

Reducing Carbon Footprint Using Renewable Energy, Distributed Generation and Smart Government Policies

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ABSTRACT

With continued and increased global outcry to the insidious effects of continued exploitation of fossil fuels and gas flaring on the environment as evidenced by climate change, attention has in recent times been turned to alternative and more efficient means of energy generation that pose less threats or damage to the environment. Utilizing such alternative means of energy generation has seen an increase in technological advancements as regards exploitation of such natural elements as sunlight, wind, tides, hydro etc. in meeting our varied energy demands. These alternative energy sources commonly referred to as renewable energy sources (RES) now constitute the global trend as not only are they providing access to clean energy in distant and remote areas, but also redefining the way our electricity grid now works. With the enormous problems associated with centralized generation and transmission of electricity vis-à-vis line losses and system reliability, coupled with the inability of the grid to effectively cover every nook and cranny of the country, attention is being put on practical and effective means and ways of integrating these RES into our electricity network. One of such means that have been evolved is Distributed Generation (DG) which seeks to decentralize electricity generation and displace demand by generating at load centres. Acting as stand-alone systems, their presence in Nigeria is gradually beginning to be felt. This paper seeks to examine the impact of RES and DG in select cities around the world in addressing issues of poverty eradication, climate change, transmission line losses etc., while also appraising the impact government policies have had in influencing their growth. Existing policies on renewable energy and DG (if any) in Nigeria would be reviewed while solutions would also be proffered as Nigeria strives to meet the objectives of the Millennium Development Goals (MDGs), 2015, especially ending extreme hunger and poverty.

Keywords: insidious, environment, climate change, renewable energy, distributed generation, policies, poverty, hunger.

1. INTRODUCTION

As environmental concerns mount due to increase in activities that contribute to climate change, individual countries worldwide are gradually and consistently beginning to take a stance against such activities through the formulation of policies and legislations that seek to directly reduce their rise and impact. Increased funding into research and development (R & D) has led to the discovery of newer, innovative and more environmentally friendly technologies.

In meeting with the objectives of the Millennium Development Goals (MDGs) which among others include ensuring environmental sustainability and eradicating extreme hunger and poverty, energy has been opined to play a crucial role in the advancement of the standard of life of mankind (Sambo, 2008). It is the driving force behind industrialization as it provides a template and foundation for the smooth running of varied economies. Businesses and other ventures are known to coalesce within cities with sustained power generation and distribution as many businesses depend on power for their smooth running. It is widely accepted and observed that energy is the lubricant that oils the wheels of industrialization and “seeds” development.

The giant strides of some of the industrialized economies in the world as of today are acknowledged as seen in their energy consumption and importation of such commodities as crude oil, limestone, natural gas etc. Also, their “romance” with oil producing countries, as Iran, Iraq, Saudi Arabia, Angola, Libya and Nigeria in sub-Saharan Africa lends credence to this belief. Satisfying their thirst for energy becomes a matter of necessity and so alliances are forged in order to satiate such “thirsts” and keep their industries running. In observing the energy distribution of such countries, it is observed that energy access is a must even in the rural areas. In taking electricity to remote areas, technologies are evolved that allow for an even participation of the rural dwellers in the overall development of their country.

2. THE PROBLEM

Phenomenal industrial and economic growth witnessed in China, USA and even in selected parts of Nigeria is made possible to a large extent by the availability of cheap energy from fossil fuels. Recent occurrences though seem to cast doubts on the viability and sustainability of this cheap source of energy (Sarvapali et al, 2012) as their insidious effect on the environment coupled with environmental pollution allude to the fact that it has become imperative that in safeguarding the quality of life of the future generations, cleaner and more efficient energy sources are evolved.

Stimulated by environmental concerns in relation to climate change, the growing pressure to reduce carbon emissions from the energy sector has fuelled global interests in renewables, new and efficient technologies (Pudjianto et al, 2008) with a substantial commitment to the development and deployment of these technologies. This is consequent upon the fact that sustainable development is only feasible when there is a synergy and an un-harmful interplay between the environment, economy and energy as shown in Figure 1.1.

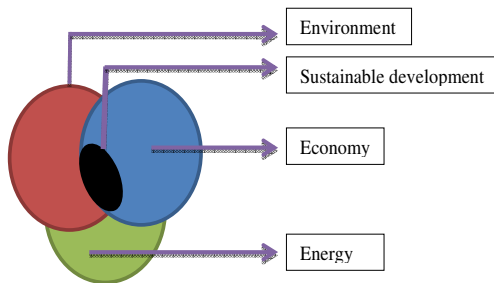


Fig 1.1: energy, environment and economy mix
Source: <http://energy.gov.ng>

This growing pressure (which as earlier posited is driven mainly by environmental concerns) for generating more electricity from renewables and improving energy efficiency, has promoted the application of Distributed Energy Resources (According to the IEEE Std 1547.1-2005 Distributed Energy Resources (DERs) or Distributed Resources (DRs) can be defined as sources of electric power that are not directly connected to a bulk power transmission system. DR includes both generators and energy storage technologies) into new and existing electricity grids.

2.1 Renewable Energy

In complementing and gradually phasing out conventional sources of energy that contribute immensely to climate change such as fossils, coal etc., attention has in recent times been turned to renewables. R & D into utilization of such natural and inexhaustible energy sources such as wind, sunlight, and tides has led to the production and mass deployment of solar panels, wind turbines and a host of other natural energy harvesters worldwide. Their unprecedented increase in recent times has to a large extent been fuelled by government policies being implemented worldwide that seek to checkmate further contribution to GHGs emissions, lessen environmental pollution, economic volatility and technological lock-in associated with 20th century energy development (Hughes, 2009).

3. THE CHALLENGES

As opined by Sambo, (Sambo, 2006), only about 40% of the country's population have access to grid electricity, while in the rural areas where about 70% of the country's population reside, only about 18% of rural dwellers have access to grid electricity. Such startling figures undermine the country's resolve at meeting the objectives of the MDGs. Sambo further posits that due to the sparse population distribution and difficulty in accessing them, connecting them to the national grid becomes uneconomical thus putting them in a disadvantage during the deregulation of the electricity market. Also, the country's centralized system of electricity distribution has not been able to cope with increased electricity demand and has been prone to frequent system collapse and grid failures. The stochastic nature of some renewable energy sources coupled with their intermittent nature also seem to pose a problem to the successful implementation of renewable technologies.

4. THE PROPOSED SOLUTION

As posited by Odubiyi and Davidson, (Odubiyi and Davidson, 2003), energy demand will continue to outstrip supply (in the short to medium term) reifying proposed views that with surging population increase, electricity demand will continue to increase. Oldfield (Oldfield, 2011) also opines that energy poverty can be addressed through the use smarter technologies. Corroborating Oldfield, Clarke (UNDP Report, 2011) posits that energy plays a central role in addressing two of the world's greatest challenges: fighting poverty and addressing climate change. Smart energy policies have the potential to fight poverty and address climate change simultaneously (Monyei, 2012).

Odubiyi and Davidson, (Odubiyi and Davidson, 2003) posit that distributed generation (DG) in developing countries, is ideally suited for small remote loads located far from the grid. In decentralizing electricity distribution and providing electricity access to rural dwellers, DG technology in the form of solar installations, wind farms, biomass, combined heat and power (CHP) etc. could be exploited. Distributed generation (DG) refers to an emerging evolution of the electric power generation systems, in which all the generating technologies available in a given centralised or decentralised region are integrated in the Power supply system according to the availability of their respective resources.

These resources are known as Distributed energy resources (DERs).It is further posited that reinventing the electricity grid is the eventual goal of DG. Implementing DG technology has a lot to offer (the rural dwellers) such as energy independence, financial optimization, equal or better power quality and a cleaner environment. In implementing DG technologies, we take advantage of such cutting edge innovative technologies as a virtual power plant (vpp) which aims at providing a framework for resource sharing and control among several DG systems, we allow for participation of the rural areas in the overall development of the economy, open them up to development while improving the living standard of the rural dwellers.

Austin Texas, Denmark, China and a host of other countries are currently pursuing the implementation of DG technologies by evolving policies and regulations that seek to assuage the initial costs and fast-track the deployment of this technology in a bid to decentralizing power supply thus increasing the penetration of electricity supply to rural areas and reducing GHGs emissions.

5. SMART GOVERNMENT POLICIES

In allowing for the successful execution of ideas and novel technologies, government policies are known to be the catalyst of same as they provide a frame-work and enabling environment for the eventual success of such schemes. In seeing to the success of this technology in Nigeria, there is the need for a more robust and legal frame-work as regards policy on the part of the government through its ministry of power and other parastatals as the Energy Commission of Nigeria (ECN), National Electricity Regulation Commission (NERC), Rural Electrification Authority (REA) etc. Smart legislations that provide for incorporating evolving technologies, protect, enhance and ensure electricity supply through renewables to rural areas, and also encourage investments in DG technologies be formulated and incorporated into our overall development plan. There is the need for the government to take urgent steps in addressing this issue of decentralizing power supply to foster development and encourage local technology and production by involving all concerned stakeholders, research institutes, universities, manufacturers etc. in coming up with a comprehensive policy. The government has to think 'smart'.

6. SUMMARY AND CONCLUSION

As the government engages in proactive steps in fulfilling its plans and objectives and in empowering its populace, there is the need for coalition between the Nigerian government and governments of other countries where these technologies are being implemented with promising signs. It is imperative and paramount that the government steps in and becomes more involved. Also, universities and research institutes in the country are enjoined to be current and up-to-date with modern trends and technology while also researching into local and cheaper ways of making energy (especially electricity) readily and cheaply available for rural dwellers. This calls for a collaborative and multidisciplinary approach as inputs are needed from every sector in ensuring that the objectives of the MDGs are met in time. Smart technologies and policies are key components in achieving this.

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