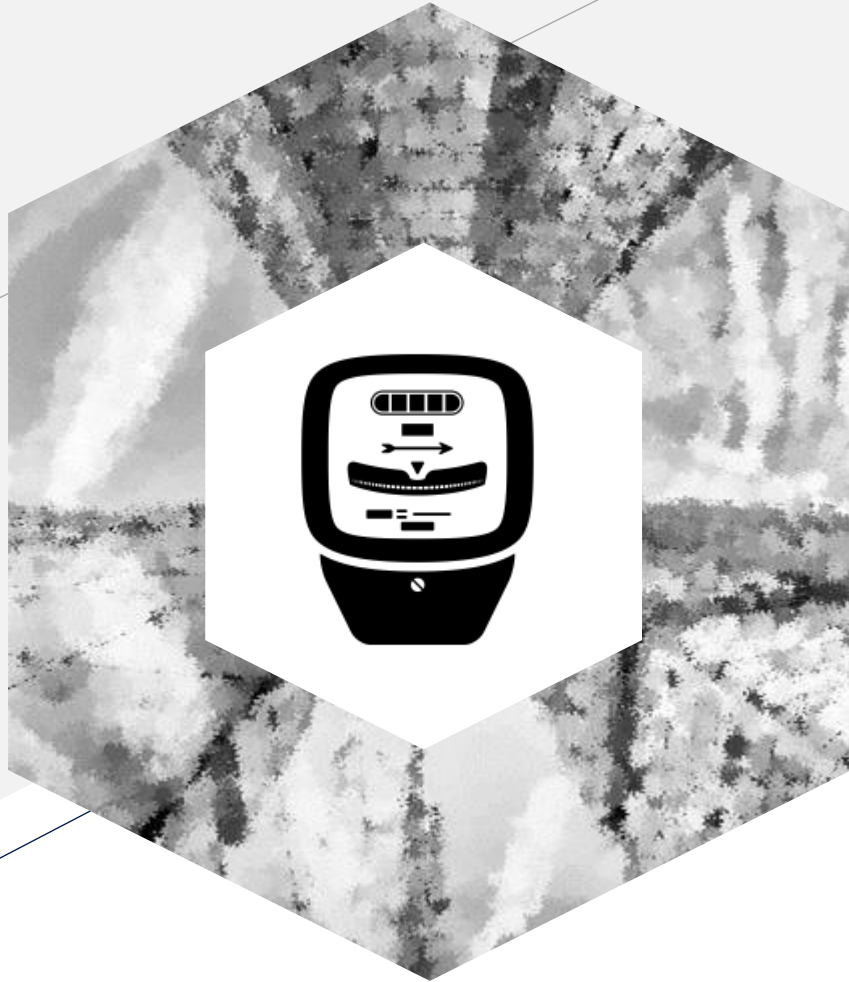


NEMSA'S 2ND STAKEHOLDERS FORUM



EFFECTIVENESS OF METER TESTING AND CERTIFICATION FOR SUSTAINABILITY OF ELECTRICITY MARKET IN NIGERIA

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OUTLINES

- Basic Energy Metering Economics
- Basic Energy Metering Technology
- Tests and Certification of Meters
- Effective metering and Sustainability in Nigeria's Power System
- Conclusion



BASIC ENERGY METERING ECONOMICS



Basic energy metering economics

SOME FACTS ABOUT ELECTRICITY MARKET

- The power market differs from the normal business market
- Normal market – pay on/before purchase with several pay points at manufacturing, transportation and distribution points
- Power market is a real-time market – pay after use with pay point only at distribution point (at the end of the power chain)
- The supplier is concerned about making profit, customer wants value for money while the government worries about inflation.
- Hence the means of measurement in any market must be effective to sustain the market system e.g.



MUDU is for Normal Food Market



ENERGY (kWhr) METER is for Electricity Market



Basic energy metering economics

WHY METERING?

- Metering provides real-time information to both the power providers and customers on how much energy has been used or is being used.
- The information obtained can be used to assist in
 - Optimizing building and equipment operations,
 - Utility procurement and
 - Energy budget planning and tracking.
- The data generated can thus be used for
 - Benchmarking energy use to reduce waste of energy and costs,
 - Verification of utility bills and tariff to ensure timely and proper payments along the power value chain
 - Improvement of overall building and equipment operations resulting in the provision of sustainable and efficient power supply



BASIC ENERGY METERING TECHNOLOGY



Basic energy metering technology

SOME DEFINITIONS

- POWER (Watt) is simply current x voltage
 - Ammeter – measurement of current
 - Voltmeter – measurement of Voltage
 - Watt meter – measurement of power
$$1,000\text{W (Watts)} = 1\text{kW (kilowatts)}$$
- ENERGY (Watt-hour) is power over a period of time, power x time
 - Watt-hour meter – measurement of energy
$$1,000\text{Whr (Watt-hours)} = 1\text{kWhr (kilowatt-hour)} = 1 \text{ Unit of energy}$$
- Billing is energy x money (tariff)
- Energy (Kilowatt-hour) meter is the “Mudu” in the electricity market



Basic energy metering technology

SOME TYPES OF METERS



Electromechanical Energy Meter

The electromechanical induction meter operates by counting the revolutions of a non-magnetic, but electrically conductive, metal disc which is made to rotate at a speed proportional to the power passing through the meter. The number of revolutions is thus proportional to the energy usage.



Electronic Energy Meter

Electronic meters display the energy used on an LCD or LED display, and some can also transmit readings to remote places. In addition to measuring energy used, electronic meters can also record other parameters of the load and supply such as instantaneous and maximum rate of usage demands, voltages, power factor and reactive power used etc. They can also support time-of-day billing, for example, recording the amount of energy used during on-peak and off-peak hours.



Smart Energy Meter

These are capable of communicating in both directions. They can transmit the data to the utilities like energy consumption, parameter values, alarms, etc and also can receive information from utilities such as automatic meter reading system, reconnect/disconnect instructions, upgrading of meter software's and other important messages. These meters reduce the need to visit while taking or reading monthly bill. Modems are used in these smart meters to facilitate communication systems such as telephone, wireless, fiber cable, power line communications. Another advantage of smart metering is complete avoidance of tampering of energy meter where there is scope of using power in an illegal way.



Basic energy metering technology

TYPES OF ENERGY METERS

- 3PHASE 4WIRE CT OPERATED STATIC ENERGY METER
- 3PHASE 4WIRE 10(100) AMPS (WHOLE CURRENT) ELECTRONIC CREDIT METER
- 3PHASE 4 WIRE 5(60) AMPS ELECTRONIC CREDIT METER
- SINGLE PHASE (2wire) 5(60) AMPS CREDIT STATIC METER
- KEYPAD SINGLE & 3PHASE ELECTRICITY DISPENSER
- SPLIT TYPE PRE-PAYMENT SINGLE & 3PHASE DISPENSER
- AUTOMATIC METER READING SYSTEM (AMR)
- SINGLE PHASE (DUAL PRE-PAYMENT AND CREDIT TYPE)





TEST AND CERTIFICATION OF METERS



Test and certification of meters

WHY TEST METERS?

- Every consumer seeks the reassurance that the products or materials they purchase meets the expectations or conform to specific requirements or standards.
- It thus implies that the products need to be tested and certified by unbiased laboratory to determine its characteristics against a standard or specification
- It is required that the laboratory performing these unbiased tests or certification is able to provide accurate and reliable data on the product
- Meter testing is required at all stages of meter development right from the designing of meters to their installation in the field
- Meter testing is necessary to improve the reliability and accuracy of performance. It also prevents meter malfunctioning. These tests help predict how long meters can operate without any degradation in performance. They also assess the anti-tampering features of meters and the performance of meters in a poor power quality scenario.



Test and certification of meters

STANDARDS AND CODES

- All energy meters to be deployed in Nigeria must meet the general requirements of the Nigerian Metering Code Version 02
- These requirements which are generally specified in Section 4 of the Code include:
 - Applicable voltage, current & frequency standards
 - Accuracy
 - Type of connection points
 - Casing
 - Location of check & metering systems
 - communication
- SECTION 4.1.2 – The specifications for the energy meters to be deployed in Nigeria are prepared in accordance with the following international standards:
 - IEC 62052 - 11
 - IEC 62053 - 11,21,22 and 23
 - IEC 62055 - 41 and 52
 - IEC 62056
 - IEC 60044 - 1,2 and 3



Test and certification of meters

REQUIRED TEST AND CERTIFICATIONS

- Type Test certification
 - This test is usually conducted on samples of newly introduced meter type (brand) to access its design and construction conformity to relevant IEC (International Electro-technical Commission) standard
- Routine Test certification
 - It is conducted on every meter unit to access conformity to set criteria, usually accuracy and installation requirements
- Recertification
 - It is the verification of meter performance and capabilities on expiration of its life span
- Acceptance Test
 - It is a test conducted on samples from a batch of meters to determine the quality level for making acceptance/ejection decisions



Test and certification of meters

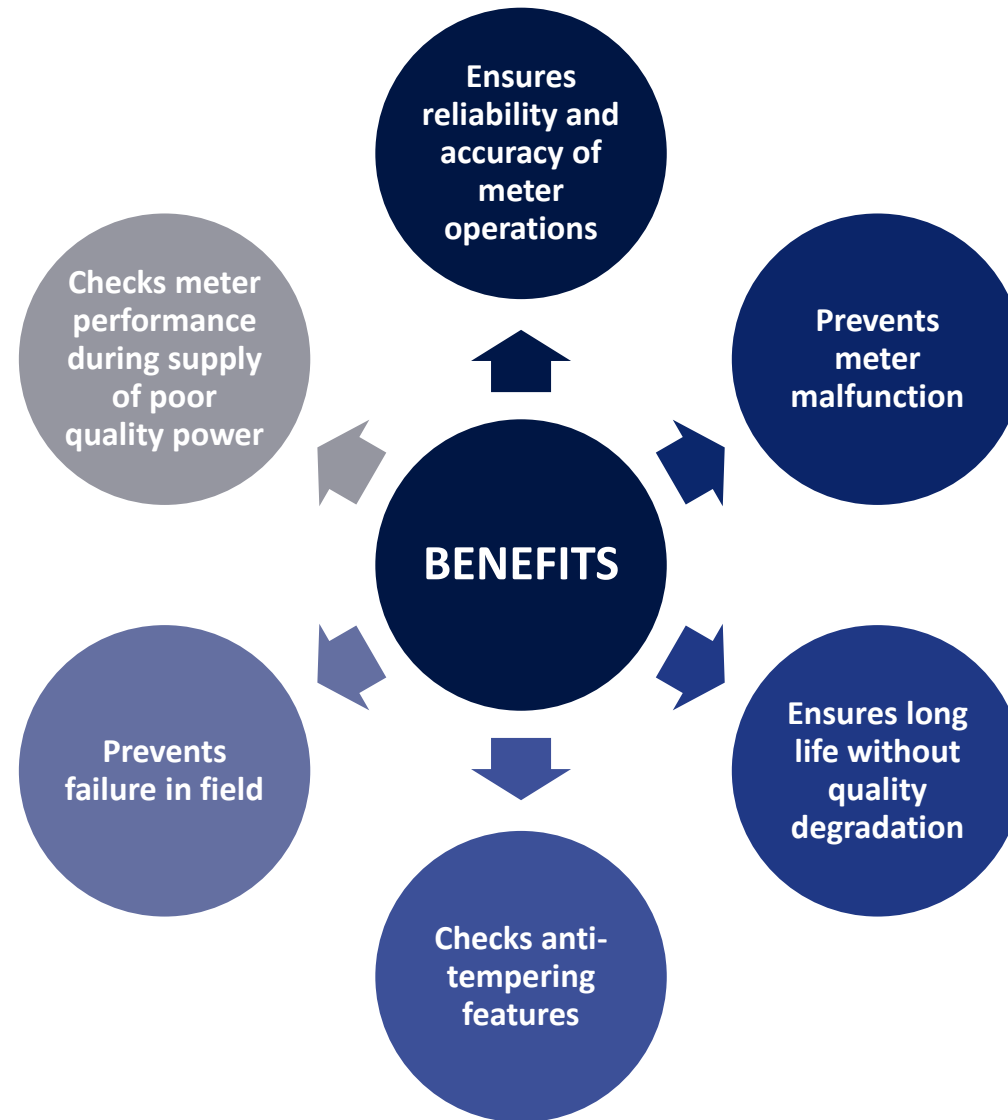
BASIC SPECIFICATIONS FOR DISTRIBUTION METERS

1.	VOLTAGE RATING	240V/415V
2.	OPERATING VOLTAGE	-40% to + 10% Vref
3.	CURRENT RATING	5(60)A
4.	FREQUENCY	50Hz $\pm$ 2%
5.	SYSTEM	Single or Three Phase
6.	SECONDARY VOLTAGE VARIATIONS	(85 – 120)/(50 – 70) V
7.	INTERNAL BATTERY OR AN EQUIVALENT GIVING TOTAL STAND-BY LIFE OF 10 YEARS (MINIMUM)	Lithium CR2025 – 1HF
8.	AUXILIARY BATTERY FOR DOWNLOADING STORED DATA.	12 D.C. Supply
9	ACCURACY CLASS	0.5s for 33KV, 0.2s for 132 and 330KV
10.	STORAGE TEMPERATURE	Up to 70°C
11.	LIFE SPAN	10 Years
12.	RELATIVE HUMIDITY. NON-CONDENSING	Up to 96% at 45° C
13.	BURDEN	2VA/phase in voltage circuit and 1VA/phase in current circuit.



Test and certification of meters

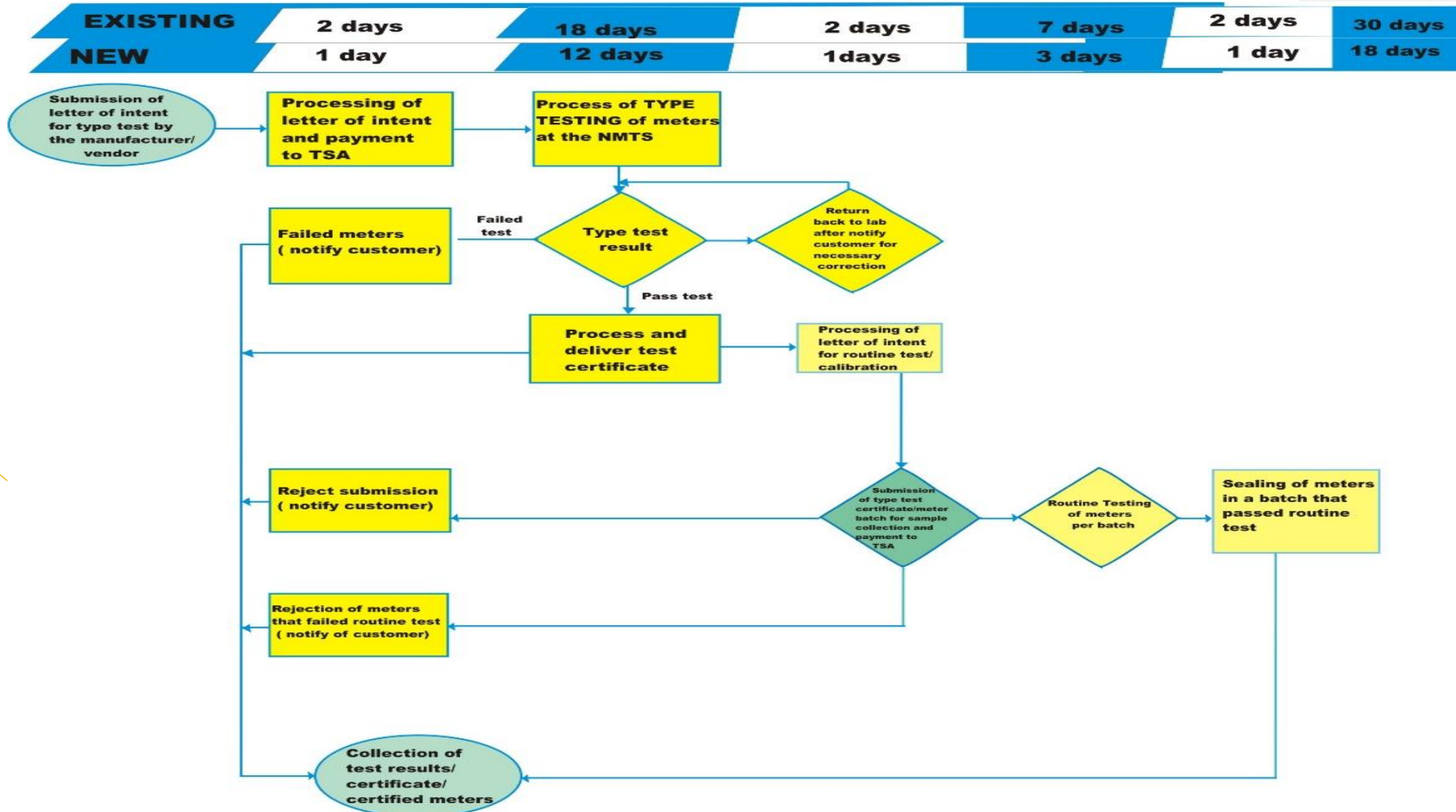
BENEFITS OF METER TESTS





Test and certification of meters

PROCESS FLOW CHART FOR TYPE TEST/ROUTINE TEST OF METERS





EFFECTIVE METERING AND SUSTAINABILITY IN NIGERIA'S POWER SYSTEM

Source: Getty Images



Effective metering and sustainability in Nigeria's power system

METERING ISSUES IN NIGERIA

- The former Minister of Finance, Mrs Kemi Adeosun, in a recent statement said that
 - Effective and wholesome metering of electricity consumers by operators would in turn significantly improve billing accuracy as well as boost collections by electricity distribution companies (Discos)
 - The collections would facilitate increase in cash flows to the power sector value chain and ensure stability of federal government reforms in the sector, adding that “If the market cannot pay for power distributed, the situation will remain unsustainable”
- The Nigerian Electricity Regulatory Commission (NERC) at the disclosure of its latest MAP Regulation 2018 report with Regulation No: NERC-R-112, has disclosed that
 - The metering Gap for all distribution licensees was reported at 4,740,275 meters as of Dec 31st, 2017. This is projected to significantly increase upon the conclusion of the ongoing customer enumeration exercise
 - The new metering policy which seeks to bridge the widening metering gap in the electricity industry will give rise to a new class of operators in the power sector known as the Meter Assets Providers (MAPs) – whose primary duty is to provide meters for the customer base of a particular DISCO
 - Other objectives are to attract private investments to the provision of metering services, close the metering gap through accelerated meter rollout and enhance revenue assurance in the power sector
 - A total of 22 companies interested in the meter procurement process approved by the Nigerian Electricity Regulatory Commission (NERC) under the Meter Asset Provider (MAP) Regulations 2018 have scaled the first hurdle in the selection process



Effective metering and sustainability in Nigeria's power system

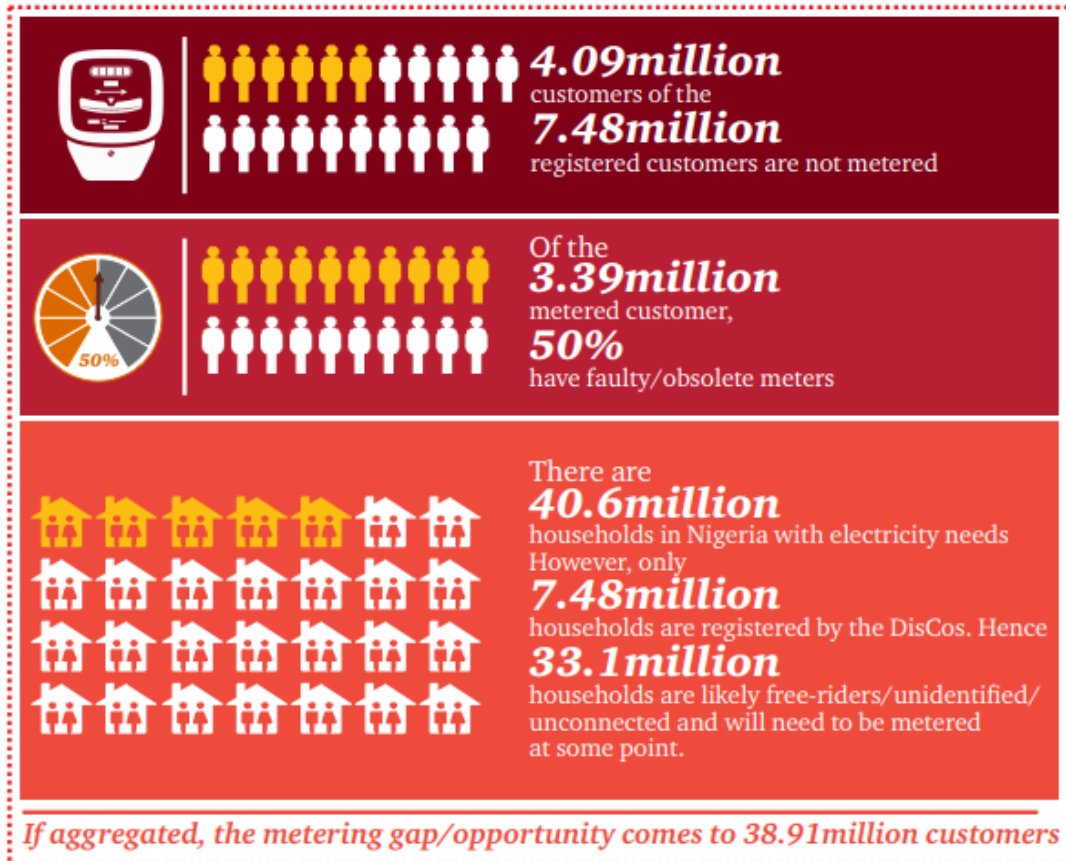
METERING ISSUES IN NIGERIA – cont...

- Dr Jamil Gwamna, Managing Director and Chief Executive Officer of Kano Electricity Distribution Company, thinks that
 - The solutions to customer metering challenges in the Nigerian electricity supply industry are close at hand
 - The new regulation was introduced to assist Discos to negotiate with independently licensed Meter Asset Providers (MAPs) to fund the rapid deployment of meters. MAPs would recover all their costs over a 10year period from Disco customers. This long repayment period might make it possible for Discos to use this initiative, provided the MAPs can access long-term funding at interest rates that would not significantly increase the cost of metering under the scheme. The regulation also allows for unmetered customers to buy meters directly from MAPs
- Meanwhile, Executive Secretary of Electricity Meters Manufacturers Association of Nigeria (EMMAN), Mr Muideen Ibrahim believes that
 - The new Meters Asset Providers Regulations (MAPR) policy would create massive employment opportunities for Nigerians and
 - The meter manufacturers would ensure production of meters to maximum capacity and utilize their resources very well and adequately.



Effective metering and sustainability in Nigeria's power system

METERING GAP IN NIGERIA



Source: Pwc

- As shown from the PWC infograph, it can be deducted that
 - Customers registered but not metered = 4.09m
 - Customers with faulty/obsolete meters = 1.07m
 - Customers unidentified or unconnected = 33.12m
 - Total number of meters required = 38.91m
- A total number of 22 Meters Assets Providers (MAPs) have been licensed by NERC to address the initial metering gap of 4.09m (which has grown to 4.70m and is still growing)
- These MAPs are different manufacturers with various designs and meter types



CONCLUSION

Bad metering
connections



CONCLUSION

- The “Mudu” must be able to deliver the correct measurement that will bring in the correct money to the seller and value for money to the buyer.
- Addressing the meter gap with MAPs will mean sourcing for meters from different manufacturers from different countries with various standards, Nigerian Electricity Management Services Agency meter test stations and laboratories will have to certify these meters to ensure compliance with the established Nigeria Metering Code by the regulator.
- NEMSA, by virtue of the Act establishing it, has three(3) meter testing stations/laboratories in the country to carry out the meter testing and certification of all electricity meters before deployment in Nigeria.



Thank You.



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