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Towards renewable energy development in Nigeria

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ABSTRACT

Access to energy has been found to affect attainment of sustainable development of a country. Poverty, unemployment, and other developmental problems facing Nigeria have been traced to unavailability of energy for both domestic and industrial purposes. In recent times, government has been active in developing the renewable energy sector to meet the country's energy need. But this has been hampered by many problems. This paper identifies some of these problems, which include absence of policy, legal and regulatory framework, non-existence of framework for Power Purchase Agreements (PPA), weak institutional framework, high initial capital costs, lack of technical or commercial skills and information, public awareness, subsidies for competing fuels, and corruption, and ways of turning the situation around were suggested. The paper however concludes that if the government, private investors, research institutions, various agents of government and the general public can join hands together, these barriers would be overcome and adequate energy provided for the Nigeria citizen.

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Introduction

Energy availability has been found to be closely related to sustainable development in a country. This is so because energy is needed for both domestic and industrial purposes. It has been discovered that to meet the energy demand in homes and factories, renewable energy must be explored and utilized. Renewable energies are essential contributors to the energy supply portfolios as they contribute to world energy supply security, reducing dependency on fossil fuel resources, and provide opportunities for mitigating effects of greenhouse gases (Awogbemi and Asaolu, 2008, Ikuponsi, 2004, Bashir, 2007).

Nigeria is endowed with abundance of renewable and non-renewable energy resources. However, the National energy supply is dependent on fossil fuels and firewood. Fossil fuels made up of 94% of exports from Nigeria in 2006 with only a small fraction of this available for domestic use. Only about 40% of households in Nigeria are connected to the national electricity grid (Akpu, 2012, IEA, 2007).

Saying that Nigeria is naturally endowed is saying the obvious. It is also obvious that Nigerians lack access to electricity despite various policies and reforms put in place by successive governments. For example, in 2001, the government started off with reforms, terminating the monopoly status of the Nigeria Electric Power Authority (NEPA) and inviting private sector participation in the electricity sector. The reform enabled the development of the National Electric Power Policy (NEP) which was approved in 2003 (Nnaji et al, 2010). The NEP was approved with the overall theme of optimal utilization of the nation's energy resources; both conventional and renewable, for sustainable development, and with the active participation of the private sector. The Renewable Energy Master Plan (REMP) was put in place to provide a roadmap for the effective implementation of the renewable energy component of the NEP. The REMP articulates Nigeria's vision for achieving sustainable development, a road map for renewable energy to help achieve this vision;

The Plan also envisions:

- * Gradually moving from a fossil economy to one driven by an increasing share of renewable energy
- * Exploiting renewable energy in quantities and at prices that will promote the achievement of equitable and sustainable growth
- * An energy transition from crude oil to a less carbon intensive economy increasingly powered by gas and Renewable Energy (Nigeria Country report).

Government, through the Federal Ministry of Power and Steel, enacted the Renewable Electricity Policy Guidelines in December, 2006, to pursue vision of renewable energy in the power sector to achieve an accelerated sustainable development through increased share of renewable electric power to the national electricity supply. The policy guidelines recognized only four forms of renewable energy, namely hydropower, solar, biomass, and wind. Beyond large hydropower, the current total contribution of renewable energy in Nigeria's electricity industry is about 35MW composed of 30MW small hydropower and 5MW solar PV, an abysmal 0.6% of total nominal electricity generating capacity in Nigeria.

Government therefore set the Nigeria's Renewable Energy targets as follows (Zumunta M. D, 2013, Bashir, 2007):

- 18% electricity from renewables by 2025
- 20% electricity from renewables by 2030
- 100 MW small hydro capacity by 2015 and 760 MW by 2025
- 300 MW solar PV capacity by 2015 and 400 MW in 2025
- 40 MW wind capacity by 2025
- 5 MW biomass fired capacity by 2015 and 30MW by 2025

These national electricity targets are expected to be met through the following strategies: (FGN, 2006).

- Grid-based extension for proximate areas;
- Independent mini-grids for remote areas with concentrated loads where grid service is not economic or will take many years to come; and
- Standalone renewable electricity systems for remote areas with scattered small loads.

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These targets are too low when compared with other Africa countries targets as shown in Table 1

Country	Renewable energy target	Target year
Cameroon	50% / 80%	2015 / 2020
Cape Verde	50%	2020
Ghana	10%	2020
Madagascar	75%	2020
Mauritius	65%	2028
Niger	10%	2020
Nigeria	7%	2025
Rwanda	90%	2012

Figure 1. Renewable energy targets in Africa. Source: UNEP 2012

The 7% renewable energy targets by Nigeria by the year 2025 might not be realizable due to some problems and barriers. These barriers often put renewable energy at an economic, regulatory, or institutional disadvantage relative to other forms of energy supply (Beck and Martinot, 2004). are too important to be ignored if Nigeria is to be energy sufficient in the nearest future. This paper highlights these barriers and suggests possible solution.

Barriers to renewable energy development

Renewable Energy development in Nigeria has been sporadic in the absence of a comprehensive framework to plan, coordinate and implement a national policy and strategy. The Energy Commission of Nigeria has a few technology-driven pilot projects on solar PVs, two wind power demonstration projects located in Sokoto, and a small hydro plant that has been operating in Jos for several years. Vast opportunities for small hydro remain either untouched or not fully developed (Awogbemi and Ojo, 2009). Recently several state governments have embarked on solar projects for rural water supply, residential lighting and lighting of clinics, roads, schools and community centers (Bugaje, 1999). These and several other contemplated initiatives have not been able to fully realize its potentials because of the following barriers:

Policy, Legal and Regulatory Framework

Achieving adequate energy supply where renewables play a role necessitates the creation of appropriate policy framework of legal, fiscal and regulatory instruments that would attract domestic and international investments. Clear rules, legislation, roles and responsibilities of various stakeholders along every stage of the energy flow from supply to end-use are key elements of the overall policy framework needed to promote renewable energy technologies. Such policy, legal and institutional frameworks are at an ascent stage in Nigeria and are being developed under the reform program (Efurumibe, 2013). The inconsistency in the formulation and implementation of policies, legal and regulatory framework does not give room for long term planning by players in the renewable energy sector. Where the necessary policy and legal instruments are in place, lack of implementation has made the policies and legal framework a mere academic document.

Non-existing Framework for Power Purchase Agreements (PPA)

The importance of a detailed power purchase agreements between investors and government cannot be over emphasized. Without the PPA, investors, and lenders are not sure when to recoup their investments. Currently there is no PPA framework for renewable energy generation to the grid. A system of rational expectations between renewable electricity producers and the grid operators are an imperative for the growth in grid-based renewables. The PPA sets the terms by which power is marketed

and/or exchanged. It determines the delivery location, power characteristics, price, quality, schedule, and terms of agreement and penalties for breach of contract. Legally binding long-term PPAs are a must, as they provide comfort to the developers as well as lenders, and would also encourage the expansion of renewable electricity development through investments (Efurumibe, 2013). With this kind of scenario, developers, investors, and lenders are not sure of what to expect from their investments and therefore reluctant to invest their money.

Institutional Framework

In Nigeria, coordination between government Ministries and agencies responsible for rural development and renewable energy development is weak and rather complex (Efurumibe, 2013).

The Energy Commission of Nigeria ECN appears to only exist on the pages of paper. The master plan recently launched has not been put into valuable use. The lack of a clear champion robs the sector of a driving force for its growth and development. The new Electricity Law is expected to facilitate the establishment of a Rural Electrification Agency and a Rural Electrification Fund. These developments will facilitate renewable energy development if fully harnessed (UNEP, 2012). The various institutions involved in the planning and implementation of renewable energy policies and programs should be managed and coordinated by professionals, and not politicians for maximum efficiency.

High initial capital costs

Even though lower fuel and operating costs may make renewable energy cost competitive on a life-cycle basis, higher initial capital costs can mean that renewable energy provides less installed capacity invested than conventional energy sources. Thus renewable energy generally requires higher amounts of financing for the same capacity. Renewable energy technologies also face high taxes and import duties. These duties often exacerbate the high initial cost considerations relative to other technologies and fuels. (Beck and Martinot, 2004).

Apart from the higher capital costs most renewable energy technologies (RET) face the barrier of being perceived as untested technologies. Given these twin barriers to RET, investors face higher risks and uncertainties when making investment decisions. Therefore in a capital constrained economy like Nigeria, where there are many competing demands for available scarce capital resources, the promoters of RET face the problems of high transaction costs and restricted access to capital.

End users of RET, especially the poor, face problems of access to credits. Lack of access to micro financing, high interest rates, poor business development skills by system vendors and unsupportive climate for investments are some of the primary barriers to market growth (Efurumibe, 2013).

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. Also project developers lack sufficient technical, financial, and business development skills. Consumers, managers, engineers, architects, lenders, or planners also lack requisite information about renewable energy technology characteristics, economic and financial costs and benefits, geographical resources, operating experience, maintenance requirements, sources of finance, and installation services. (Beck and Martinot, 2004).

Also, capacity building in four areas are most lacking, namely; training of manpower to install, operate and maintain

RET, development of manufacturing capabilities, development of critical mass of scientists, engineers, and economists, and design and effective functioning of institutional framework.

Public Awareness

Awareness of the opportunities offered by renewable energies and their technologies is low among public and private sector stakeholders. This lack of information and awareness creates a market distortion that results in higher risk perception for potential renewable energy projects. The general perception is that RETs are not yet mature technologies, hence are only suited for niche markets and even then will require heavy subsidy to make it viable.

There is therefore a need for dissemination of information on RE resource availability, benefits and opportunity to the general public in order to raise public awareness and generate activities in the sector. Such process is key to building public confidence and acceptance of RET. Providing information to selected stakeholder groups like the investors can help mobilize financial resources needed to promote RET projects. The Renewable Energy Master Plan proposes the setup of a National Renewable Energy Development Agency (NREDA), which together with non-governmental organizations (NGOs), can assist in increasing public awareness and providing information and assistance to interested stakeholders (Nigeria country report).

Subsidies for competing fuels

Large public subsidies, both implicit and explicit, are channeled in varying amounts to all form of energy, which can distort investment cost decisions. Public subsidies can take many forms: direct budgetary transfers, tax incentives, R & D spending, liability insurance, leases, waste disposal and guarantee to mitigate project financing or fuel price risks. Large subsidies for fossil fuels can significantly lower final energy prices, putting renewable at a comparative disadvantage if it does not enjoy equally large subsidies (Beck and Martinot, 2004).

Corruption

According to available statistics from various international organizations, Nigeria is one of the most corrupt countries in the world. This has negatively affected all the developmental plans and reforms of governments at various levels. Every year, governments budget huge sums of money for its reform programs not only in the energy sector but also in other sectors of the economy but these has not have any appreciable impact on the lives of the people because these monies are either mismanaged through contract inflation or end up in private pockets (Awogbemi and Asaolu, 2008). The anti-corruption agencies have been rendered impotent due to high level political considerations and patronage. For these reforms to work, corruption must be tackled head long.

Solution

In order to overcome the barriers enumerated above, the following suggestions will be of immense help.

- (i) To compliment the strategies to achieve the Millennium Development Goals especially the goal on environmental sustainability, the use of renewable energy should be encouraged.
- (ii) Government should develop policies and strategies to promote the use of renewable energy and promote energy efficiency practices and technology.
- (iii) Establish an awareness program to help stakeholders harness international potentialities on renewable energy and sustainability and transfer such to state and local government levels.

(iv) Government should invest in the renewable energy sector and make the products affordable to the Nigerian people.

(v) More research and training centres should be established by the federal and state governments to ensure speedy development of renewable energy and energy efficiency practices

(vi) The Federal Government, through the relevant ministries and the Nigerian University Commission should put in place mechanisms to ensure effective collaboration between research institutions, universities and relevant government agencies to develop affordable renewable energy and energy efficiency technologies.

(vii) Private sector should be given the right environment and encouragement by the Government to engage in the development of renewable energy and energy efficiency

(viii) Government, NGOs and development agencies should sensitize and encourage stakeholders to adopt the use of renewable energy and energy efficiency technology and practices

(ix) Government should develop a school curriculum that will teach students to shun the degradation of the environment and use energy more efficiently.

(x) Various anti-corruption agencies should be strengthened and well-funded and allowed free hand to operate and effectively prosecute all cases of corruption.

Conclusions

Nigeria as a large oil and gas economy poses an uneven playing field for renewable energy development. There is substantial flow of resources and policy attention to the fossil fuel sector. This makes it difficult for renewable energy to gain a foothold. Certain subsidies for fossil-fuel conventional energy technologies create a barrier for renewable energies to achieve a higher market share. Presently, technology imports for conventional electricity production carry a much lower tariff than renewable energy electricity technologies. This penalizes the growth of the market for renewables.

Similarly, external costs – including environmental, health, and safety- which are often significant in conventional energies are generally not taken into account in market prices of these energy carriers. In addition, benefits of renewable energies such as increased employment are often not reflected in the energy market conditions.

Efforts should be made towards leveling the playing field, by helping to understand the limits and potential of renewable energy, raising awareness and confidence in renewable energies, building capacity, improving the policy framework, and developing innovative applications in other sectors as well as innovative financing and business models in order to improve the market conditions and enabling environments for renewable energy.

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