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Renewable Energy, Crude Oil Revenue and the Environmental Issues in Nigeria

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Abstract

The tremendous and sharp fall in the prices of oil forced so many countries including Nigeria to source for an alternative for crude oil such as renewable energy which could have a negative impact on oil exporting countries globally. In addition, despite crude oil bring high revenue it has some negative consequences in the environment which include carbon emission, oil spillage and environmental degradation. Therefore, there is a need to assess renewable energy as an alternative source of income in Nigeria. This is because renewable energy is environmentally friendly and is sustainable. The reduction of Nigerian revenue recently as from 2014 downward that lead Nigerian economy into recession could be overcome if the revenue of Nigeria is enhanced using renewable energy sources. The study offers policy makers, such as Nigerian government the opportunity to diversify the economy and develop the renewable energy resources abundantly available in Nigeria.

Keywords: Renewable energy, crude oil, revenue, recession

1. INTRODUCTION

There is sharp falling on crude oil prices globally as from ending of 2014 up to 2016 and Nigeria depend solely on the said crude oil. In fact, Nigerian main budget is 80% - 90% financed by revenue generated from crude oil (Central Intelligence Agency et al., 2012). Since alternative source of income is inevitable, therefore, Nigeria must move toward substituting fossil fuels for other source of energy. This is in line with so many debates by researchers as regards to the alternative source of energy and reduction on the fossil fuel demand (Kothari, Singh, Tyagi, & Tyagi, 2012; Nehrir, Wang, & Guda, 2006; Roberts, Cassula, Osvaldo Prado, Dias, & Balestieri, 2015). One way to overcome the short fall on crude oil income is to go for more on renewable energy as argued by Kandpal and Broman (2014). This could be biofuel, thermal, wind, solar and biomass among others (Destouni & Frank, 2010). Some scholars also argued that, since renewable energy has less carbon therefore, is safe environmentally and is termed green energy (Panwar, Kaushik, & Kothari, 2011; Sørensen, 2011). Apart from the increase in income and energy security (having uninterrupted energy supply), the reason for renewable energy exploration is the control of carbon emission that has significant impact on global warming (Deshmukh & Deshmukh, 2008; Panwar et al., 2011; Wstenhagen, Wolsink, & Brer, 2007).

Therefore, the world bank is putting more effort on renewable energy thorough provision of loan, training of human on the area of renewable energy, advertisement on media including social media and making public awareness as regard to the cleanness of such energy environmentally apart of the clean income as a result generated from such energy (World Bank, 2008).

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The issue of viability and capacity of renewable energy is another debatable factor as many energy scholars were doubting its viability as it is high cost of production, in addition, the said energy only accounted for less than 20% of the global energy consumption (Kandpal & Broman, 2014). Yet, there is tendency for high projection in the long run for more positive impact on the world economy by renewable energy and Nigeria is not in isolation. This will in turn improve the income of those countries that solely depend on crude oil, for example Nigeria.

Furthermore, Nigerian derivation of income on renewable energy is constantly improving as compared to previous years (Central Bank of Nigeria, 2014). This situation exists when global projection of demand for crude oil is positively high despite fall in the prices of crude currently (International Energy Agency, 2010). That shows how important crude oil is as it is expected to continue playing a significant role in the energy market even though it is not environmentally friendly in addition to the other sources of energy like renewable energy. Despite the increase in demand for renewable energy globally, the consumption of fossil fuel is still increasing and would have negative consequences on our environment through the emission of carbon, oil spillage and environmental degradation (Hassan, 2012). As stated earlier, the other alternative energy source, that is renewable energy, is globally improving at faster rate due to the high improving energy source as seen in Figure 1.1 below. The said energy is environmentally friendly, and it is more reliable source of energy since it is not control by nature as crude oil (Kandpal & Broman, 2014).

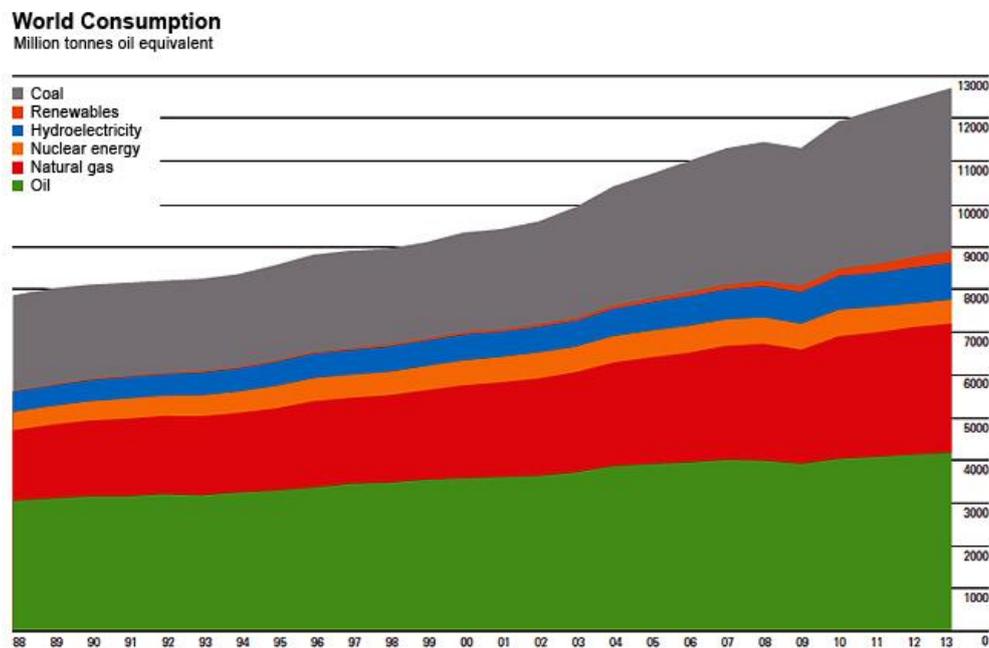


Figure 1.1: World Energy Consumption
 Source: Dudley (2014)

Figure 1.1 above signified an improvement on renewable energy globally from 1998 to 2013 as seen on the data from Dudley (2014). This shows that the total annual global consumption of all forms of primary energy in the year 2012 was equivalent to the total energy content of 12.5 billion tonnes of crude oil and fossil fuels provided more than three quarter of the total energy mix, with renewables and hydroelectricity contributing about 10% of world primary energy in the year 2012. As from 1988, the renewable energy consumption was around 1,800 million tonnes oil equivalent while that of oil was around 3,000 million tonnes as seen in the graph above. Meanwhile, as the consumption of oil is increasing over the years, the renewable energy is also increasing with close range of rate. This can be verified in Figure 1.1 above. As of the year 2013, while the renewable energy consumption increased to 3,000 million tonnes oil equivalent, consumption of oil also increased to 6,000 plus million tonnes. This implies that, as the renewable demand is increasing that of oil is also increasing over the years, which could perhaps be attributed to increase in population or increase in production and utilisation of technological equipment.

Since renewable is one of the fastest growing sources of energy as an alternative for crude oil income earners, this study will focus on the renewable energy role on the Nigerian crude oil income and the environmental issues. This is because Nigeria is mono-cultural economy that depends on revenue generated from crude oil and is suffering from environmental degradation especially in the Niger Delta region of the country.

2. CRUDE OIL REVENUE AND RENEWABLE ENERGY

Researches are of the view that renewable energy is one of the major alternative sources of energy that could address the shortage and inconsistent supply of energy globally. This is in addition to the tackling climate change challenges since it is environmentally friendlier than fossil fuel (World Bank, 2014). There is high tendency that renewable energy will account for 50% of energy mix with the present growth, and British Petroleum and energy information administration of United State of America (USA) predict a rapid increase in the demand of renewable energy with less attention to hydrocarbon related energy such as fossil fuel (Energy Information Administration, 2011).

The prediction could be attributed to the fall in the prices of crude oil, increase in population and energy consumption with much attention to the present global warming issues in addition to the environmental degradation, and the rate of crude oil supply with corresponding increase in renewable energy supply globally among others (Kandpal & Broman, 2014; Verbruggen et al., 2010; Walker & Devine-Wright, 2008). This is supported by the European Renewable Energy Council (EREC) where they assert that if there is constant efficiency in renewable energy improvement with its potentials fully explored, it can replace fossil fuels for all the services rendered by the said fuel which includes transportation, electricity, and finally heating and cooling (EREC, 2011).

According to Scarlat, Dallemand, Monforti-Ferrario, Banja and Motola (2015) energy security is a major concerned among European Union members as regard to the high demand of fossil fuel increase with shortage supply of same product, therefore, they projected reduction on the consumption of fossil fuel and high improvement in the technological knowhow towards renewable energy for the replacement of fossil fuel. This could be achieved through energy efficiency and maximum utilization and exploration of other sources of energy. In addition, Krozer (2013) was in the view that the increase in over dependence on crude oil with current environmental concerned in addition to the political issues internationally, will play a significant role for the growth of renewable energy in the entire market thus, gradually the dependency on fossil fuel will reduce to some certain extent.

Furthermore, many scholars agreed that importation of fossil fuel will drastically reduce due to some improvement in other energy sources such as renewable energy especially solar energy in many nations globally and in African nations (Nigeria inclusive) (Kousksou, Bruel, Jamil, El Rhafiki, & Zeraouli, 2014). This is true as Nigerian biggest buyer of crude oil that is US, reduced her importation of crude from Nigeria drastically as reported by Nigerian National Petroleum Corporation (NNPC) (2016). The reduction of importation of crude oil is also seen as result of renewable energy enhancement and high production, increased in discoveries of crude oil reserves in their locality, increase in technological efficiencies and concentration on clean energy among others (Cheddadi, Gaga, Errahimi, & Sbai, 2016).

Another issue that could be the reason for the movement toward renewable energy is due to the fluctuations of crude oil prices as it increases rapidly and falls rapidly. This makes the revenue generated from crude to be more vulnerable thus a negative consequence on mono-production countries such as Nigeria. The implication is that as the prices increases, there should be increase in the crude oil revenue and vice versa especially to Nigeria (Yunusa, Idris, Zango, & Kibiya, 2016). The prices could be seen in Figure 1.2 below. As seen in the figure, the highest price of crude oil is \$140 as at July 2008 but sharply fall to averagely \$38 by December 2008 where around June 2009 it went back to averagely \$70 and improved to \$110 by April 2011. However, around July 2014 it started falling sharply where it falls to \$44 around January 2015. By February 2016, the price fall to as low as \$29 but later improved to \$50 by June 2016 and currently up to \$70 as at December 2017. This shows how vulnerable crude oil is due to its inconsistencies and vulnerability any nations tend to find alternative solution to it among which renewable energy is one, even though many researchers attributed renewable energy with less cost effective, is still assume the most reliable, user friendly source of energy (Kousksou et al., 2014).



Figure 1.2: The Price of Crude Oil
Source: (MacroTrend, 2017)

In addition, the world energy outlook report a significant increase in energy consumption globally as a result of rising levels of energy demand in the next three decades where the outlook predicted a strong increase in energy demand especially outside the Organization for Economic Cooperation and Development (OECD) countries even though the OECD countries energy demand also increases as predicted by the outlook but the Non-OECD countries particularly Asia, where China and India, are predicted to account for more than 50% of the total predicted energy consumption globally as from the years 2012 to 2040 periods (U.S. Energy Information Administration, 2016). That is even the reason why there is need for clean energy such as renewable energy simply because, the risen demand for energy is increasing as predicted by the US Energy Outlook by the year 2040, which will eventually have negative consequences on our environment through the emission of carbon which will result to global warming since the carbon will destroy the ozone layer (Hassan & Kouhy, 2013; Yunusa, 2011).

On the side of environmental concerned, the use of crude oil brings among others the emission which is highly hazardous with very little concern by the firms in Nigeria to report such in their annual report which the reason for so many agitations in the country such as Niger Delta militants (Yunusa et al., 2016). In related development, some studies link renewable energy to market of carbon and the huge capital investment even though it improves the revenue of the country where some of the study attributed the said energy as an alternative to other source of energy such as crude oil in addition to other source of income which is refer to as clean energy income (Nfaoui & Sayigh, 2012; Tang, Chiara, & Taylor, 2012).

Thus, one can conclude that, as country improve their renewable energy just as Nigeria, their source of income will increase resulting to increase in revenue, especially now that the crude oil prices is falling, hence the revenue generated from crude will fall. In other words, since there are inconsistencies on the revenue generated from crude oil, then there is need for more investment on the other source of energy such as renewable energy most importantly to a country like Nigeria. This is in addition to the cost of environmental degradation that the use of crude oil could cause, and the use of renewable energy could save.

3. CRUDE OIL AND THE ENVIRONMENT

Environmental pollution is seen as the new trend that is worrisome globally since it led to so many disasters among which global warming is one where many industrialized countries including China and USA were blamed due to their role on energy usage which include the use of crude oil (Almeda, Baca, Hyatt, & Buskey, 2014; de Klerk, 2007; Wu, Wei, Fan, & Liu, 2007). The environmental pollution could be a situation where an environment is destroyed as a result of some activities of firms or industries be it environmentally friendly industries or otherwise

which could be attributed to emission of carbon, oil spillage, release of harmful chemical and gas flaring, among others (Nasiru & Rapih, 2015; Sakthi Priya, Doble, & Sangwai, 2015; Spp, 2008). Many scholars argued that, crude oil is seen as the major contributor to environmental pollution. For example, Nigeria is among the top producers of crude oil, in fact is ranked as number six or seven globally (NNPC, 2015) where in the process of the crude oil production, gas is usually flared which result to high emission of carbon. Due to this, the country is among the top gas flares and is very dangerous to the environment since it destroys ozone layer thus, leading to global warming (Hassan & Kouhy, 2013). Even if in the process of crude oil production gas is not flared as in the case of many advanced countries, still there is high tendencies of oil spillage which damage the environment especially for the fisheries and agricultural products (Adelana & Adeosun, 2011; Effiong & Oti, 2012; Kadafa, 2012).

A report released by a World Bank (2016) organisation comprises of oil industries, the government and the international institutions for control of gas flaring called Global Gas Flaring Reduction Partnership (GGFR) revealed that, about one hundred and forty seven billion cubic meters (bcm) of natural gas was flared in 2015 which shows an increase compared to the one released in 2014 which is around hundred and forty five bcm and hundred and forty one bcm in 2013. The report revealed that Russia is the largest gas flaring country where it flared about twenty one bcm annually, then Iraq with sixteen bcm, followed by Iran and USA with twelve bcm each and then Venezuela with nine bcm (World Bank, 2016).

Even though Nigeria is seen as one of the countries that reduced flaring, it is insignificant and yet, it flares up to eight bcm in 2015 alone as reported by the World Bank. It is important to note that, the said flaring, which is burning of natural gas associated with oil as a result of extraction of oil, is used to be as a result of some constraints which include and not limited to technicality in the cause of the extraction of the oil, government regulation and economic constraints among others (World Bank, 2016).

Another important aspect of the environmental pollution associated with crude oil is the cost of cleaning the environment as the case of Ogoni land in Nigeria where Nigerian government under the administration of President Muhammadu Buhari approved huge amount of money in 2016 for the cleaning of the environment that is caused by production of crude oil. The amount to be spend or already spent could be save for other uses if the energy used is environmentally friendly as the case of renewable energy.

4. RENEWABLE ENERGY AND THE ENVIRONMENT

As earlier stated, renewable energy is other energy that is sourced directly from solar or other form of indirect energy such as bio, wind, waste and hydro (Nfaoui & Sayigh, 2012). Other researchers view the energy as any form of energy that is natural, abundant, certain and can be reproduce as against the other source of energy that is not reliable (Deshmukh & Deshmukh, 2008; Tang et al., 2012). The sources of renewable energy are many in which Nigeria is blessed with the common source of renewable energy that is solar. Many scholars attributed renewable energy to be environmentally friendly, thus is good for the environment since it has little or even no emission of carbon, no any form of spillage and therefore, it considered friendly for the environment especially now that the earth is facing global warming (Sørensen, 2011; Walker & Devine-Wright, 2008).

Unlike crude oil, renewable energy is more certain, and it is considered reliable since it does not have time of facing out, this is in addition to the fact that, renewable energy can be reproduced especially the bioenergy and hydro energy (EREC, 2011). Therefore, many countries are mandated and encouraged to map out a renewable energy way to curtail the environmental degradation issues and uncertainty attributed to global energy (EREC, 2011; World Bank, 2016). Not surprisingly, Renewable Energy Division (RED) was established in August 2005 by the Nigerian government to curtail environmental issues and to maintain energy sustainability in the countries (NNPC, 2015). The NNPC explain further in respect of the establishment of the RED that, “the initiative is a national response to the global aspiration to curb Green House Gas (GHG) emissions by diversifying towards a Low Carbon Regime, in a sustainable manner” and this is in line with the global best practice in relation to energy consumption.

Nigeria is among the countries that sign for emission control which include gas flaring in Kyoto Protocol. One of the World Bank Senior Director for Energy and Extractive Industries called Riccardo Puliti, also explain in the report that, 62 major oil companies agreed to end the gas flaring routine that is taking place almost 150 years. For that to be more realistic, there is a need for renewable energy since even if the flaring is curbed, the issue of oil spillage and other factors like chemical released cannot be curtailed, hence, renewable is more friendly to the environment than spending a lot on the crude oil production as a source of energy.

There are a lot of ways to source for renewable energy globally and in Nigeria which include and not limited to hydro, solar, biofuel, wind and fuel wood. Among all the energy mentioned, the most common and more friendly to the environment are solar and wind energy.

5. POLICY IMPLICATIONS, CONCLUSION AND RECOMMENDATIONS

This study seeks to evaluate the comparison between crude oil revenue and renewable energy in relation to the environmental pollution in Nigeria. From the trend of crude oil revenue and the forecast of the renewable energy so far, there could be some policy implications which can be summarized. The consumption of crude oil brings about high revenue but has some negative consequences in the environment. For example, the carbon emission could lead to global warming which in Nigeria it is done through gas flaring, oil spillage that could damage the environment and caused an adverse effect on the peasant farmers as in the case of Niger Delta in Nigeria and environmental degradation among others. Most importantly, the crude oil is not reliable since it is control by nature and the prices of the oil are vulnerable thus making it more risky than other source of energy such as renewables. These negative consequences lead to alternative source of energy as renewable energy. The renewable energy could reduce the amount of carbon emission which could control global warming. Moreover, it is environmentally friendly and can be sustainable since it can be reproduced, thus, it could lead to improve in the standard of living of the habitants. The reduction of Nigerian revenue recently as from 2014 downward that lead Nigerian economy into recession, could be overcome if the Gross Domestic Product of Nigeria is enhanced using renewable energy sources in addition to other sources. Thus, this study should serve as a guide to policy makers to diversify the revenue generation of Nigeria, to maintain the sustainability of the environment and to achieve the world green gas house emission objectives in order to save humanity and the environment.

Therefore, this study recommends the use of other source of energy such as biofuel, solar, wind to improve the revenue generation as an alternative source of energy in replacement of crude oil. Other source of energy could minimize the dependency of crude oil in order to control environmental hazard, curtail carbon emission and save cost that could be spent to clean the polluted environment as a result of crude oil production.

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