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DESIGNED TO FAIL? NIGERIA'S QUEST FOR BIOFUEL

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ABSTRACT

The quest for biofuels in Nigeria, no doubt, represents a legitimate ambition. This is so because the focus on biofuel production has assumed a global dimension and the benefits that may accrue from such effort may turn out to be enormous if the preconditions are adequately satisfied. As a member of the global community, it has become exigent for Nigeria to explore other potential means of bettering her already pulverized economy. However, the prospects of achieving this momentous feat appear to be pathetically bleak in Nigeria. Although the focus on biofuel production may be a worthwhile endeavor in view of Nigeria's development woes, but the paper argues that since Nigeria is yet to adequately satisfy the preconditions for such program, the effort may be designed to fail after all. To avoid this, the government must address key areas of concern such as food insecurity, environmental crisis and official corruption.

Key words: Biofuels; Development; Nigeria

INTRODUCTION

The production of biofuels has become a global agenda. Keeney and Muller (2007) describe this global effort as 'bioeconomy revolution'. In the Netherlands, in March 2006, the Dutch government set programmatic targets according to which biogenous fuels should make up at least 2 per cent of combined gasoline and diesel sales by 2007, and 5.75 per cent by 2010. Furthermore, the Dutch government planned to provide €60 million between 2006 and 2010 to promote innovative projects in the field of alternative fuels, in order to exhaust market potential as far as possible and maximize CO₂ reduction. In Germany, the Ministry of Finance proposed a biodiesel blending quota of 4.4 per cent in energy terms or 5 per cent in

volume terms starting on 1 January 2007. This corresponds approximately to 1.5 million tonnes of biodiesel, or about half of German biodiesel manufacturers' output. In Switzerland, there are pilot projects testing the practicability of alternative fuels involving vehicle fleets (Pastowski, 2007). The goals set by these countries are largely in line with the European Union (EU) targets.

The United States is already the largest producer of biofuels in the world. The US has set a production target at 132.6 billion litres of ethanol in 2017, which will mainly be produced from domestically grown maize. Just like the United States, Brazil is also a front runner in the production of biofuels. Brazil used to be the world's biggest producer and consumer of biofuels until the United States took over its position. Still, Brazil produces around 21 billion litres of ethanol a year of which over 90 per cent is consumed domestically (Sielhorst, Molenaar & Offermans, 2008). Japan and China also have ambitious biofuel targets. China, in particular, is hoping to use 6.3 billion liters of bioethanol in 2012, compared with 3.8 billion in 2006 (Sahel and West Africa Club (SWAC)/Organization for Economic Co-operation and Development (OECD), 2008).

Given the giant strides recorded by the countries above, it has become necessary for African countries to follow the same pathway. The industrialized countries of the West always pilot the affairs of development in the world. Little wonder, they are taking the lead once more in bioeconomy revolution, but this time with the involvement of Brazil, an emerging economy. Harnessing the development potentials of alternative energy sources such as biofuels would therefore constitute a noble goal for countries desirous of change like the poor nations of Africa. It is within this context that Nigeria's quest for biofuel is situated.

Nigeria's ambition to join the league of key producers of biofuel is a legitimate one. Development exigencies in Nigeria provide a justification for such effort. Fossil fuel sources such as oil and natural gas have been the main stay of Nigeria's economy. Oil in particular provides over 90 per cent of Nigeria's foreign exchange earnings, even though the oil sector of the economy contributes only 30 per cent to the GDP in comparison to 40 per cent from agriculture (Oniemola and Sanusi, 2009). Again, since independence, Nigeria has realized over \$300 billion in revenue from the oil and gas sector (Okonjo-Iweala, Soludo & Muhtar, 2003). Unfortunately, these huge earnings have failed to translate into real development for Nigeria. Despite being one of the world's largest exporter of crude oil and natural gas, 64 per

cent of the population live on less than \$2 per day and nearly a quarter of the population of the extreme poor in sub-Saharan Africa reside in Nigeria (Eleri, Nangavo, Onuvae & Ugwu, 2011). The socio-economic landscape has become precariously fragile because of the galloping poverty situation in Nigeria (Oshewolo, 2011). Given this scenario, investing in biofuels to promote employment, diversify Nigeria's source of income and choose a cleaner development pathway through low carbon energy alternatives would potentially contribute to poverty reduction.

Although the adoption of biofuels holds a diversity of opportunities and potentials for the Nigerian economy (Abila, 2011), there appears to be challenges. Unlike the other ambitious countries that are successfully implementing their biofuel programs, Nigeria is confronted with critical challenges that may lead the program to the path of failure. The paper analyzes Nigeria's faltering prospects of achieving its biofuel program, employing explanatory variables such as food insecurity and environmental crisis. If Nigeria is to successfully implement its biofuel objectives and promote low carbon sustainability, the paper argues that the challenges need to be effectively addressed.

WHY BIOFUEL?

The fundamental question now is why the global focus on biofuel? Why the bioeconomy revolution? Before providing plausible explanations, there is the need to define the term 'biofuel'. Biofuels include fuels derived from biomass (largely agriculturally produced materials which are renewable). These fuels which are produced based on technologies known as 'first generation' using agricultural food produce include but not limited to:

- **Ethanol**, used in petro engines, produced from plants containing starch (primarily corn but to a lesser extent wheat) and sugar (primarily sugar cane, marginally sugar beet);
- **Vegetable oil methyl esters (VME)** used in diesel engines, commonly known as **biodiesels** produced from vegetable oils (rapeseed sunflower, soya, palm etc.) (SWAC/OECD, 2008).

The second generation biofuels are sourced mainly from non-edible sources such as jatropha, algae, switchgrass, miscanthus, stems, leaves and husks. Many developing countries

however have not been able to leapfrog the first generation biofuels to embrace the second generation technologies. Furthermore, biofuels are termed green fuels due to low level emission of greenhouse gas (GHG) and are made from crops. Ethanol and biodiesel are mainly used as transport biofuels. Ethanol is a substitute for gasoline, and biodiesel can substitute diesel. A liter of ethanol has an energy content of some 75 per cent compared to gasoline; a liter of biodiesel contains 85 per cent of a liter of conventional diesel. Ethanol is the most important biofuel in terms of volume, accounting for over 85 per cent of globally produced biofuels (Sielhorst et al, 2008).

No doubt, the world is experiencing bioeconomy revolution. World ethanol production has risen from 17.5 billion liters in 2000 to 52 billion in 2007, a 200 per cent increase. As for biodiesel, output has risen from some 0.8 billion liters in 2000 to 10.2 billion liters in 2007. The OECD and FAO believe that these volumes could be multiplied by 1.6 for ethanol and by 2 for biodiesel between 2008 and 2017 (SWAC/OECD, 2008). The surge in global biofuel production is attributable to certain inherent development benefits. The production of biofuel is driven by geopolitical concerns of fuel prices, availability, and as a substitute for methyl tert-butyl ether (MTBE) which is volatile and flammable; realization that fossil fuel supply is finite; benefits for rural economies; high returns on investment (Keeney and Muller, 2007).

Governments around the world have developed biofuel policies in an attempt to increase energy security, increase rural development and decrease CO₂ emissions (Sielhorst et al, 2008). Biofuel production is driven by the motivation to redress trade imbalances through reduction in oil import bills and increase export earnings. It offers a great opportunity for diversifying energy sources and livelihood systems of rural communities through employment creation in the bioenergy industry, production and marketing of biofuel products (Jumbe, Msiska & Mhango, 2007). Biofuels are considered as a replacement for fossil fuels and the answer to poverty and even the climate crisis. They are presented as being both renewable and environment friendly (Bassey, 2010). Increasing attention is being focused on the production of biofuels as the alternatives that will contribute to global reduction in greenhouse gas emissions (Oniemola and Sanusi, 2009).

In Nigeria, the use of biofuels is anticipated to make significant impact on petroleum products quality enhancement in view of the current limitations of the fossil-based fuels

which have not kept pace with the increasing demand for environmentally friendly fuel. Other anticipated benefits include additional tax revenue for the government from the economic activities attributable to the industry; job creation, increased economic development and empowerment of rural communities; agricultural benefits such as improved farming techniques, increased agricultural research, and increased crop demand resulting from activities in the industry; energy benefits; environmental benefits such as reduction in ozone pollution, reduction in particulate emission, and replacement of toxic octane enhancers in gasoline (Federal Republic of Nigeria, 2007).

Due to unending oil drilling catastrophes giving rise to massive destruction of the ecosystem in Nigeria, irresponsible onshore/offshore drilling practices, environmental concerns such as increased greenhouse gas (GHG), rising concerns over the continual availability of fossil fuels, fluctuating oil market, politics of oil trading within the Organization of Petroleum Exporting Countries (OPEC), brain drain as a result of underemployment of Nigeria's university and polytechnic graduates, it has become exigent for Nigeria to join the rest of the world in the search for renewable energy which is biofuel (Anieto, 2010). Petroleum is one of the highest CO₂ emitting sectors in Nigeria and gas flaring contributes nearly half of all energy-related emissions. CO₂ emitted through gas flaring and total emission from all fossil fuel consumption between 2000 and 2007 were outrageous (Eleri et'al, 2011). In view of this situation, Nigeria's quest for biofuel which is adjudged to be cleaner has been justified. But the question remains, how prepared is Nigeria?

NIGERIAN BIOFUEL POLICY AND INCENTIVES

To facilitate the adoption of biofuels and promote investment in the sector, Nigeria has developed a policy on biofuel. The Nigerian biofuel policy has been gazetted as Nigerian Biofuel Policy and Incentives No. 72 Vol. 94 and is dated June 20, 2007 (Bassey, 2010). The Nigerian National Petroleum Corporation is charged with the responsibility of carrying out the objectives of the policy in collaboration with stakeholders (Eleri et'al, 2011). The key provisions include the approval of an inclusion rate of 10 per cent for ethanol and 20 per cent for biodiesel, with a view to creating national demand; official designation/classification of biofuel as an agriculture-related industrial sector; tax measures which include reductions and

exceptions from duties and VAT; establishment of the biofuel energy commission, responsible for managing the industry in conjunction with ministries and agencies; regulation of imports; establishment of a biofuel research agency (SWAC/OECD, 2008).

The Biofuel Energy Commission charged with the responsibility of implementing the strategies for biofuels shall perform the following specific functions:

1. Register all biofuel plants/projects in the country.
2. Issue license to biofuel operators for the production of fuel ethanol or/and biodiesel in Nigeria.
3. Formulate and recommend fiscal, financial and other incentive policies for the biofuel industry, as well as protection measures if required.
4. Periodically, review and assess the economic, technical, environmental and social impact of the use of biofuels, and shall determine changes in policies required when necessary.
5. Monitor the supply and utilization of biofuels and biofuel blends and recommend appropriate measures to the Department of Petroleum Resources in case of shortage in the supply of biofuels or feedstock.
6. Review and adjust the minimum mandated biofuel blends as it deems appropriate.
7. Determine and put in place industry stabilization mechanisms.
8. Designate and oversee the activities of the investment bank appointed to manage the Biofuel Industry Equity Fund.
9. Establish and support the Biofuels Research Agency to be established under the Biofuels Program.
10. Monitor intra-industry commerce, in particular relationships between outgrowers and biofuel producers.
11. Present quarterly reports and briefings on the status of the Biofuel Industry to the National Assembly.

12. Disseminate and share information with investors and other interested members of the public.
13. Liaise with the Energy Commission of Nigeria in the formulation, revision and implementation of the National Energy Policy.
14. Liaise with the National Sugar Development Council as may be required.
15. Liaise with government ministries, agencies, parastatals, research institutes (e.g. NIFOR, NCRI, NRCRI, IITA, etc) or other bodies charged with responsibility for the development of biofuel feedstock such as palm oil, sugarcane, cassava, jathropha etc (Federal Republic of Nigeria, 2007).

The Biofuels Research Agency shall serve as the central coordination body for biofuel research in the country. The agency shall coordinate biofuel crop production optimization program and collaborate with the research and developments effort of International Institute of tropical Agriculture (IITA), National Cereal Research Institute (NCRI), National Root Crops Research Institute (NRCRI), Nigerian Institute for Oil Palm Research Council (NIFOR), Forestry Research Institute Nigeria (FRIN), Nigerian Stored Products Research Institute (NSPRI), Institute for Agricultural Research and Extension Services (IARES), Agricultural Research Council of Nigeria (ARCN), National Biotechnology Development Agency (NABDA), SHEDA Science and Technology Complex (SHESTCO), Federal Soil Conservation School (FSCS), National Center for Agricultural Mechanization (NCAM), National Agricultural Seeds Council (NASC), Nigerian Automotive Council, Raw Materials Research and Development Council (RMRDC) and Federal Institute of Industrial Research Oshodi (FIIRO) and other relevant agencies (Federal Republic of Nigeria, 2007).

A number of incentives have been introduced to stimulate Nigeria's biofuel industry. These include:

1. Pioneer Status: All registered businesses engaged in activities related to biofuels production and/or the production of feedstock for the purpose of biofuel production and co-generation within the country shall be accorded pioneer status within the provisions of Industrial Development (Income Tax Relief) Act.

2. Withholding tax on interest, dividends etc: Biofuel companies shall be exempted from taxation, withholding tax and capital gains tax imposed under sections 78, 79, 80 and 81 of the Companies Income Tax Act in respect of interest on foreign loans, dividends and services rendered from outside Nigeria to biofuel companies by foreigners.
3. Waiver on import and custom duties: Biofuel companies shall be exempted from the payment of custom duties and other related taxes on the importation and exportation of biodiesels into and out of Nigeria. Biofuel companies shall be exempted from payment of excise duties on biofuels for an initial 10-year period subject to renewal depending on prevailing circumstances.
4. Waiver on Value Added tax: Biofuel companies that are involved in the production of biofuels feedstock; or the production of biofuels and/or the generation of electricity from biomass shall be exempted from payment of Value added taxes on all products and services consumed by them.
5. Long term preferential loans: Preferential loan arrangements will be made available to investors in the biofuel industry to aid the development of large scale outgrower schemes and large scale integrated options; preference in loan disbursement will be given to investors/organizations with commercially viable outgrower schemes as a source of significant feed stock supply for biofuel production; an Environmental Degradation Tax shall be charged on oil and gas upstream operations to provide a source of funding for preferential loans; a fund of N10 billion has been set aside by the government for provision of preferential loans for investment in biofuel distilleries to complement the N50 billion set aside for the agricultural sector on similar terms of a single-digit interest rate; preferential loan facilities shall be administered by the Central Bank of Nigeria through commercial and agricultural banks (TradeInvest Nigeria, 2009).

This program has been followed by concrete actions. For instance, Dura Clean and AADL have plant locations in Bacita and Sango Ota using molasses and cassava as feedstock. They have installed capacities of 4.4 and 10.9 million liters per year respectively. There are also proposed plants in Jigawa, Benue, Anambra, Ondo, Nasarawa and Ekiti. The project information about these proposed plants include integrated bioethanol refineries, ethanol

plant, cassava farm and sugarcane farm (Agboola, Agboola & Egelioglu, 2011). Also, the Manufacturers Association of Nigeria claimed that its members are investing \$40 million in cassava-based ethanol. 10,000 cassava outgrowers were producing crop for ethanol, and that the current national capacity had reached 69 Mgy, more than needed for the anticipated demand of 53 Mgy for ethanol in Nigeria (D-8 Secretariat, 2008).

Although the program appears to be well crafted but it has been widely criticized. Most of the criticisms stem from the argument that the project was packaged and delivered by the Nigerian National Petroleum Corporation (NNPC) without any public participation. Bassey (2010) argues that it follows the signature pattern of oil sector arrangements where everything is skewed in favor of corporate actors while the environment is opened to nothing except exploitation. Again, given the recurrent failure of development programs in Nigeria, one may not but hold some reservations about the biofuel project. As argued elsewhere, Oshewolo (2011) maintains that successive governments in Nigeria have embarked on different reforms but with little result. The reasons have been the lack of political will to catalyze them in the face of prevailing circumstances and the failure to adopt participatory reform instruments which are necessary to achieve positive reform outcomes. Assessed against the above requirements, the Nigerian biofuel program may be designed to fail after all.

NIGERIA'S FALTERING PROSPECTS

Although Nigeria has high potential for biofuel production due to the level of water availability and the vast arable land available with fertile soils but observers are skeptical about the potentials of biofuels to chart the much anticipated path of change. This is justifiable given the development realities in Nigeria. Will Nigeria be able to ensure its energy security through biofuels without undermining its food security and its environment? With the development of biofuel programs, will Nigeria be able to successfully achieve its objectives? These are germane issues that form the core of the analysis here.

Biofuel production is crucial in lowering emissions of greenhouse gases and stimulating industrial growth. However, the transition to high growth and low carbon development in Nigeria is hampered by a number of factors. According to Eleri et'al (2011), these factors include: lack of infrastructure and high cost of industrial production which generate cash

squeeze for companies and the resultant failure to invest in technology renewal; poor implementation of stimulus packages due to policy inconsistencies, conflicting laws and regulations which wane the trust of investors on new government initiatives; poor incentives for converting to low carbon energy technologies; inadequate inter-agency coordination; financial constraints because the Nigeria financial market is presently not deep enough to offer long-term loans at reasonable interest rates; and poor public awareness. If Nigeria is to successfully implement a sustainable low carbon strategy in the energy sector in particular, the key problems above need to be addressed.

The use of bioethanol blend in Nigeria has triggered sharply polarized views among agricultural scientists, food engineers, policy makers, and the general public (Agboola et'al, 2011). Social scientists have equally joined the fray. This is because biofuel production is believed to be a major threat to food security. The food versus fuel debate therefore introduces us to another critical problem. Since important food crops such as cassava, corn, soya beans, oil palm, sorghum and sugarcane also constitute energy crops, there is bound to be serious competition on land. This competition may lead to possible diversion of agricultural land intended for food crop production towards the production of green fuels. Beyond assumptions and speculations, copious literature on the food versus fuel debate support the argument that biofuels represent a threat to food for people and also explains worldwide rise in food prices.

The rise in the price of food produce is partly explained by the rapid growth in biofuel production (SWAC/OECD, 2008). This situation can produce nasty consequences in sub-Saharan Africa where the problem of hunger persists. The rise in the prices of staple food may lead to starvation, diseases, food crisis and even death. The situation in Nigeria is even worrisome as food insecurity has become a critical element of Nigeria's poverty profile (Oshewolo, 2011). Nigeria is one of the food-deficit countries in sub-Saharan Africa (Davies, 2009). Nigerians rank among the hungriest people of the world. With a projected rise in the prices of staple food items like corn to up to 180 per cent by 2030, Nigeria is likely to be the hardest hit with 70 per cent of its population poor and spending more than 80 per cent of their income on food (Akpochafo, 2011). Given this condition, focusing on green fuel production now using important food crops, may worsen the poverty situation in Nigeria.

To produce one liter of bioethanol requires 14.3 kg of sugarcane, 2.5 kg of corn, 2.9 kg of wheat, 16.7 kg of sorghum or 5.6 kg of cassava (SWAC/OECD, 2008). According to Lester Brown, the President of the Earth Policy Institute and a United States environmental analyst, the grain required to fill a 25-gallon SUV gas tank with ethanol could feed one person for a year (Lester Brown, 2006). In other words, engaging in rapid biofuel production without viable plans to mitigate its negative impact on food security may well be an invitation to global food crisis of immense proportion. The situation in Nigeria is more precarious given the prediction of imminent food crisis in the country by the Food and Agriculture Organization (FAO). From the foregoing, biofuel production in Nigeria will represent an epic competition between energy security and the survival of the poor majority. The implementation of the biofuel program will only be successful in Nigeria if the problem of food insecurity is addressed.

Again, experiences have shown that biofuel production could result in environmental catastrophe just like the dirty fossil fuel sources. For instance, the United Nations has warned that biofuels like ethanol can greatly help reduce global warming and create jobs for the rural poor, but that the benefits may be offset by serious environmental problems and higher food prices for the hungry. The rapid growth in liquid biofuel production will make substantial demands on the world's land and water resources at a time when demand for both food and forest products is also rising rapidly. Changes in the carbon content of soils and carbon stocks in forests and peat lands may constitute serious threat to the environment. Also, use of large scale mono-cropping could lead to significant biodiversity loss, soil erosion and nutrient leaching (CBS News, 2009). All the biofuels we use now cause habitat destruction, either directly or indirectly (Connor, 2008).

Aggressive biofuel production also depreciates the environmental values of wetlands such as flood control, protection of coastal zones and the presence of a great diversity of species. In Africa, where many people depend directly on wetlands for their livelihood because of their fertile soils, availability of fresh water and fish stocks, rapid biofuel production is believed to lead to declining biodiversity, declining livelihood alternatives from wetlands (income and food), livelihood and income changes and reduced future options (tourism and water storage) (Sielhorst et'al, 2011). Given the lax environmental standards in Nigeria, biofuel production in an uncoordinated socio-economic milieu may precipitate ignominious environmental

reality. Nigeria has one of the worst environmental records in the world (World FactBook, 2011). Environmental concerns in Nigeria include soil degradation, rapid deforestation, urban air and water pollution, desertification, oil pollution and loss of arable land. If the biofuel project is not approached with caution, it may add to the long list of environmental issues in Nigeria.

Nigeria is part of the global environmental management equation (Eneh, 2011) and is party to international agreements such as Climate Change, Kyoto Protocol on Global Warming, Desertification, Endangered Species, Hazardous Waste, Law of the Sea, Marine Dumping, Marine Life Conservation, Ozone Layer Protection, Ship Pollution, Wetlands (World FactBook, 2011). Although the focus on biofuel production represents an attempt to promote a more friendly environment, but generally the local adaptation performance of Nigeria remains in the realm of prospective analysis. A plausible analytical barometer here is the weak environmental standards in Nigeria. The corporate bodies engaging in biofuel production may take advantage of these lax environmental standards for corporate gains just like the multinational oil companies. The protection of the environment to aid biofuel production requires strong institutional framework and urgent legislative measures.

CONCLUSION

Globally, countries are adopting biofuel policies ostensibly to follow a cleaner path of development characterized by low carbon energy alternatives, achieve energy security and transform rural economies. Within this context, Nigeria's quest for biofuel arguably does not represent a misplaced priority. Nigeria even has high potentials for biofuel production due to the level of water availability and the vast arable land available for the production of energy crops. Amidst these potentials, however, the paper contends that the prospect of a sustainable biofuel program in Nigeria is faltering. If the food and environmental challenges are not effectively addressed, the program may be destined to fail. To address these challenges, Nigeria has to ensure that land competition with agriculture for food purposes is avoided. Adequate resources should be committed to research and development. Since second generation technologies can help solve some of the problems associated with the first generation biofuels, supply green fuel affordably and with greater environmental benefits, it has become imperative for Nigeria to invest in the former.

There is the need for Nigeria to come up with institutional frameworks that will support and enhance the production of biofuel in a sustainable manner like in Brazil. In line with the argument of Jumbe et'al (2007) on the sustainable development of a viable biofuels industry, Nigeria must develop a strong, supportive policy, and a firm legal, regulatory and institutional framework to ensure that measures are put in place to harness the contribution of the sector to rural livelihood. Adequate incentives should also be provided for private sector participation in the production and processing of biofuel. Practical measures must be put in place that will enable the country overcome its lax environmental standards. These measures should include sound environmental legislations. Nigeria equally needs to build international partnership. As rightly explained by Eleri et'al (2011), this is necessary because a number of Nigeria's bilateral partners and multilateral financial institutions have technology cooperation programs that will benefit Nigeria's industries. A good example is the Clean Development Mechanism under the United Nations Framework Convention on Climate Change (UNFCCC). Finally, the menace of corruption which produces corrosive effect on the economy and drains investible funds for social development must be checked

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