



World Energy Council
CONSEIL MONDIAL DE L'ENERGIE

Report on

World Energy Council (WEC)
Africa Forum on Energy Efficiency

Held at the Transcorp Hilton Hotel, Abuja, Nigeria
8th - 9th January 2007



REPORT ON WORLD ENERGY COUNCIL-AFRICA FORUM ON ENERGY EFFICIENCY 8TH -9TH JANUARY, 2007

PREAMBLE

The World Energy Council Africa Region, the Nigerian National Committee of the World Energy Council (NNC-WEC), and the French Agency for Environment and Energy Management (ADEME) organized the Africa Forum on Energy Efficiency from 8th – 9th January 2007 at the Transcorp Hilton Hotel, Abuja Nigeria. The theme of the forum was “Making Energy Efficiency a Reality in Africa and not a Myth”. The World Energy Council is the foremost multi-energy, United Nations-accredited, non-governmental organization formed in 1923. It has over 90 autonomous Member Nations. Nigeria became a member committee in April 1960. WEC’s mission is “*to promote the sustainable supply and use of energy for the greatest benefit of all.*”

OPENING CEREMONY

The Secretary to the Government of the Federation, Chief Ufot Ekaette, CFR, chaired the opening ceremony, which started at about 9:40am and attended by about 125 people. The list of participants at the Workshop is attached as Appendix I.

In attendance was the WEC Vice-Chairman for Africa, Dr. Alioune Fall, of the Senegal National Committee, the WEC Regional Coordinator for Africa, Dr. Latsoucabé Fall, the Director of Communications from the WEC Headquarters in London, Dr. Stephan Albrechtskirchinger, members of the Diplomatic Corps and representatives of the UNIDO, UNDP and ECOWAS. Other Participants came from Algeria, Egypt, Senegal, Tunisia, France, Germany, UK, USA UPDEA and Nigeria.

In his welcome address the Chairman of the NNC-WEC, who is also the Director General of the Energy Commission of Nigeria, Prof. Abubakar S. Sambo, informed participants that the WEC is actively involved in energy policy analysis and strategy recommendations in the entire energy spectrum, single energy issues, market restructuring, energy efficiency, energy and environment, etc. He further said that these are achieved through undertaking research, holding congresses, workshops, and seminars as well as collaborating with other organizations in the energy sector with compatible goals.

The WEC Vice Chairman for Africa, Dr. Alioune Fall, in his address expressed appreciation to the NNC-WEC for hosting the Forum which consisted of three events: Workshop on Energy Efficiency, Meeting of Executive Committee of the WEC – Africa Region and the meeting on Regional Scenarios 2050. He said that Nigeria is a very important member of WEC considering its population and natural resources. He also noted that the investment requirement for the development of the energy sector is huge and poses a major challenge for most African countries. He was of the view that the investment requirement can be drastically reduced through energy efficiency and cooperation.

The Special Adviser to the President of Nigeria on Energy, Prof. A. O. Adegbulugbe, in his address observed that energy efficiency has become a major issue in the global energy scene. He traced the advent of energy efficiency activities to the 1970s during the oil crisis. He also noted that Nigeria has recognized the importance of energy efficiency but was yet to implement any major projects along the line. He congratulated the WEC for the Forum and wished it success.

The Chairman of the occasion and the Secretary to the Government of the Federation, Chief Ufot Ekaette, in his remarks praised the efforts of the WEC in pursuing its mission vigorously since its inception in 1923. He reminded the audience of the roles of energy in development. He said that the activities of WEC have impacted positively on the world energy system. He looked forward to receiving the recommendations of the Forum.

The Honourable Minister of Science and the Technology of Nigeria, Prof. Turner T. Isoun, noted that energy is the engine that drives the economy of the world. He also observed that energy use in Africa is characterized by wastages due to ignorance and poverty. He concluded that the culture of energy wastage in the continent must be done away with if we want to meet our energy demand in a sustainable manner. On this note, he declared the Forum open.

TECHNICAL SESSIONS

Session I: Background and Introduction

Chairman: Professor A. O. Adegbulugbe, Special Adviser to President on Energy, Nigeria

Rapporteur: Engr. O. N. Ekpenyong, Energy Commission of Nigeria, Abuja

Three papers were presented during this session:

- (1) Energy Efficiency: A Worldwide Review Indicators, Policies and Evaluation –Dr. Didier Bosseboeuf, ADEME;
- (2) The WEC Service on Energy Efficiency Policies and Evaluation - –Dr. Didier Bosseboeuf, ADEME;
- (3) Potential of Energy Efficiency in North African Countries and GEF Financed Projects in Egypt – Dr. Ibrahim Mahmood Yassin, Egyptian National Committee – WEC.

The paper on “Energy Efficiency: A Worldwide Review Indicators, Policies and Evaluation” identified the factors driving energy efficiency worldwide as: high oil prices because of market instability, structural issues (depletion of conventional oil resources with peak oil around 2030 or before), global warming and post-Kyoto issues and scarcity of funding for energy supply expansion in developing countries. It presented a description and evaluation of energy efficiency trends and policies at world level and concluded as follows:

- Co-ordination of policies and measures at the international level would help to overcome the obstacles to the implementation of both regulations and price signals;

- The exchange of information and sharing of experiences on energy efficiency measures among different countries around the world can be useful to benefit from the good experiences;
- The World Energy Council is a unique forum for such a task.

The paper on “The WEC Service on Energy Efficiency Policies and Evaluation” recommended the need:

- To update and extend the WEC database on energy efficiency and energy related CO2 indicators in the world by regions (1980-2005);
- To describe and explain the energy efficiency trends in particular in relation to policies implemented;
- To update and review the implementation of energy efficiency policies and measures (questionnaire survey), with an in depth evaluation of 5 types of measures (case studies) with specific focus on Developing/Emerging countries;
- To Provide recommendations on energy efficiency P&M’s implementation according to national circumstances.

The indicators covered in the presentation included, efficiency of electricity generation, efficiency of thermal power plants, overall efficiency of energy transformations, CO2 indicators by sector,

selected indicators of diffusion of energy efficiency technologies and practices - number of audits per capita, per capita installed capacity of solar water heaters, share of vehicles using alternative fuels, penetration of heat pumps (for representative countries only). Policy measures evaluated include : building codes, energy audit, labelling and standards of electrical appliances, fiscal measures for cars and motor fuels, economic and fiscal incentives, voluntary/sectoral agreements, local energy information centres, new energy efficiency financing shemes, etc.

The paper titled “Potential of Energy Efficiency in North African Countries and GEF Financed Projects in Egypt” presented by Dr. Ibrahim Yassin of the Egyptian National Committee of WEC noted that all North African countries are already implementing energy efficiency projects. He gave details of projects implemented in Egypt, Morocco, Tunisia, Algeria and Libya, which included labeling, demand side management, energy audits, etc.

Discussion:

Question: Energy intensity in Nigeria is very low due to low access and availability, and here we are talking about energy efficiency. Will this not exacerbate the problem? **Answer:** Though we are not producing enough electricity yet in Nigeria, we are still wasting the little we are producing. We are wasting about 500MW of generation at any given time on unnecessary uses, for instance putting on electric lamps during the daytime. When we are talking about energy efficiency, we are talking about making savings from useful energy consumption.

Question: What is the government of Nigeria doing to enlighten people about the need to do away with the wastage? **Answer:** A proposal has been made to government in this regard, and the government has tentatively mandated the Nigerian Electricity Regulatory Commission to

promote Demand Side Management (DSM) in the country, pending the establishment of a substantive institution to carry out the responsibility.

Question: The speakers dwelt so much on energy efficiency labelling. One would like to have their experiences on other energy efficiency policies and activities. **Answer:** Other measures and policies include energy management systems, insulating materials, energy efficiency lighting

Session II: Policy Instruments, Institutions and Regulations

Chairman: Engr. J. O. Makoju, Special Adviser to President on Electric Power, Nigeria

Rapporteur: Engr. A. T. Rogo and Mr. A. Abdurrahman, Energy Commission of Nigeria, Abuja

The following papers were presented in this session:

1. Strategies and Policies for Enhancing Energy Efficiency in Africa, Dr. David Tommy, UNIDO Country Representative, Nigeria
2. Legal and Regulatory Framework and Appropriate Institutions for Energy Efficiency Projects –The NERC Experience, Dr. Ransome E. Owan, Chairman, National Electricity Regulatory Commission (NERC), Nigeria
3. Creating an Enabling Environment for Energy Efficiency Programmes in Nigeria, Prof. A. S. Sambo, Director General, Energy Commission of Nigeria
4. Building Local Capacity for Policy Options Analysis for Data Collection on Energy Efficiency- Case of Tunisia, Dr. Néjib Osman, Director of Studies and Planning ANME, Tunisia
5. Raising General Awareness to Support Energy Efficiency Projects, Engr. (Dr.) A. A. Esan, Technical Director, UNIDO-Regional Centre for Small Hydro Power, Abuja Nigeria
6. Labelling, Standards, Codes and Information, Dr. John Ndanusa Akanya (Director General, Standard Organization of Nigeria).

Dr. David Tommy gave his presentation with the following framework: Need for energy; efficiency strategies and policies; Energy efficiency strategic process; Essential components of policy; Implementation procedures; Experiences of Asian countries and Conclusions.

He gave the aims of an energy efficiency strategies and policies as to unlock the significant but un-tapped economic potential and to achieve a major enhancement of the Nation's energy efficiency performance, reducing energy demand and lowering greenhouse gas emissions and to be successful must cover a range of policy measures, designed to overcome the barriers and challenges. These should be developed with the involvement of all government jurisdictions and key stakeholders, should address demand-side energy efficiency, primarily in the residential, commercial, industrial and transport sectors as well as involve intermediaries, who can influence energy efficiency choices, such as energy retailers, builders, financiers and appliance suppliers. The process for energy efficiency modeling should involve modeling of technical efficiency potentials, modeling of investment costs and energy savings, modeling the economic costs and benefits and modeling the outcomes for the energy sector. He presented the features of energy

efficiency in Japan, China, Australia, India and Thailand, which included the actors, the institutional arrangement, and barriers to energy efficiency initiatives and concluded with the following recommendations:

- The need for an assessment of global energy efficiency potential;
- Implementation of energy pricing policy;
- Gather, process and disseminate information,
- Provision of consultancy services for energy surveys & audits;
- Capacity building;
- R&D to facilitate transfer of locally available and other technologies;
- Extension of financial support (incentives, subsidies, taxes); and
- Creation of standards and labels to discourage waste of energy.

Paper 2 by Dr. Ransome E. Owan was presented with the following outline: Brief on NERC & Electricity Reform Act of 2005; The Challenge of Power Sector Reforms & Electricity Trading; Power Purchase Agreements for Supply to Captive Customers; Purpose of Energy Efficiency; Added Benefits of Energy Efficiency; Approach to Energy Efficiency; Funding Sources. The challenges for power sector reform and electricity trading enumerated by him include: Management of Change & “Keeping the lights on”, Integrated Resource Planning, Upgrading Poor Infrastructure (Generation, Transmission & Distribution), Setting Clear Market Rules and Industry Standards, Attracting Investors & setting proper market price signals. He gave the objectives of energy efficiency and the benefits which include introduction of efficiency lighting such as compact fluorescent lights (CFL) & T8 lamps, use of LED Fixtures, reactive Power / Kvar Improvements, use of intelligent / smart metering, improvement in energy efficiency & standards, industrial process improvements. He also itemized approaches to energy efficiency (setting industry standards for buildings and specifications, incentives for new technology adoption, energy audit and energy accounting, cost benefit analysis of new and retrofit projects, project costing, cash flow, IRR /Payback). In conclusion, he provided some recommendations on funding sources for energy efficiency projects, which include:

- Internal Budget: Concentrate On:
 - Low cost/no cost projects. (Replacement of Exit signs, auto-thermostat, occupancy sensors)
- Bank Finance: -Borrowing for short payback projects
- Shared Savings:
 - Retrofits paid from energy savings often paid by a third party. Simplified application process and Market Entry
- Other Sources: - Government, States, Industry

Paper 3 by Prof. A.S. Sambo, was presented with the following outlines: Introduction; Energy Efficiency Programmes; Barriers to EE Programmes; Creating Enabling Environments for EE Programmes. Recommendations – Country Case Studies and Conclusions. Prof. Sambo, in the paper, discussed some energy efficiency programmes and recommended that the enabling environment should revolve around: Capacity Building; Energy Audit/Assessment; Energy Codes and Standards – Energy Labeling; Research, Development and Demonstration; Energy Pricing/Efficiency Policy; Demand Side Management (DSM); Energy Efficiency Database; Energy Efficiency Awards; Networking for Improved Energy Efficiency as well as Technical

Cooperation/International Collaboration. He discussed some barriers to EE programmes implementation and the experiences of Thailand, Finland and France.

Paper 4 discussed the measures adopted for achieving EE in Tunisia, which included, institutional support (establishment of a National Agency for Energy Conservation), regulation (on energy audits and labeling) and financial incentives (establishment of a National Fund for Energy Conservation). The author also discussed some parameters for assessing energy conservation programmes in Tunisia such as primary energy intensity. The paper also discussed the new challenges resulting from increasing energy demand, rising oil prices, increasing dependence on importation, alternative energy sources and increasing financial requirements. He also discussed the cooperation agreement between ANME and ADEME and the main achievements on the joint projects on capacity building (implementation of information system, indicators of EE and GHG and annual assessment reporting) and information dissemination.

Paper 5 by Engr. (Dr.) A.A. Esanwas presented under the following outline: Introduction; The Challenge of Energy and Development; Issues And Strategies; Potential For Efficiency Improvements; Energy Efficient Improvement Projects (Ghana's Efficiency Standard, South Africa's Lighting Programme, Zimbabwe Efficiency Project); Gaps to Bridge; Raising General Awareness; Nigerian Initiatives and Conclusion. The author advocated an aggressive, holistic and innovative approach towards campaign to get the message of energy efficiency to all stakeholders.

Paper 6 by Dr. John N. Akanya defined standards and specifications which he emphasized their importance on energy efficiency or sufficiency of products (e.g. electric motor refrigerator, freezers, etc). He advocated the need for stakeholders in the African energy sector to adopt energy efficiency standards to ensure that their resources are efficiently utilized.

Discussion:

Comments:

1. In some quarters, it is believed that when you review upward the tariff for energy consumed, you are trying to suffer the consumers to cover your glaring inefficiency. This is so because there are so many leakages in your (PHCN's) distribution system. Take for examples:
 - i. Illegal connections with the connivance of the PHCN's staffs to such places as when the meters are stolen, the houses are connected directly to the electric poles and the consumers given estimate bills indefinitely
 - ii. The welder, the furniture makers, road side mechanics enjoy illegal but directly connected to the electric poles energy consumption. For examples, between Benue plaza and central mosque, there is a bridge, under this bridge there are some workshops which enjoy electricity energy illegal connected from the street light poles above them on the bridge- This is a common phenomenon across the country (using quack materials).
 - iii. Both the elite and the low level members of the public are either out of ignorance pride or unpatriotism do not have the consciousness of putting off the unused

- electric appliances, e.g. Household lamps, Air-conditioners, Television sets without any body watching them, radio sets starting without listeners
- iv. If you notice at times, the streetlight on the Airport Road at Abuja is left on during the day for so many days without being put off.
2. All the above-cited examples are sources of leakages that the concerned authority seems to ignore due to reasons best known to them. There should be a way of monitoring this leakage issue and offenders both on the sides of PHCN and the public punished accordingly. Note that new buildings are also connected to electricity supply, without meters by the PHCN staff after collecting unreceipted –(illegal) fees from the desperate consumers.
 3. I believe through Radio, Television and Posters, the Public can be more enlightened on Energy conservation, the benefits, the disadvantages, and the fact that it is economical for both the consumer and the Government to be conscious of Energy Efficiency.
 4. **On coal as a source of electricity:** In the days of Electricity Corporation of Nigeria, the energy consumed in Nigeria was namely coal. Later, the Ijora power station was dismantled and the nation ever depends on Kanji Hydropower and Egbin – gas powered stations whereas, the massive coal deposits are neglected to decay away. Is it not possible to decentralize energy production and distribution? That is we should try producing electricity from coal, hydro and natural gas and instead of national grid, let there be regional grid, which can be connected to the national grid in emergency cases. By so doing the whole nation will not be in darkness at the same times. You will recall that there are no major activities at Okpara, Onyeama, Okaha Mines and others, yet they are all hosting massive coal deposits that can be converted to electricity.

Session III: Specific Measures (Case Studies)

Chairman: Dr. Latsoucabé M. Fall

Rapporteurs: Mr. O.N. Ekpenyong & Mr. E.C.M. Iwollo

Paper 1: Evaluating of Measures in Industry (and Services); Mandatory Audits and Benchmarking - The Case of France, Ivory Coast and Taiwan

Paper 2: Obligations on Energy Savings: The Case of the UK, Australia (Southern Wales), Belgium (Flemish Region), Italy, France and the Netherlands.

Paper 3: The Energy Service Companies (ESCO's); Key Issues and Method of Evaluation - The Case of China and India

Paper 4: Package of Measures: Case of Solar Water Heaters, The Case of Tunisia

Paper 5: Case Study on Incentive Measures for Passenger Transport

Paper 1 discussed the context and key issues for mandatory audit schemes /benchmarking in industry and services sectors which, include: Energy Audits, Appointment of Energy Managers,

Reporting on Consumption or Investment, Benchmarking of unit Consumption, Boilers Inspection.

The paper concluded that evaluation of audits schemes reveals that they are very cost-effective; that the general trend is towards more programmes of energy audits and mandatory audits; that audits are almost always an evaluation component of a package of measure and may provide information to the administration. Finally, the paper concluded that subsidies help to introduce audits.

Paper 2 presented the general principles of obligations on energy savings :

- To impose an energy savings obligation to energy actors to different options: suppliers, distributors, equipment producers;
- To define energy savings projects (including energy sources and eligible sectors) to implement in order to respect obligation;

It also presented the eligible sectors: residential, tertiary, transportation, small industry (not installations covered by European Trading System and examples of energy savings projects: substitution of incandescent lamps with CFLs, wall and roofing insulation, installation of variable speed drives for pumping systems, solar water heaters, wood boilers, energy - in general electricity and gas but also fuel, cooling and heating. The paper presented some of the existing or planned obligations for the UK, Australia, Belgium, Italy, France and the Netherlands. The examples are:

- In UK, Energy Efficiency Commitment in UK since 2002
 - Two periods: 2002-2005, 2005-2011;
 - Obligation on electricity and gas suppliers;
 - Eligible sectors: only residential;
 - No other eligible agents, no certificates;
- In Australia (New South Wales), energy efficiency certificates as a part of a larger greenhouse gas abatement scheme since 2003
 - Obligation on electricity retailers and other parties to meet mandatory targets for reducing GHG emissions resulting from electricity they supply and consume;
 - The obligation can be achieved by undertaking 'demand side abatement' which includes energy efficiency projects;
 - Eligible projects: actions resulting in a reduction of electricity consumption, fuel switching;

In paper 3, the author presented the types of ESCO's as:

- National or multinational
- Equipment manufacturers and suppliers
- Independent specialist companies
- ESCOs of finance institutions
- Energy utility or supply company
- Public sector agency
- Public-private joint venture

He concluded that the level of operation of the ESCO's are linked to the nature of the sponsors involved, beneficiaries are mainly the industrial and public sector and that the sources of funding are generally public and private.

In Paper 4, the evolution of energy consumption by sector in Tunisia between 1990 and 2005 was presented. The paper also presented the percentage contribution of renewable energy – waste, wind, biogas and solar water heat for the 11th plan, that is, the period 2007 - 2011. Solar water heater is projected to increase to provide 28% by 2011 from a value of 15% in 2005 of residential energy consumption. The author gave the targets for solar water heating installations as 0.7 Mm² by 2011, 1.5 Mm² by 2020 and 2.5 Mm² by 2030.

In paper 5, the incentive measures covered in the survey towards establishing policies to improve energy efficiency in transportation was discussed. The parameters analysed include taxes on motor fuels, car purchase and annual car ownership/ registration, label on fuel economy / CO₂ emissions for new cars, agreement/commitments of car manufacturers, subsidies for clean and efficient cars (CNG, electric, hybrid), incentives for old cars scrapping, road pricing (urban tolls), limit to imports of old cars, promotion of public transport (general objective, difficult to monitor at world level). The paper concluded that there are very few real field evaluations of single measures, but the effort should be focussed on modelling such as to assess the impact of taxation, evaluation of package of measures through a monitoring of the car market transformation, importance of complementary measures between actions on technology (car efficiency) and behaviours (price)

Session IV: Roundtable

**Chairman: Dr. Stephan Alberchitkirchager, Director of Communications, WEC
Headquarters London.**

Rapporteurs: C. Ukabiala, A. U. Abaka

The following papers were presented in this session:

Paper 1: Promoting Energy Security through Energy Efficiency, Prof. B. Garba, Energy Commission of Nigeria, Abuja.

Paper 2: How can Energy Efficiency Contribute to Poverty Alleviation - Prof. A. A. Zuru of Sokoto Energy Research Centre, Energy Commission of Nigeria.

Paper 3: How can Energy Efficiency Mitigate the Effect of Volatile International Energy Price - Dr. O.O. Ogunsola.

Paper 4: Revenue Protection in Electricity Industries As Agent.- How to Tackle the Technical and the Non -Technical Losses in Electricity Sector - Engr. J.O. Makoju

Paper 5: Addressing the Problem of Electricity Shortage in Africa - Engr. Mutima S. Herman - Secretary General of UPDEA.

Paper 6: How could EE (Energy Efficiency) Projects benefit from GEF and CDM Financing – Mr Ewah Eleri, International Centre for Energy, Environment and Development presented the paper for Energy, Environment and Development in conjunction with a staff of Federal Ministry of Environment.

Paper 7: Tackling Technical and Non-technical Losses in the Nigerian Electricity Industry, Prof. U. G. Dambatta, Bayero University Kano

The overview of Paper 1 is shown below:

Introduction; Energy and Natural security; Energy Efficiency Incentives; Energy Efficiency in Industries; Energy Management/Conservation Programme; Energy Efficiency Promotion through Energy Labeling Programmes; International Engineering/Practices in Energy Efficiency and Conservation; Conclusion.

The paper stressed the importance of energy to life and socio-economic development and emphasized the need for efficient management of energy resources in order to reduce energy requirements per unit of output. The three basic processes of energy management, which are planning, execution and control, were highlighted. The paper concluded presenter that:

- The culture of energy wastage in Africa must be seriously tackled to through appropriate methods of administering the system of energy supply and use;
- In implementing energy efficiency/management programmes in our continent, consideration needs to be given to neglected energy resources;
- Supplementation or even substitution of fossil fuels by renewable energy resources should form part of our enlightenment campaign programme on energy efficiency and conservation;
- Since energy is the commodity on which the provision of goods and services depend, unless Africa is able to solve its energy problems, the hopes for industrialization and technical development are likely to remain just that – hopes.

Paper 2, which was presented by Prof. A. A. Zuru contained the following outlines: Introduction; Human and Income Poverty in Nigeria; Poverty Indices- Key Indicators in Nigeria; Primary Energy used in various Regions; Energy Poverty and MDGs; Energy Access, Energy Efficiency, Poverty Alleviation; Renewable Energy Resources and Technologies for Poverty Alleviation – Biomass Option; Conclusion.

During the presentation, Prof. A.A. Zuru remarked that the Sub-Sahara African countries are below poverty index HDI of 0.5. He presented a statistics of Nigeria human and income poverty indices. In conclusion, the presenter made a case that renewable energy sources and technologies, with special reference to biomass, could offer realistic option for energy provision for sustainable development of rural settings in view of the numerous positive social and environmental impacts such as creation of employment opportunities, raising the living standards of the people and improving access to education.

Dr. O. O. Ogunsola used the following outline for the presentation of Paper 3: Introduction; World Energy Outlook; Energy Pricing; Oil Pricing System; Price Changes and Price Volatility; Cost of Volatility; Energy Efficiency and Price Volatility; Can Energy Efficiency Mitigate Energy Price Volatility? Can Stability Arise from Instability?

The author noted that:

- The factors that influence price volatility bear little relationship with to energy efficiency;
- Energy efficiency may reduce energy intensity of production but nor price savings;
- World energy price volatility can not be eliminated as long as the present market system determines the price;
- Mitigation can be achieved by some measures such as:
 - Reform of market related pricing which is based upon reference crudes that do not meet the requirement of stability in terms of volume;
 - The market related pricing formula should be increased beyond the current five days average reference prices;
 - The informal markets NYMEX, IPE should be properly regulated to limit fluctuations of prices not related to economic fundamental;
 - Mechanism of protection of “OPEC price Band” should be a made more transparent, more so through the alignment of its production policy to price movement;
 - Avoid unnecessary wars and threats of war.

In Paper 4, Engr. J.O. Makoju made his presentation based on the following outline: The Electricity Industries; System (Revenue) Losses; Revenue Protection (Objectives, The Revenue Protection Project) and Conclusion. He presented the structure of the electricity industry in Nigeria and gave the total system losses as about 39% of generation, made up of 14% technical and 25% non-technical. He also identified the sources of revenue losses in the electricity industries, which could occur from people side, asset side and system side, as:

- Energy thief (meter tampering, by pass and illegal direct connections);
- Metering inaccuracy;
- Under estimations;
- Wrong billing;
- Payment evasions;
- Theft of cash;
- Network design and operations problem.

In conclusion, he noted that:

- Effective revenue recovery and protection program will help to recover revenue lost to the industries through theft, fraud, poor asset, system and staff management and prevent further revenue from been lost.
- A punitive approach to revenue protection and recovery issues will not result in sustainable return on investments in the RPP (Revenue Protection Project).

In Paper 4, Engr. Mutima S. Horman, identified two types of electricity shortages in Africa:

- Occasional shortage caused by exceptional events like technical problems, drought bad rainfall, lack of fuel in poor procurement and supply system and the seriousness is dependent in the gravity of the fault;
- Permanent shortages due to many reasons such as lack of infrastructure, lack of planned and systematic maintenance of facilities and lack of effective organization as regards operation activities.

Some of the solutions proffered to the shortages include:

- Application of demand side management;
- Effective operation and maintenance programme;
- Planning and load forecasting;
- Rehabilitation by LRMC tariffs and investment acquisition and regional cooperation through inter connection of national power system.
- In emergencies utility should report to gas turbine power station because of the shorter time it requires to construction and commission them;
- IPP is more of a political solution than a business one;
- A positive teamwork and customers driven approach will accomplish the objectives of the programme and result in profit for the industry;
- The law (Police and Court) should be used as a last resort;
- If revenue protection programs are not introduced and maintained very large sums of money will be wasted;
- Revenue is the engine for the growth of the electricity industry and customers satisfaction and must therefore be protected.

Paper 6, which was presented by Mr Ewah Eleri of the International Center for Energy, Environment and Development with a staff of Federal Ministry of Environment under the following framework: What's the Global Environment Facility (GEF); What's the Clean Development Mechanism (CDM); Status of the GEF and CDM; Barriers to EE projects in Nigeria; Overcoming the Barriers.

The presenters identified the barriers to energy efficiency projects in Nigeria as:

- Inadequate regulatory and Institutional framework;
- Low price of grid – based power;
- Poor public awareness;
- Dearth of project development manpower;
- Poor internationalization of the Nigerian economy.

The paper presenters also proffered the under listed means of overcoming the barriers noted in the paper:

- Providing an institutional home for energy efficiency;
- Providing pricing incentives to save energy;
- Increasing public awareness;
- GEF and CDM project development capacity building;
- Full implementation of the NEEDS and opening up of the Nigerian Economy;

- Utilities should always prepare medium and long-term plans complete with engineering design which must be in harmony with the National Energy Masterplan;
- Sources and means of power generation should be diversified as much as possible to promote renewable energies;
- Utilities are prepare complete documentation to secure low cost external funding;
- Utilities should continue to use prudent and competent operational and maintenance techniques to reduce shortages;
- Utilities must charge long run marginal cost (LRMC) tariffs;
- Utilities and government must fully commit themselves in regional power pools (power generation and interconnection projects).

The seventh paper presented by Professor U. G. Dambatta on Tackling Technical and Non-Technical Losses in the Nigerian Electricity Industry System in Nigeria also recommended as follows:

- Power factor correction measures should be incorporated in the High Voltage and Low Voltage sides of electricity networks by installing capacity banks;
- During installation of various networks, it is required that all joints, jumpers, contacts and junctions be standardized as well as electrically and mechanically sound using correctly rated conductors and materials;
- After the feeders are constructed and installed, it is the responsibility of the operation and maintenance engineer to keep an eye and ensure that as soon as the feeder reaches 70-80% of design load, or the lengths are increased beyond the design limits, a new feeder should be installed to carry the additional loads;
- The long feeder should be sectionalised with an injection sub-station to avoid over loading and to keep the feeder losses within allowable limit;
- Long 11kV feeds should be replaced with 33kV since it has been shown that the higher voltage (transmission / distribution system) has the desired effect on loss control;
- Underground cables should not be operated above their maximum carrying capacities as this would result in heating of the cables occasioned by losses;
- Underground cables have life spans which should be adhered to;
- Authorized consumers of electricity should be provided with meters that are well calibrated to measure the quantity of electricity being consumed;
- Appropriate measures should be put in place to discourage illegal and fraudulent consumption of electricity by creating the necessary awareness on the dangers associated with the risk.

Discussion:

Three questions and answers were asked and the answers were provided

Question: Based on the presentation from UPDEA on ‘Addressing the Problem of Electricity Shortages in Africa’, who advocated the use of long run marginal cost (LRMC) tariffs as a probable solution to the electricity shortages the Senior Special Adviser to the President on Electric Power enquired on the probability of private investor to recover investment cost at a marginal cost level. **Answer:** The long-term recovery of cost is vital for successful reform in the electric power sector because of its cost effectiveness and should be embraced.

Question: The low level of funding in GEF and CDM in Nigeria was noted and the question was raised on the effectiveness of the involvement of private sector in GEF/CDM. **Answer:** In answer to the question, the presenter of the paper on “How Could Energy Efficiency Project Benefit from GEF and CDM Financing” said that private sector participation in GEF/CDM is very useful and could help the country to benefit more from the energy efficiency programmes.

Question: What are the steps being taken by the Federal Government of Nigeria toward reducing the huge non-technical losses from about 40% of access to electricity in the country by the provision of meters to consumers. **Answer:** The lack of meters was mainly responsible for some of the non-technical losses and that the Federal Government had directed that the utility company should provide about 2.5 million flat rate meters to the consumers and arrangements to provide flat rate meters in some locations have reached an advanced stage.

Session V: Gas Flaring

Chairman: Engr. Foluseke A. Somolu - Special Assistant to President on Power Reform in Nigeria

Rapporteurs: Dr. I. J. Dioha & Mr. Asogwa Jude

The following two papers were presented in this session.

Paper 1: Contacts with Oil and Gas Companies as Chairman of the Committee on Oil and Gas of the National Committee on National Energy Masterplan - Prof. Olusegun Omole, Department of Petroleum Engineering, University of Ibadan.

Paper 2: Gas Flaring in ECOWAS Mr. David Kamara, ECOWAS Secretariat, Abuja

In Paper 1, Prof. O. Omole gave the structure of the Nigerian oil and gas industry and quoted decree 59 of 1979, which has the Ministry of Petroleum Resources split into two-the Department of Petroleum Resources (DPR) and the Nigerian National Petroleum Corporation (NNPC). He noted that the DPR has the responsibility for inspection and granting of permits for operations while the NNPC is for all operations in the oil and gas industry. He gave the estimated resources of natural gas as 5.3 trillion and said that it is larger than oil terms of the energy value. The presentation also gave the following highlights on the oil and gas industry in Nigeria:

- Despite the large amount of natural gas reserves, Nigeria witnessed very low utilization of gas. The expected Life span of Natural Gas in Nigeria is about 88 years however, the gas flaring rate dropped from 68% in 1999 to 36% in 2005;

- The proposed fiscal terms for natural gas development, which include capital allowance, Tax. Credit allowance, Education Tax, NDDC levy among others;
- The latest Government deadline of 2008 to end gas flaring as encapsulated in the gas bill that is awaiting passage at the National Assembly;
- The combined effect of the generation fiscal gas terms and Government aspiration to eliminate flaring by 2008 through Africa and Regional activities and export. The West Africa Gas pipe lines and Nigeria & Algeria pipeline were mentioned as one of the measures;
- The Government initiatives on some gas based independent power plants to boost power supply in the country, which total installed capacity of almost 7000MW on completion.

Mr. David Kamara in Paper 2, spoke on the West African Gas Pipeline project and said that it holds a lot of promise for the ECOWAS member states. He commended the effort of the Nigerian government in paying the fee for some countries that were unable to pay the fee in order to ensure that the project is completed. He said that the main end use is electricity generation. He said that the weather condition especially during harmattan has made it necessary to support the project. He also emphasized that there must be an appropriate framework and good market among other requirement for the project to take off properly. According to the speaker, the role of the ECOWAS Secretariat was to provide basic framework and the rules for participation. He said that about six million euros was been attained from government to promote the regulation framework. He also said that power pool programme has been put in place to interconnect the member states to encourage regional trade in power and energy. This cost excess of US \$700 million.

Discussion:

Question: Do you think that 2008 target for ending Gas flaring as achievable? **Answer:** **The Federal Government is a major shareholder, so the deadline of 2008 is a achievable.**

Question: **What security measures were put in place to check mate gas pipeline vandalization?** **Answer:** **The gas pipelines is not the same as the PMS pipeline since the gas cannot be tapped and sold, as is the case with PMS.**

Question: Why is domestic cooking gas in short supply despite the abundance reserve of natural gas? **Answer:** The consumers need to be given awareness on dangers of gas consumption.

Question: Are there price incentives to natural gas production and consumption? **Answer:** The Federal government is providing incentives to the oil and gas industries to enable them operate.

RECOMMENDATIONS

A number of recommendations emanated from the various presentations and during the discussion sessions towards promoting energy efficiency in all sectors of the economy in Africa. The various recommendations may be summarized as follows:

Energy Efficiency

1. Encouraging the introduction of energy labelling, standards and codes in countries where they are not existing;
2. Establishing innovative financing mechanisms for funding energy efficiency and conservation projects;
3. Promoting the establishment of local energy information centres;
4. Incorporating energy efficiency into all main public sector policies (land planning, transport infrastructure, social and housing policies, urban planning);
5. Encouraging the local manufacture of energy efficient appliances / equipment- e.g. Compact Fluorescent Lamps (CFLs);
6. Increasing public awareness programmes for the diffusion of energy efficiency technologies;
7. Encouraging the establishment of Energy Services Companies (ESCOs) and NGOs to implement energy efficiency projects;
8. Supporting large-scale retrofitting measures e.g. replacing incandescent lamps with the Compact Fluorescent Lamps (CFLs) in public sector buildings;
9. Introducing economic and fiscal measures to encourage the promotion of energy efficiency in all sectors of the economy;
10. Introducing mandatory energy audit, savings and obligations in industry, especially large industries;

11. Establishment of an energy efficiency and conservation agency (EECA) in countries where they are not existing;
12. Appointment of energy managers, with adequate training, for large buildings to ensure follow up on energy efficiency measures;
13. Sensitising National Policy decision makers to Energy Efficiency;
14. Conducting periodic regional workshops involving major stakeholders;
15. Enhancing the capacity of National experts to develop and implement energy efficiency (EE) projects;
16. Establishment of Database of the status of EE in African Countries;
17. Adoption of harmonized international EE test procedures for electrical household appliances;
18. Encouraging incorporation of EE programmes into national education curricula;
19. Taking advantage of existing funding sources such as GEF and CDM;
20. Utilities must charge long run marginal cost (LRMC) tariffs;
21. Intensifying sub-regional, regional and continental cooperation with respect to EE
22. Supplementation or even substitution of fuels by renewable energy sources should form part of our enlightenment campaign programme on energy efficiency

Natural Gas Flaring

23. Planned exploration for National Gas and wide range of activities and programs to encourage the utilization on natural gas all sectors of the National economy and for export;
24. Increasing the penalty for gas flaring from N 10.00 to N 5000.00 per 1000 scf;

25. Ensure that the provision of the Downstream Gas Bill are pursued and achieved at target time-ensuring accelerated completion of all on going utilization projects and commencement of proposed ones;
26. Encouraging R&D on natural gas within the country;
27. Reviewing of existing urban and regional planning regulation's with a view of incorporation gas transmission, distribution and utilization infrastructural facilities such as pipeline and associated transmission facilities.

Closing Remarks

Dr. Alioune Fall, giving his closing remarks said that the Forum has been very successful, with a harvest of a lot of ideas, and important issues discussed. He noted that although there were constraints with the time allocated to the discussion of the papers, the recommendations of the Forum presented by the NNC-WEC Secretary and the report of the Forum by the WEC Regional Coordinator for Africa, Dr. Latsoucabé Fall, were handy take aways. He expressed his appreciation to the NNC-WEC Chairman and his colleagues, delegates and participants from within and outside the country, the Secretariat and all those who contributed to the success of the forum.

Responding, NNC-WEC Chairman, Prof. Abubakar S. Sambo, noted that when the idea of an Africa WEC meeting was muted to hold in Nigeria, there were a lot of apprehensions as a result of the negative reports about Nigeria in the international news media, especially due to the community disturbances in the Niger Delta, the oil producing areas of the country. He expressed the opinion that the events of the last two days would prove the picture of insecurity painted about the country to be untrue.

Furthermore, the NNC-WEC Chairman said that participants now know more about energy efficiency. He enjoined participants to feel free to send additional comments to the WEC Africa Regional Coordinator, Dr. Latsoucabé Fall, since the time for discussions were rather short. The message is that we should try and entrench the principle of energy efficiency in our day-to-day activities so that energy efficiency consciousness would become a way life.



WEC AFRICA FORUM ON ENERGY EFFICIENCY
8th – 9th January, 2007 - ABUJA, NIGERIA

“Making Energy Efficiency a Reality in Africa, not a Myth”

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