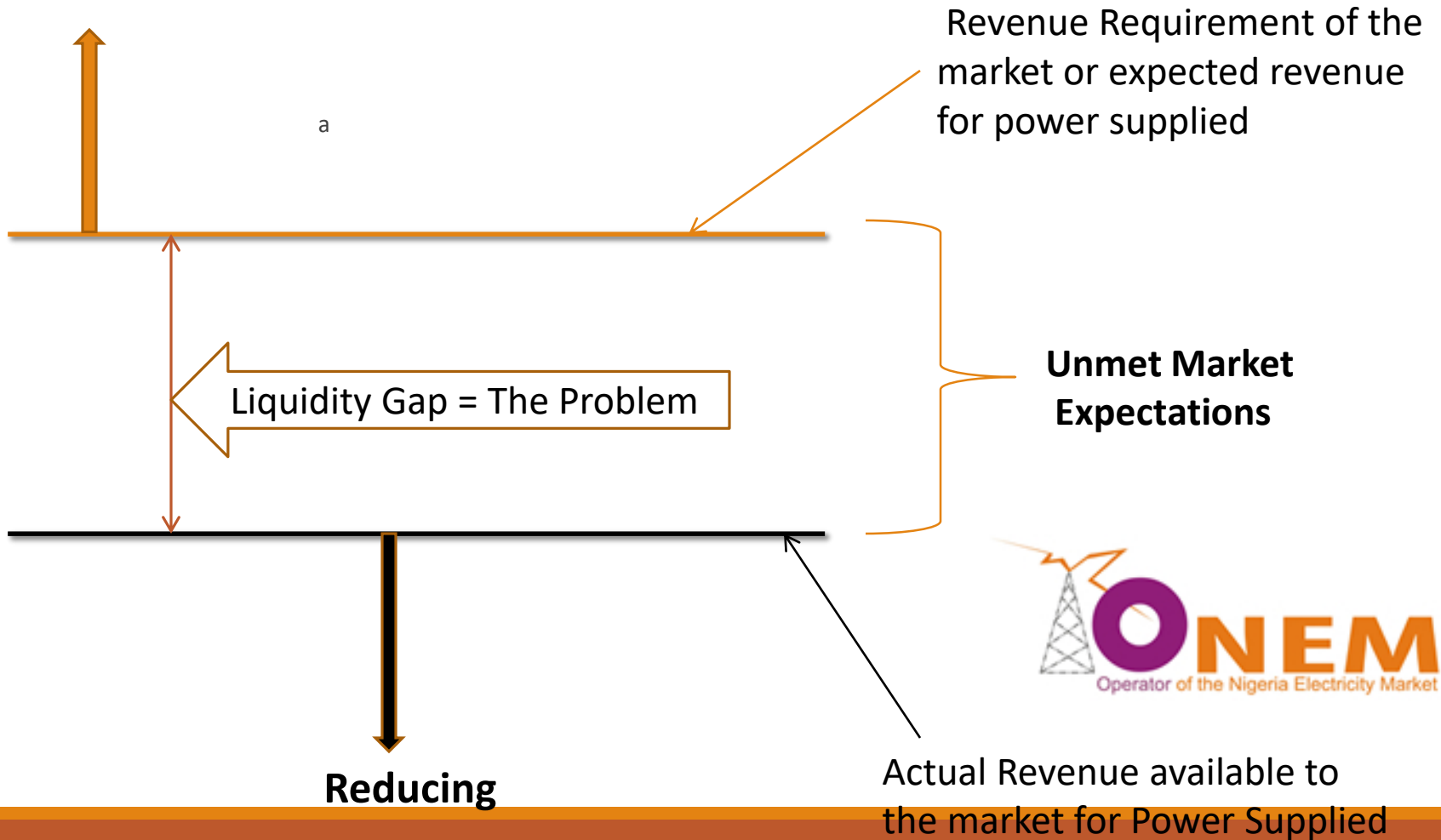
Also, the problem of low liquidity can be self-sustaining, in which case individual market participants may have little incentive or capacity to address it.

An electricity market is said to have attained a Low-Liquidity Equilibrium (LLE) when it is obvious that liquidity cannot improve from its own internal resources.



The NEM Liquidity Problem

Increasing



Stakeholder Roles Towards the Low Liquidity Problem of the NEM

Policy perspective

Regulatory Perspective

Perspective of the Market Structure

Operational perspective



Policy: Irregular Power Sector Reform

Most successful Power sector reform programmes normally go through stages in the process of implementation.

The sequence recommended for Nigeria:

- Restructuring the electric power supply chain, developing and introducing the Rules to enable the introduction of competition
- Obliging the emerging electricity enterprises to operate according to commercial principles
- Developing an economic regulation of the power market that is applied transparently by an Agency that operates autonomously
- Developing a power market that is enduring and operates efficiently
- Entry of private capital into the market, at all levels of the supply chain.
- Privatization of the unbundled generation and distribution entities under dispersed ownership
- Development of competition in generation and supply segments.



Policy: Irregular Power Sector Reform (Cont'd)

Each stage takes years to conclude before entry into the next stage.
Reform is not an event, but a process

Nigeria omitted critical stages in the programme and rushed to the high-end privatization (ownership transfer)

Again, people were made to understand that privatization only means assets sales, thereby omitting the stage of letting private capital into the market, to help improve operations, with out ownership transfer.

The emerging electricity enterprises were not allowed to operate according to commercial principles (to establish a reference) before they were sold.



Policy: Irregular Power Sector Reform (Cont'd)

In the privatization programmes of most developing countries, revenue collection and payment mechanisms are usually secured before the market is saddled with huge PPA bills.

Viability of the Discos and their abilities to settle wholesale market invoices, should be reasonably guaranteed before privately developed power plants are allowed to dominate the market.

In the Nigerian programme, the reverse is the case. The market was first populated with an army of IPPs, by converting all the government power plants into independent power plants, before trying to improve the viability of the Discos.

These efficiently produced PPA invoices are expected to be settled by a market with undeveloped and inefficient revenue collection and payment systems.

This is an error that has contributed to the current liquidity problem of the NEM

Policy: Power generation levels

A key factor in the power sector liquidity equation is the price of electricity.

Factored into the price calculation is the volume of energy to be generated, transmitted and distributed during the price period.

Any deviation from this projected level in the actual volume of energy generated and supplied during the period, will affect the ability of the Discos to generate the projected revenue required by the industry (all things being equal).

If the level of generation is lower, the ability to make the required revenue will be lower, if generation is higher, the ability to the make the required revenue will equally be higher.



Policy: Power generation Levels (Cont'd)

Generation mix for the Nigerian electricity market is 20:80 for Hydro: Gas plants. It follows that generation capacity in Nigeria is essentially gas driven.

Therefore, any of the many issues on gas supply in Nigeria directly affects the capacity of power generation into the grid. This is mainly responsible for the inability of the market to achieve the generation capacity projections in the MYTO design.

What the consumers need for their loads is the energy and not the generation capacity. In reality therefore, the generation capacity may be less than the MYTO design projections, but the actual energy delivered to the Discos may not be correspondingly less.

The electrical energy associated to the generation capacity is dependent on the simultaneous availability of the generating plants, the transmission network and the distribution network, while the revenues associated to the energy depends on the loss levels in the system.



Policy: Power generation Levels (Cont'd)

The projected generation capacity for the 2015 MYTO design is 4,500MW, but the actual average capacity achieved is about 3,500MW. This shows a 30% deficit from the projection.

Projected energy for delivery to the Discos between Feb. and Dec. 2015 is 27,664 GWh. Actual energy delivered during the period is 23,947 GWh (ie 14% deficit from projection)

The expected revenue for the actual energy received between Feb. and Dec. 2015 is N353.099bn but actual revenue collected for the same energy is N237.355bn (ie a 33% deficit)

The expected revenue at the MYTO projected energy (ie the industry's required revenue for the period) is N407.903bn, but the calculated revenue collection by the Discos at the prevailing collection efficiency and tariffs is N274.195bn (ie 33% deficit).

This shows that if the MYTO projected energy was delivered to the Discos, the market would still have suffered a revenue deficit of about N133.708bn in the eleven months

If the market had operated at the required efficiency with the energy received, the deviation from the revenue requirement of the market would have been N54.00bn



Policy: Power Generation Levels (Cont'd)

Other observations made during preparation for this workshop:

- As energy received increased, losses increased and average performance decreased.
- Revenue remittances to the stakeholders did not follow any market pattern

These compounded the liquidity problem of the market

Conclusion from 2015 data is that the performance contributed more to the sector liquidity challenge than the problem of inadequate power generation.



Other Policy Issues

Inflation (economic policy)

Exchange rate fluctuations

Escalating Gas prices (denomination in USD)

The generation capacity, inflation and exchange rates, and the gas price are all independent variables in the tariff equation.

Actual revenue depends on the volume of System Losses overcome by the Discos



Regulatory: Electricity pricing and wrong assumptions in the retail tariff model

The retail tariffs were obtained from models based on some basic assumptions. Some of the variables, whose values were assumed in the tariff calculations include,

- generation capacity and system availability,
- exchange and inflation rates,
- ATC&C loss level and loss reduction trajectory,
- Customer population and mix
- Gas price
- Rate of inflation



Regulatory: Electricity pricing and wrong assumptions in the tariff model (Cont'd)

Some of the variables are within the control of the operators, while others are outside their control.

- ATC&C loss levels, and loss reduction trajectory, customer population, as well as the system availability are within the control of the operators,
- the issue of gas prices, exchange and inflation rates are outside their control.

The assumed numbers for most of the variables were correct when the tariffs were determined. These have changed significantly with time. As at 2016, most of the variables, including the ones under the control of the operators had turned wrong

Therefore, the tariffs designed out of these variables are no longer tenable, and cannot support the recovery of the current industry revenue requirement.

This is a major contributor to the current liquidity problem of the industry



Regulatory: Delayed declaration of the Transitional Electricity Market Stage (Cont'd)

Another regulatory issue that significantly affected the sector liquidity is the delayed implementation of TEM.

The Nigerian electricity market was designed to develop in four stages with increasing competition and reducing monopoly.

The first stage, the pre-transitional stage, represents the full monopoly stage where the government is the owner and manager of the Utility from generation to customer service.

The second stage is the Transitional stage with an improved competition, where all the trading is governed by contracts and the market is operated on Rules.

TEM, apart from the operationalization of Contracts and the Rules, is expected to operate on commercial principles, improve collection efficiency and attract investments in power generation, transmission and distribution, for market development



Regulatory: Delayed declaration of the Transitional Electricity Market Stage (Cont'd)

TEM is a period for testing the adequacy of the Rules and the Contracts. These should be established before Privatization

In Nov. 2013, the generation and distribution assets were privatized, without testing the Rules and the Contracts. Commercial efficiency of the market was still low and could not support payment of wholesale invoices.

In February 2015, NERC advised the Minister of Power to declare TEM. As at today, the market is contract based, but the Contract Agreements are not kept and there are no sanctions for default.

The original plan was to declare TEM long before privatization

This reversal of events contributes to the liquidity problem of today



Regulatory: Untested Market Design

Electricity Market is defined in terms of its design, characterized by the Market Structure, Market Architecture and the Market Rules.

The Market Structure refers to the properties of the market tied to technology and ownership, numbers, sizes of firms and the cost structure.

Poor market structure poses the greatest threat to the health of power markets, as the structure of the market has a decisive impact on the cost of power.



Regulatory: Untested Market Design(Cont'd)

Electricity Markets are extremely complex and prone to problems.

Every market design should therefore undergo at least a minimal testing before use.

It is recommended that no design should be implemented without this minimal level of testing, which is called “bottom-line test”, because it tests the effect of market design on the total cost of supply

Unfortunately, the design of the Nig. Electricity Market was not tested before it was implemented.

The consequence is high and increasing wholesale market invoices, backed by contracts, and low and reducing revenue collection at the retail market, resulting in wide and ever increasing liquidity gap and ultimately in the inability of the market to pay for power generation and market services.



Regulatory: Inadequate Trading Arrangement

The liquidity problem of the Nigerian electricity industry became more pronounced since TEM was declared in February 2015.

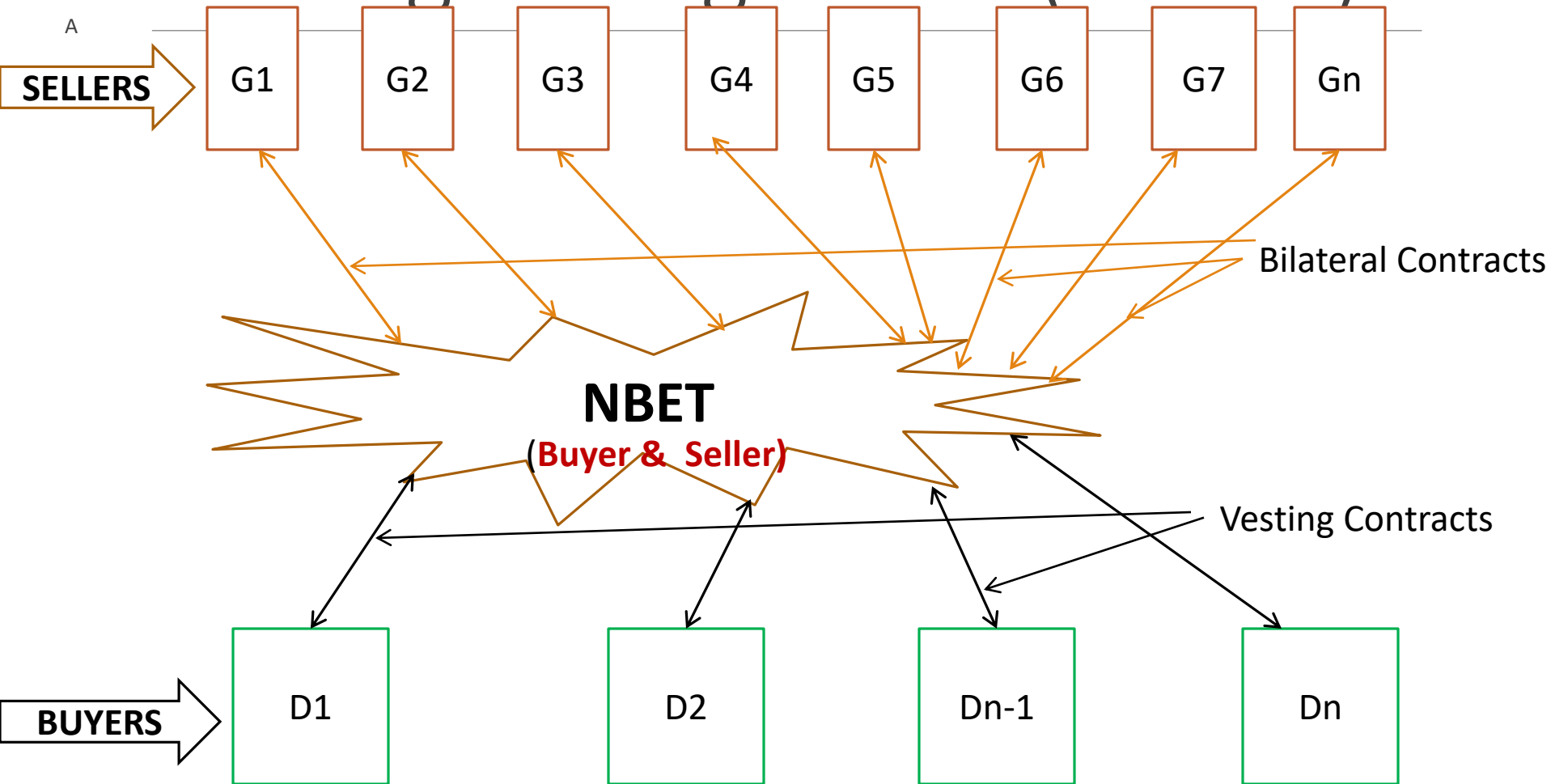
The TEM is the stage when all transactions are governed by contracts and Rules

There are two types of contracts in the Trading Arrangement for NEM.

- Bilateral Contracts
- Vesting Contracts



Regulatory: inadequate Trading Arrangement (Cont'd)



Regulatory: inadequate Trading Arrangement (Cont'd)

NBET purchases power from the generator participants with Bilateral Contracts, but sells to the load participants with Vesting Contracts, in the same market

With TEM, the Gencos were promised 100% invoice payment by NBET, as part of the BCA.

It is therefore expected that the Gencos would have made some upfront investments, in anticipation of full recovery of investment, even at the high cost of capital

Bilateral Contracts are pure commercial agreements that demand full compliance by parties



Regulatory: Inappropriate Trading Arrangement (Cont'd)

The Vesting Contract is a formalized procedure for transparent load allocation under supply shortage conditions.

This trading arrangement makes sure that all the load participants get some allocation at all times, whether they have the capacity to pay or not.

Vesting contracts are more political than commercial and affect the efficiency of the electricity market.

For reasons of viability, most Gencos will be reluctant to trade with some Discos. But due to the fact that all the Gencos have been mandated to trade with all the Discos, through the vesting contracts, every Disco has a load allocation from every Genco.

The result is that most of the Discos are unable to pay their full invoices. Those which pay significantly are discouraged by those which do not pay much, particularly when no actions are taken against payment defaults.

This situation dislocates the market equilibrium and leads to low liquidity problems of the electricity market.



Regulatory: Inappropriate Trading Arrangement (Cont'd)

The trading arrangement creates an impression of high demand and low supply.

Every available generation is consumed because it is allocated to the Discos, whether they are capable of paying or not.

In the process, there is high demand for power, high pressure on the network infrastructure, as well as high demand for gas to power the plants. These high demands are ineffective or false, because they are not backed by commensurate revenue capabilities.



Performance Issue: High Energy & Revenue Losses

Liquidity depends on the efficiency of energy and revenue performance of the electricity industry.

The market can never make its revenue requirements when it is operated at high energy or revenue losses, **irrespective of the level of supply and how cost reflective the tariffs are.**

One of the reasons to justify privatization of the Nigerian electricity industry is the perennially high level of losses (ATC&C Losses) in the distribution network, which permanently made the industry un-viable.

One of the promises of privatization is urgent attention to these losses to improve sector viability.

Therefore, successful Discos in the privatization process were selected based on their ATC&C Loss reduction plan.

However, these plans have had limited success due to a number of reasons, including Declining Market Liquidity (DML)



Performance Issue: High Energy & Revenue Losses (Cont'd)

Collection losses, which are considered the easiest and cheapest to address have remained an issue.

In many countries, including African countries, collection losses are not part of the tariff equation, but in Nigeria they constitute a significant component of costs to be recovered from the consumers.

The ATC&C Losses for most Discos have continued to increase, instead of reducing. The implication of this is decreasing cash flow.

With the decreasing cash flow, the Discos' ability to borrow for investments is equally reduced.

The vicious cycle of “inadequate investments, low cash flow and inability to borrow” perpetrates the sector's liquidity problem.

Performance Issue: People Side Issues

Apart from the technical and commercial reasons for low revenue performance of the electricity market, there are people side issues that affect the ability of the Discos to collect revenue.

Some of these people side issues are:

- Utility staff attitude
- Utility Management attitude
- The Public attitude
- The Government attitude

All the people side issues border on indiscipline , which is a major part of the Nigerian power sector liquidity problem

Impacts of Low Market Liquidity of the NEM

Impacts on Generation

- The most significant impact is the market's inability to pay for power generation.
- Less capital for investments in capacity expansion
- Less funds for plant operation and maintenance
- Inability to pay gas bills, affecting gas supply
 - Gas supply infrastructure cannot be developed due to lack of the necessary investment funds
- Overall impact is low power generation

Impacts on the Customers

- Less energy to consumers
- Higher retail tariffs
- Customer frustration, apathy and disloyalty to the Utility

Impacts on the Electricity Market

- Apart from generation, there are other market participants, eg, transmission, and the service providers.
- The market is as good as its transmission grid.
- Liquidity problem also affects the distribution companies and the supply end.



Impacts on the Economy

One of the impacts of the power sector liquidity challenge is low power generation, resulting in higher retail prices for electricity.

High tariffs lead to reduced energy consumption. In order to achieve the industry revenue requirement with the reduced energy consumption, further tariff increases are inevitable.

Again, higher prices force more customers out of the network for alternative sources of energy, including firewood, candle, etc.

Also, energy thefts are encouraged by higher prices of electricity, leading to more losses.

At higher prices, more customers resort to more efficient programmes of energy consumption.

The aggregate result of the liquidity challenge is reduced power consumption, reduced power generation, high wholesale and retail tariffs, high costs of goods and services, increased unemployment from job losses, reduced economic activities, low government earnings from taxes, as well as low government spending and ultimately low GDP for the nation

Impacts on the Economy (Cont'd)

It is known that volume of electricity consumed in a country has a direct relationship with the level of economic activities, as well as economic growth in the country.

Also, the percentage distribution of the total energy consumed among the major categories of consumers – Domestic, Commercial and Industrial, indicates the level of economic growth in a country.

In Nigeria, the volume of electricity produced and consumed is quite low. For a country with a population of about 170 million, the average monthly energy consumption is about 2,400,000 MWh, translating to 14KWh per month, per capita.

Again the percentage energy consumption by the different consumer categories is: domestic = 65%, commercial = 20%, industrial = 10%, others = 5%. These numbers paint a gloomy picture of low economic activities

Impact on the Economy (Cont'd)

Due to the liquidity problem in the electricity industry, the effective volume of power generation is not growing, the electricity market is failing in its obligations to the stakeholders.

The electric energy consumption per capita will reduce further, more industries will close down, more jobs will be lost and the percentage energy consumed by the industrial load will further reduce, if urgent action is not taken to address the issue of liquidity in the sector

The economy is currently in recession and will continue to recede until the issue of the electricity industry liquidity is addressed with sincerity.

Impacts on Infrastructure Development

In a privatized electricity industry, liquidity drives infrastructure development

In a SOU, Govt may chose to deploy any amount of investments in infrastructure, whether the market is viable or not

This is the case in many countries, it was the case in Nigeria

- By 1990, we had about 6,000MW generating capacity, etc
- There was no record as to how much was being collected as revenue for the power generated and consumed
- There was no record of energy losses in the system
- Govt. objective was to invest in power, increase access and stimulate economic and social development

In a privatized electricity industry, profit is a major objective



Solving the Liquidity Problem: What Must Not Be Done

Most of the sources of the Nigerian Power Sector liquidity problem have been highlighted.

This is a veritable prelude to solving the problem, so that the electricity industry can be on the part of sustainable development

The problem can be solved, everybody says so, but the will to do so is currently not enough. People must be prepared to solve the problem, and be sincere about it

In looking for solution, the issues highlighted as the reasons for liquidity problem must be addressed.

But there are things that must not be done as part of the solution. These are:

- Tariff increases without adequate tariff studies
- Increases in generation capacity without drastic system loss reduction

Tariff increases without adequate tariff studies

Effects of tariff increases:

- Sharp increases in the non-technical losses. Tariff increases that do not take cost efficiency or customer affordability into consideration usually provoke customer disloyalty, which can be demonstrated in a number of ways, including energy thefts
- It is proven that high energy tariffs are counter-productive in the developing countries, like Nigeria.
 - High tariffs prevent or reduce consumption of goods and services, reduce production of goods and services, as well as reduce the economic development of the country.
- Countries going through economic recession (like Nigeria is) do not contemplate increases in their energy tariffs, in particular. Recovery is hampered by high energy tariffs

Tariff increases without adequate tariff studies (Cont'd)

Effects of Tariff increases:

- With increased energy losses, which result from increased tariffs, revenue losses will multiply
- With high electricity prices, more customers leave the grid for alternative sources of power, eg, self generation, decentralized renewable energy (DRE) solutions, etc
- As tariffs increase, the more honest consumers who cannot afford self generation, reduce their energy consumption by means of demand side management (DSM)

Grid power is needed for national development everywhere in the world.

Tariff increases without adequate tariff studies (Cont'd)

The results of all the effects:

- possibility of energy glut in the grid, due to customer exodus
- High level of stranded generation capacities that must be paid for.
- Temptation of further tariff increases, so as to be able to achieve the industry revenue requirement.
- This vicious cycle may continue to increase in dimension, until there is a run-away when the sector completely loses control.

If prices of electricity are jacked up to force liquidity, it ultimately reflects in the consumer prices of goods and services in the economy.

The ultimate effect of uncalculated tariff increases is a reduction in the growth rate of the economy

Tariff increases without adequate tariff studies (Cont'd)

Conditions for Tariff Increases

- For tariff increases to ever be contemplated as a possible contributor to the solution of liquidity problem, such increases must follow adequate tariff studies to determine:
 - the efficiency of the costs to be recovered from the tariffs,
 - the actual losses in the respective Disco networks
 - the efficiency with which the existing tariffs are being implemented and
 - the impacts of the proposed tariff increase on the Customers, Market and Nation's Economy.
- The regulator should arrange for proper tariff studies to be carried out to ensure that every efficient cost in the value chain is captured in the tariffs.
- The regulator should make sure that inefficient costs are not passed on to the consumers.

Tariff increases without adequate tariff studies (Cont'd)

Conditions for Tariff Increases

- Reasonable components of the losses should be captured in the tariffs while unreasonable components should be removed.
- Simple and achievable loss reduction plan should be built into the resulting tariff, and the regulator should ensure compliance with the loss reduction trajectory.
- Tariffs are meant to recover efficient costs and not to conceal operator's inefficiency
- Tariff increase is the last thing to be mentioned when efficiencies are low.

without drastic system loss reduction

High generation capacity should not be operated under conditions of high energy losses, particularly in a contract driven market.

- Imagine a situation where Discos operate with ATC&C Losses of more than 50%, the first thing to do is not to increase generation capacity.
- Implication of a system with a generating capacity of 4,000MW, operated in a distribution network with ATC&C losses of 50%:
 - about 2,000MW of the power produced is either not accounted for or
 - consumers are burdened with the risk of paying for what they do not know about.

Further increase in generation capacity, will widen the liquidity gap in the industry, given the prevailing conditions and structure of the Nigerian electricity market

Issues of Intervention

The Power Sector Liquidity problem has been described as a critical underfunding of the sector to the extent that plants and equipment cannot be adequately maintained or efficiently operated.

It is a cash flow problem that reduces the ability of the value chains to meet their obligations in the market

When it becomes clear that liquidity cannot sustain itself in the market or improve on its own, intervention (political, regulatory or even legislative) becomes inevitable.

The intervention will be required to kick-start improvements in liquidity that is self-sustaining.

However, such interventions must be targeted (ie tied to projects), with predictable impacts.

The interventions must also be supervised to ensure objectives are achieved.



Issues of Intervention (Cont'd)

Evidence shows that the current levels of liquidity in the Nigerian electricity market is very unsatisfactory.

The market is locked in a “low-liquidity- equilibrium” that is artificial.

The LLE of the Nigerian electricity market is artificial because it is not unlikely that it can resolve the problem by itself, if sufficient and honest efforts are put in.

There is always a preference for industry – led action to achieve the liquidity objectives

Under this condition, a regulatory intervention is required to ensure that the right things are done in the market.

Issues of Intervention (Cont'd)

Whenever, for any reason, financial intervention becomes necessary in the electricity industry, it must be tied to projects whose implementation must be supervised by certified experts.

Interventions should not be used for clearing outstanding debts, they must support critical investments, looking ahead.

System losses should not be funded in the name of liquidity intervention.

There have been a number of interventions in the Nigerian power sector in the past, but they were not properly deployed.

This is the reason there is not much to show for them now

