ISSN 2229-5518

RENEWABLE ENERGY FINANCING:

Towards a Financing Mechanism for Overcoming Pre-Commercialization Barriers of Renewable Energy Financing System in Nigeria

Kaisan Muhammad Usman, Aminu Haruna Isa, and Johnson Oluyemi Ojosu

ABSTRACT

Nigeria is exploiting a new way of boosting its energy supply by utilizing all its available renewable energy resources. As a way of tackling the persisting energy crises in the country, renewable energy technology is being introduced into the nation's energy supply mix. However, the utilization of renewable energy technology innovation process is influenced at different stages by technology-push and market-pull forces that need to be managed and balanced by technology innovators, governments, financiers and eventually end-users. The problem today in Nigeria is the pre-commercialization financing gap that plaques new technology utilization developments and the financing mechanism needed to overcome these problems. Such financing gap is as a result of the quality of financing intermediation, debtor information, cost to banks and financing needs of renewable energy technology firms. In solving this problem, we considered three financing aspects of renewable energy technology that target the enhancement of the financing sector performance, such as sources of financing, policies for mitigating financing barriers and financing mechanism. The result shows that the development of renewable energy technology to sustainable use depends on financing mechanism that targets the pre-commercialization financing gap.

KEY WORDS: Renewable energy, Sources of financing, Policies and Financing mechanisms

INTRODUCTION:

The Government of the Federal Republic of Nigeria has taken bold steps and has put together solid plans and various initiatives to ensure a permanent solution to the country's energy crises, by introducing renewable energy (RE) into its energy supply mix. Policies and strategies have continuously been formulated by the government to project its energy demands and supplies for decades yet to come. The National Renewable Energy Master Plan has been developed by Energy Commission of Nigeria (ECN); and this recommended that 23% of the national energy supply mix should come from renewable energy technology1 (RET). There are several renewable energy technology (RET) projects that are being carried out in the country. However, one of the most important parameters needed to achieve the successful implementation of the National Renewable Energy Master Plan is the financing mechanism of the RE projects. Presently, RE is on the agenda and it has gained a strong momentum, despite this, RE projects still face serious constraints hampering their further development and commercialization. Hence, significant improvements in energy efficiency and conservation and a transition to renewable energy (RE) in Nigeria will require huge investments in the national, state and local energy infrastructures over the coming decade2. These investments will

- ***Engr. Kaisan Muhammad Usman is a Scientific Officer, Energy Management, Training and Manpower Development, Energy Commission of Nigeria, Abuja, Nigeria***
  E-mail: engineer.kaisan@gmail.com PH: +2348036943404
- ***Mr. Aminu Haruna Isa is a Senior Scientific Officer, Energy Planning and Analyses, Energy Commission of Nigeria and a PhD Candidate in University of Abuja, Nigeria***
- ***Engr. J. O. Ojosu is the Director energy Planning and Analyses, Energy Commission of Nigeria.***

need to come from both the public and private sectors, and they will have to take many forms: including financial incentives from government; loans and capital investment from banks, private investors, venture capital funds and communities; as well as new innovative markets that contribute to the benefits of RET. Financing sources will include venture capital, share raised capital, energy bill charges (public benefits or lines charges), financial institutions, community development funds and general tax revenues.

RETs are unique in that they require higher up-front investment than conventional energy sources, while at the same time providing multiple benefits that are not reflected in their cost. Hitherto, Nigeria lags behind other African countries like South Africa and Egypt, in its support for RE investment3. Innovative strategies and policies are therefore needed to increase investment, spread cost over the life cycle, and reflect the multiple benefits of renewable energy. In this regard, Nigeria needs to:

Make a strong political commitment to RE and their many benefits such as economic development, job creation, energy security and reliability;

Implement ecological tax reform in which financial incentives for conventional energy sources such as oil, gas, coal are significantly reduced and diverted into incentives for RE;

Make changes to public support (tax breaks, subsidies, royalty reductions) of conventional energy to divert investments into RE, especially at the local level; and

Provide and training other programs that build national infrastructure to manufacture, assemble, distribute, install, operate and maintain all types of centralized and distributed RE technologies.

Policy implications: experience from developed countries

The European community has already issued directives on energy efficiency and Green Power and is working on one for Green Heat. This will establish a sound long-term investment environment for RE. In the US, state level policies are leading the way in encouraging investment3.

2.1 POLICIES THAT LEVERAGE INVESTMENT IN RENEWABLE ENERGY

Countries such as Spain, Germany, India, Italy and the United Kingdom as well as some States in the US are leading the world in the implementation and manufacturing of renewable energy systems, such as wind turbines and solar systems. These efforts provide clear examples of what can be quickly achieved when the right policy mechanisms are in place. Their leadership and success is based on a set of common factors4:

• Very active political commitment to renewable energy;

• Supportive education initiatives for R&D, training and public awareness;

• Strong incentive systems to achieve wide public participation; and

• The implementation of supportive

Policies such as renewable energy standing-offer contracts or FIT, renewable energy obligations and financial incentives.

TABLE 1

SUMMARIZES SOME OF THE POLICIES USED TO MAXIMIZE INVESTMENT.

Country	Index	Policies
Spain	1	Carbon penalties on fossil fuels Potentials of fixed (standing offer) of market –based tariffs for renewable power sources Solar thermal incentives
United States	2	Renewable energy production tax credit State renewable portfolio standards and renewable energy certificate markets

Germany	3	20-year guaranteed feed-in-tariff/standing offer National target for 2010 and 2020
United Kingdom	4	Certificate based renewable obligations
India	5	Regional (state)feed-in-tariffs/standing offer State level renewable obligations
Italy	6	Renewable obligations and green certificates program (with long term value)

In Germany, the renewable energy sector plans to invest 200 billion euros in renewable energy by 2020, which is 15 times the announced investment in new coal power plants5. Germany's goal is to have more than 20% of its energy consumption from renewable energies by 2020. The long-term nature of Germany's commitment to a strong target and a variety of ownership models is responsible for these high investment projections. Successful policy approaches for encouraging investment in Germany have included legislation that guarantees access to the power grid and fixed tariffs over 20 years for private investors in renewable energy generation. Germany has also introduced an energy tax to reduce energy consumption, and it provides subsidized loans for investments in energy efficiency.

The California Solar initiative is a comprehensive set of policies designed to leverage investment in 3GW of solar photovoltaic power systems on new buildings. The initiative includes a public-benefits charge to raise public funds that will provide rebates to builders. The remaining costs will be passed on to building owners through mortgages and leases5.

R.E. FINANCING GAPS /BARRIERS IN NIGERIA

Experience shows that the cost of RET falls approximately 20% every time accumulated production doubles2. The result of gaps/barriers puts Nigerian RE at an economic, regulatory, or institutional disadvantage relative to other forms of energy supply. These gas/barriers include continuous subsidies for conventional forms of energy, high initial capital costs of RET, imperfect capital markets, and lack of skills or information, also poor market acceptance, technology prejudice, financing risks and uncertainties. Many RETs are commercially available but still in the cost-reduction phase. They also face many non-price market barriers; however, such as lack of consumer understanding and capability, lack of pproduct and service availability, nevertheless, three broad categories of barriers are discussed in this section4.

COSTS AND PRICES THAT UNFAIRLY DISTORT R.E. FINANCING IN THE NIGERIAN MARKETS

There has been argument that RE "costs more" than other energy sources, resulting in cost-driven public decisions that avoid RE. In practice, this comparison can be distorted by a variety of factors. For example, the initial capital costs for RET are often higher on a cost-per-unit basis (i.e., $/kW), but this argument is not based on the total "lifecycle" costs, that is, the initial capital costs; future fuel costs; future operation and maintenance costs; decommissioning costs; and equipment lifetime. Also, part of the distortion for the comparisons goes like: What are fuel costs going to be in the future? How should future costs be discounted to allow comparison with present costs based on expected interest rates? The uncertainties inherent in these questions affect cost comparisons. Existing analytical tools for calculating and comparing costs can discriminate against RE if they do not account for future uncertainties or make unrealistic assumptions6.

i. SUBSIDIES FOR COMPETING FUELS

Large public subsidies, both implicit and explicit, are channeled in varying amounts to all forms of energy, which can distort investment cost decisions. Organizations such as the World Bank and International Energy Agency put global annual subsidies for fossil fuels in the range of $100-200 billion, although such figures are very difficult to estimate Renewable energy markets in developing countries6. Statistics released recently

shows that over 1.8 trillion naira is spent by the three tiers of government (federal, state and local) on oil subsidy between 2006 and 20087. Large subsidies for fossil fuels like this is responsible for lowering final energy prices in, putting renewable energy at a competitive disadvantage if it does not enjoy equally large subsidies.

ii. HIGH INITIAL CAPITAL COSTS

Despite lower fuel and operating costs enjoyed by RE on a life-cycle basis, provides less installed capacity per initial dollar invested than conventional energy sources. Thus, RE investments generally require higher amounts of financing for the same capacity as conventional. Depending on the circumstances, capital markets may demand a premium in lending rates for financing RE projects because more capital is being risked up front than in conventional energy projects. Taxes and import duties may also exacerbate the high first-cost considerations relative to conventional energy technologies and fuels8.

iii. UNFAVORABLE POWER PRICING RULES

Due to unleveled playing field in Nigeria and lack of RE Feed-In-Tariff (FIT), RE sources feeding into an electric power grid may not receive full credit for the value of their power. Two factors are at work. First, RE generated on distribution networks near final consumers rather than at centralized generation facilities may not require transmission and distribution (i.e., would displace power coming from a transmission line into a node of a distribution network). But utilities may only pay wholesale rates for the power, as if the generation was located far from final consumers and required transmission and distribution. Thus, the "locational" value of the power is not captured by the producer. Second, renewable energy is often an "intermittent" source whose output level depends on the resource (i.e., wind and sun) and cannot be entirely controlled. Utilities cannot count on the power at any given time and may lower prices for it. Lower prices take two common forms: (i) a zero price for the "capacity value" of the generation (utility only pays for the "energy value"); (ii) an average price paid at peak times (when power is more valuable) which is lower than the value of the power to the utility—even though the renewable energy output may directly correspond with peak demand times and thus should be valued at peak prices6.

3.2 LEGAL AND REGULATORY

i. LACK OF LEGAL FRAMEWORK FOR INDEPENDENT POWER PRODUCERS

Up till in now, many countries' power utilities are in the hold of monopoly control on electricity production and distribution. A capital example is Nigeria. In these circumstances, in the absence of a legal framework, independent power producers may not be able to invest in renewable energy facilities and sell power to the utility or to third parties under so-called "power purchase agreements." 6

ii. TRANSMISSION ACCESS

Transmission access is necessary because some renewable energy resources like windy sites and biomass fuels may be located far from population centres. This access is also necessary for direct third-party sales between the renewable energy producer and a final consumer. Utilities may not allow favourable transmission access to renewable energy producers, or may charge high prices for transmission access.

iii. LIABILITY INSURANCE REQUIREMENTS

Small power generators (particularly home PV systems feeding into the utility grid under "net metering" provisions) may face excessive requirements for liability insurance. The phenomenon of "islanding," which occurs when a self-generator continues to feed power into the grid when power flow from the central utility source has been interrupted, can result in serious injury or death to utility repair crews. Although proper equipment standards can prevent islanding, liability is still an issue.

3.3 MARKET PERFORMANCE

i. Lack of access to credit. In Nigeria, consumers or project developers may lack access to credit to purchase or invest in renewable energy because of lack of collateral, poor creditworthiness, or distorted capital markets. Likewise, in rural areas of Nigeria, "microcredit" lending for household-scale renewable energy systems does not exist. Available loan terms may be too short relative to the equipment or investment lifetime. In Nigeria, RE power project developers will have difficulty

obtaining bank loans because of uncertainty as to whether utilities will honour long-term power purchase agreements to buy the power4.

ii. PERCEIVED TECHNOLOGY PERFORMANCE UNCERTAINTY AND RISK

Lack of familiarity with renewable energy technologies can lead to perceptions of greater technical risk than for conventional energy sources. This is because of the little or no experience with them in a new application or region. These perceptions may increase required rates of return, result in less capital availability, or place more stringent requirements on technology selection and resource assessment. Utilities may be hesitant to develop, acquire, and maintain unfamiliar technologies, or give them proper attention in planning frameworks.

iii. LACK OF TECHNICAL OR COMMERCIAL SKILLS AND INFORMATION

Markets function best when everyone has low-cost access to good information and the requisite skills. But in specific markets, skilled personnel who can install, operate, and maintain renewable energy technologies may not exist in large numbers. Project developers may lack sufficient technical, financial, and business development skills. Consumers, managers, engineers, architects, lenders, or planners may lack information about RET characteristics, economic and financial costs and benefits, geographical resources, operating experience, maintenance requirements, sources of finance, and installation services. The lack of skills and information may increase perceived uncertainties and block decisions.

STRATEGIZING R.E. FINANCING TO COMMERCIALIZATION IN NIGERIA

Today, with the pre-commercialization financing state of RE financing in Nigeria, we need to consider three financing strategies in order to move ahead:

Sources of financing: Sources of financing such as loans, investment capital, environmental markets, international facilities and partnerships; including financial institutions that lend to developers of new facilities like solar, wind farms, or bio-fuel production plants. These institutions also lend to energy users who purchase renewable energy equipment.

GOVERNMENT POLICIES FOR LEVERAGING INVESTMENT IN R. E. SUCH AS MARKET TRANSFORMATION, FINANCIAL SUPPORT

Financial incentives such as production or user tax credits, standing-offer contracts that provide a fixed higher tariff for renewable power and/or direct financial assistance in the form of rebates or free installation, are effectively a public source of financing. Regulation includes removing inefficient and conventional investment options from the market through performance requirements in building codes and equipment standards. Legally binding targets for RE can also be set. Market support policies include certification and training, information and technical assistance to users, market transformation, infrastructural development and other programs that remove investment barriers.

RE financing mechanisms: Financing mechanisms such as micro finance, on-bill payment, leasing/rental, local improvement charges, allow the purchaser or developer to pay back a loan or provide a return to investors at a rate less than or equal to the income or savings achieved. For example, micro-credit schemes used in many developing countries allow buyers of solar-home systems to pay for the system at the same rate as they would have had to pay for kerosene or battery charging. If a building efficiency improvement is financed by a municipality and repaid as a local improvement charge, the cost is associated with the property and not the owner, allowing transfer of costs and benefits from owner to owner.

INNOVATIVE FINANCING MECHANISMS FOR THE PRE-COMMERCIALIZATION FINANCING GAP PROBLEM IN NIGERIA

Innovative approaches are needed at the national and regional level to allow the up-front costs of RE to be spread out over the lifetime of the technology, and to monetize the multiple benefits of RE. There are a number of ways to help spread upfront costs over a period long enough to provide a positive cash flow for renewable energy developers: providing revolving funds for micro-finance and renewable energy technology and service bundling programs into larger investments; offering guarantees to reduce loan risk; and providing long-term purchase agreements for renewable power, heat and fuels9.

These innovative market financing mechanisms include:

(i) the issuing of green and white certificates; the issuing of certificate for verified RE production referred to as green certificates and are now being applied to energy savings referred to as white certificates. France and Italy have had a white certificate program in place for a number of years, and several EU countries have set up the Euro White Certificate project10. The market for green or white certificates includes utilities that are legally required to meet renewable energy or energy efficiency targets as well as individuals, organizations and socially responsible corporations that want, voluntarily, to "green" their energy purchasing. Some companies are now also becoming investors—moving beyond purchasing green energy to also investing in it9.

(ii) Use of local charges: a new option for financing long-payback energy efficiency and renewable energy improvement in buildings is the use of local improvement charges. The cost of the renewable energy equipment or building upgrade is financed by the municipality and repaid through the property tax system. By associating the cost with the property and not the owner, the cost and benefits are passed from owner to owner, allowing equipment of a much higher cost to be installed. This option would be ideal for financing a distributed generation system (e.g. cogeneration, solar PV) that sells power to the grid under a long-term standing-offer FIT contract.

(iii) Risk reduction: is another important practice for developers of RE. Delays, cost overruns, resource uncertainty (in quantity and in price), technical risk, maintenance costs, sales price/volume, renewable energy premiums and tax environment are all risks that need to identified and managed. Because investors and lenders typically have a low threshold for risk, RE investments will only grow as low-risk projects become available.

DISCUSSION OF RESULT AND RECOMMENDATION

The suggested implementation strategies are strategies are divided into three for easy implementation by the various stakeholders.

STATES AND LOCAL GOVERNMENTS STRATEGIES

States and local governments should come up with programs that will maximize private, community and public investment in RE. These programmes should be part of a politically-supported, comprehensive policy strategy which includes targets and milestones, financial incentives, new funding sources, regulations, capacity building and training. The following are ways to supporting RE investment in states and local government levels:

• Provide incentive mechanisms such as FIT, renewable portfolio standards (RPS), renewable energy certificates.

• Take action to remove all barriers to renewable energy investment and installation, including requirements for solar readiness in building codes; updates of electrical, plumbing and building codes; and training of inspectors.

Support policies that encourage community investment in and ownership of renewable energy systems including community finance funds, training and legal framework.

FEDERAL GOVERNMENT ENABLING POLICIES AND SUPPORT

The federal government should play a leadership and enabling role to increase investment in and financing of renewable energy as part of a national strategy so that Nigeria can become an attractive place to invest in these resources. Specifically, the objectives of the federal government should be to remove barriers, level the playing field, and maximize private and public investment:

LEADERSHIP

This is the role needed for the federal government to take in implementing the recommendation

FINANCING

• Establish a national RE investment facility with major banks and credit unions. Investment targets should be set for each technology and end-use.

• Encourage the private sector to establish more venture capital funds for investment in/and debt financing of RE.

• Develop and implement a national RE industrial development and infrastructure action plan which will that include financial support for commercialization and cost reductions in manufacturing; training and certification of the designers, installers, operators and inspectors of large and distributed systems; financial incentives for manufacturers, builders, suppliers, etc.; and risk-reduction strategies for project developers.

• Support innovative financing strategies such as a national tradable certificates system (green and white certificates) for RE investments that would work with national or states portfolio standards and municipal financing using local improvement charges.

• Make changes to the public support (tax breaks, subsidies, royalty reductions) of conventional energy to divert investments into RE, especially at the local level.

• Provide training and other programs that build a national or state level infrastructure to manufacture, assemble, distribute, install, operate and maintain all types of centralized and distributed RETs.

• Take action to remove all barriers to RE investment and installation, including requirements for solar readiness in building codes; updates of electrical, plumbing and building codes; and training of inspectors.

Support policies that encourage community investment in and ownership of RE systems including community finance funds, training and legal framework.

PRIVATE SECTOR INVESTMENT AND OTHER STAKEHOLDERS

Private and other non-governmental organizations can also play an important role in financing the transition to sustainable RE production and utilization:

• Municipalities can encourage community investment in RE through the establishment of community power corporations, green funds and the use of local improvement charges for project financing.

• RE industries can join with NGOs and other stakeholders in holding finance forums, advocating more support for investment and local manufacturing. They can work with government and stakeholders to increase Nigeria's investment attractiveness.

• NGOs can work with all stakeholders to lobby for investment supportive policies in Nigeria. They can participate in all global networks that support the establishment of an International Renewable Energy Agency and Investment Bank.

Socially responsible corporations and institutions can purchase green energy (power, fuels, and heat) by buying tradable certificates and investing in community power and fuels projects.

International financial institutions can set meaningful and ambitious RE targets, with part of the funding allocated to the development of energy commodities markets in the six-geo political regions of the federation. The granting capacity of the Global Environmental Facility (GEF) should be increased. A renewable energy investment attractiveness index that includes sustainable and local development value in its metrics needs to be developed for all the states.

CONCLUSION

RE financing in Nigeria is crucial to the maximizing of national transition to RE utilization on a larger scale. Today, RE has not gone far beyond the R&D, and to achieve a transition to commercialization stage, we suggested in this paper iinnovative financing mechanisms such as: the issuing of green and white certificates for verified RE production and carbon reduction respectively; the use of local improvement charges including FIT to pass benefits from utilities to investors; risk reduction for institutional framework, are all needed because of the unique features of RET. Successful implementation of the Renewable Energy Master Plan, Government commitment and policies to leverage investment are the keys to success.

States and local governments can play important roles in attracting investment through standing offers and Renewable Portfolio Standards. The federal government must show leadership at the national level and international level by providing

financial incentives, removing barriers and levelling the playing field.

REFERENCES

ECN (2005). National Renewable Energy master Plan.

Global Village Energy Partners (2010), Innovative financing for low-carbon development in Africa: http://www.gvep.org/

International Energy Agency. (2003). Renewable Energy Policies and Measures in IEA Countries. Paris.

Press Release (2006): "Renewable Energy Branch wants to invest 200 billion Euros in Germany." Information Campaign for Renewable Energy, http://www.unendlich-viel-energie.de/index.php?id=239

Renewable Energy World (2006), Vol. 9, No. 2, p.22.

Fred Beck and Eric Martinot 2004: Renewable Energy Policies and Barriers Encyclopedia of Energy, Cutler J. Cleveland, ed. (Academic Press/Elsevier Science).

Momodu S. (2010) "Fuel Subsidy: How FG Burnt N2 trillion in Four years." This Day, February 2 and May 30.

Martinot, E., Chaurey, A., Moreira, J., Lew, D., Wamukonya, N. (2002). Renewable energy markets in developing countries. Annual Review of Energy and the Environment 27: 309-348.

Jennifer I., Julie A. and Matthew B. (2008): Appraisal Guide for Microfinance Institutions: Revision of 1999 Appraisal Handbook.

Morrison J. (2006). "Moving Renewable Energy beyond Green Tags." North American Wind Power, April, p. 26.