

MANAGING ENERGY RESOURCES THROUGH SOVEREIGN WEALTH FUND AND RENEWABLE ENERGY TECHNOLOGIES IN NIGERIA

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DOI: **10.29816/sjss.9.1.6**

ABSTRACT

The time path to depletion of petroleum resources reduces as more oil and gas are exploited. However, the windfalls obtained from these exhaustible natural resources have not been properly managed in Nigeria. There is no doubt that government has not fully committed to Nigeria Sovereign Investment Authority (NSIA) since its establishment as the huge amount of fund in Excess Crude oil Account (ECA) has not been transferred to the NSIA for proper management. Also, Nigerian government has not fully harnessed new technologies in developing renewable energies available within the country. Hence, this paper examined the global best practices of managing sovereign wealth fund as well as the proper utilisation of the renewable energy technologies in solving energy challenges facing Nigeria. Exploratory and comparative analysis was conducted on selected sovereign wealth fund and the paper recommends sovereign wealth fund plus (SWF-P) to support the distribution of certain percentage of the oil proceeds to all adults of the country in addition to the stabilisation, savings and infrastructural functions which the existing sovereign wealth fund performs. On the other hand, the paper also suggests that the government should finance renewable energy projects as well as develop capabilities in renewable energy technologies. Enabling environment and incentives should be provided to private firms and universities/research institutes respectively so that rural dwellers that are not connected to the national grid can also enjoy electricity supply through renewable energy sources such as solar and small hydro plants among others situated in various local communities. These strategies will enable all Nigerians to equally enjoy the natural resources own by the country.

Keywords: Renewable energy, managing resources, sovereign wealth fund, technologies, Nigeria

1. Introduction

The thought of most Nigerians that oil production is infinite and will not run out one day is comical. The earlier people realised that we are nearing the peak period of oil production; the more cautious we become in managing the oil revenue and even strengthen our capabilities in developing renewable energies. It is no longer news that Nigerian economy is heavily dependent on oil and gas sector as it accounts for approximately 95% of the export revenue and 76% of government revenue, yet almost half of Nigeria's population is living below the poverty line of \$1.9/day (World Bank Group, 2018). The World Bank Group (2018) report put Nigeria's unemployment and underemployed rates at 18.8% and 21.2% respectively. One begins to wonder why is Nigeria, the largest producer of crude oil in Africa and tenth in the world, still experiences energy crises and poverty among her citizens are experiencing today. Whereas the nation's current oil reserve is about 37.5 billion barrels with recoverable reserves ratio of 52 years and proved recoverable natural gas reserve of 184 trillion cubic feet with recoverable reserve ratio of 110 years (BP Statistical Review of World Energy, 2018). Nigeria witnesses an average economic growth rate of 7% for almost a decade now before the slow growth of 2015, but this has not translated to economic development in the country. The Gini index of 48.8 showed that Nigeria is among the countries in the world with the widest gap between the rich and the poor (United Nation Development Program Report, 2013). The level of corruption and the weak institutions in the country remain major setbacks for development.

Despite the wide acknowledgement that Research and Development (R&D) plays a large role in the development of a country, Nigerian government devoted very little attention to research (Akinwale, 2016). This is

evidenced from the expenditure of Nigerian government on R&D based on 2007 figure which was put at 0.2% of the national GDP as against that of 3.4% in South Korea, 3.4% in China and 0.95% in South Africa (African Innovation Outlook, 2014; Akinwale *et al.*, 2012). The world leaders as well as the emerging economies have engaged in various in-depth R&D activities which enabled them to continuously improve the standard of living of their citizens and protect them against terrorism and war. However, Nigerian government due to the abundance of natural resources and the easier access to the oil fund has not been paying serious attention to the development and application of science, technology and innovation research (Ukwuoma *et al.*, 2019). Also, the management and the operation of the 'Excess Crude Oil' account in the country always create problems in terms of revenue sharing among the tiers of government (Akinwale, 2012). Equally, the extent of adoption and usage of renewable energy technologies is still relatively low despite the huge potentials for renewable energy from different sources in the country (Akinwale *et al.*, 2014).

Despite the significant role that sovereign wealth fund is playing in many resource-rich economies and the abundance of renewable energy potentials in Sub-Saharan Africa, there is a dearth of research on the management of energy resource through sovereign wealth fund and renewable energy technologies in Nigeria. This paper therefore examined how sovereign wealth fund plus and renewable energy technologies can be used to address the challenges of energy resource management in Nigeria.

2. Literature review

Several scholars have shown the correlation between the country's natural resource

endowment and poor economic development (Sachs and Warner, 2001; Gylfason, 2001; Auty, 2001; Weinthal and Luong, 2006; Sala-i-Martin and Subramanian, 2003; Akinwale, 2012). Some of these studies pointed out the major causes of the resource curse and suggested ways of solving them. The study of Akinwale (2012) highlighted the factors contributing to resource curse in Nigeria from his purposive survey conducted in 2011. He concluded that there is high perception that corruption and weak institutions are the main factors responsible for resource curse in Nigeria followed by poor level of technology and 'Dutch disease'. Onyeukwu (2007) also associated the Nigerian resource curse to poor governance and lack of transparency, weak institutions, and corruption among other factors. Humphreys *et al* (2007) argued that the presence of large oil revenues can weaken the link between citizenry and government which can further weaken the institutional framework of a society. The electorate may be less informed about state activity if they are untaxed, and may lack financial means of removing those in government if they so desire. Moreover, large revenues from natural resources can encourage rent seeking and unaccountable state activity as it happens in Nigeria, Angola and many other developing nations. The experiences of Norway, Alaska and few others have shown that the challenges of resource curse do not necessarily need to affect countries that are naturally endowed. Of course, the effects aforementioned only happen when oil funds are mismanaged which are prominent among the developing nations. Resource curse tends to prevail in countries that are already democratically and institutionally weak like Nigeria and Angola. Although sanitisation of the oil sector is a topical issue in Nigeria, but the full commitment of the Federal Government remains unclear. Many

committees have been set up such as Ribadu's Petroleum Revenue Task Force committee, Farouk's Oil Subsidy committee among others to review and reveal the various heinous activities going on in the oil sector, but none of their reports are perceived by the citizens to be substantially implemented by the government. Senate also probe the abuse of ₦873billion Natural Resource Fund (NRF) (Punch, 2013). The report was presented by the Ministry of Finance to the National Assembly on how the total of ₦701.49bn was paid out as expenditure from the Accruals totalled ₦873.4bn between 2002 and 2012 in the NRF, most of which were issued out and approved by the presidency as loans to various ministries but never paid back as against the purpose of the fund which is meant to develop the country's non-oil resources (Punch, 2013).

On the other hand, poor development of capacity and capability in the area of renewable energies has been acknowledged as one of the major factor contributing to energy poverty given that only about 40% of households in Nigeria are connected to the national grid (Akinwale et al., 2019; Sambo, 2009). Ibitoye and Adenikinju (2007) stated that ageing of power plants, poor maintenance and dearth of funds are some of the factors that could be responsible for the sub-optimal operation in the power sector. There are significant line voltage and power losses, as high as 25% compared with 3% in the US and 0.5% in Japan in the transmission systems due to the large average distances between 300 and 500km over which electrical energy is distributed. Low transmission grid voltages, typically 330kV and 132kV compared with 765kV in developed countries also cause significant transmission and distribution losses. Iwayemi (2008) also noted that Nigeria experiences a double digit transmission and distribution losses, which are quite large by international standards. The losses could be

attributed to the poor and obsolete state of the transmission network. These problems arise due to the far distance where the electricity power will be transmitted and distributed which could be ameliorated if power is being generated from various energy sources in various local areas.

Energy mix is a major challenge facing the power sector in Nigeria. The electricity sector in Nigeria has been powered mainly by large hydro and thermal plants which have not sufficiently provided the required electricity in the urban centres not to talk of the rural areas (Makwe et al., 2012). Nigeria is said to be blessed with abundant renewable energies but most of them are yet to be fully tapped in generating electricity (Ogundari et al., 2017). Majority of the rural areas, where renewable energy technologies can be deployed, are not connected to the grid system and the few others that are connected do not have regular supply of electricity (Akinwale et al., 2015).

Thus, based on the aforementioned discussion, there is a need for a paradigm shift in the mechanism hitherto employed to manage the resource funds and also the deployment of renewable energy technologies in Nigeria. These will not only resolve our energy poverty crises and challenges but also create wealth and generate employment for the purpose of national development.

3.0 Management of Funds in Selected Countries

This section adopts comparative analysis of fund management of selected countries in the world. Many scholars have suggested different forms of strategies to manage the revenues from the natural resources such as Stabilisation and Savings Fund. Stabilization funds aim to reduce the impact of commodity price volatility on the economy and, in turn, improve budget predictability by stabilizing spending patterns while Savings funds are

intended to ensure that a share of the wealth will exist for future generations, even after the natural resources are depleted (Davis *et. al* 2003). Many countries have established different kinds of resource funds like Alaska Permanent Fund, Norway's Government Pension Fund, Sovereign wealth fund in Kuwait, Kazakhstan, Azerbaijan and Ghana among others. The main reasons for establishing these funds are to stabilize government expenditures despite volatile resource prices, build up a capital stock to draw on after the resource is depleted, and to save and spend resource revenues transparently.

Prior to the establishment of these funds, government of different countries seem to spend the resource rent injudiciously. This rent is refer to as the "unearned" income from the exploitation of a natural resource. According to Sala-i-Martin and Subramanian (2003), these high economic rents are regarded as "manna from heaven" which tends to corrupt institutions as well as lowering the long-term growth prospects. Hartwick (1977) opined that all economic rents or profits from exhaustible resources should be invested in reproducible capital such as machines, and that only the capital income from the reinvested resources will be consumed by the present generation. He believed that this approach will maintain a constant consumption stream in the future by given both the current and the future generations the same weight as they will all have the same interest-bearing capital stock at their disposal. However, this approach is not realistic in the present world as the future generations are believed to have access to a better innovation, technological progress and more labour force. Also, it is not realistic in real world that government will invest all revenues from mineral resource without spending some part of them to meet current

expenditures; otherwise such government will lose public support especially in developing countries. This led to the concept of Natural Resource Funds which provides the current generations to stabilise their spending patterns as well as saving some part of the resource rent for the future generation.

Norway established a Natural Resource Fund called Government Pension Fund-Global (GPF-G) in the 1990s when her oil production is nearing its peak. By early 2000s, the fund has increased rapidly due to the upsurge of the oil price. The fund is presently one of the largest sovereign wealth funds in the world with total assets of approximately US\$ 400 billion, equivalent to 111 percent of Norway's 2009 GDP (Lucke, 2010). The annual non-oil deficits are intended to be financed from the capital income of the resource fund alone; and the fund aims for a 4 percent real rate of return in the long run, based on a strategy of maximizing financial returns with moderate risk. Norway's Central bank is charged with the responsibility of managing the fund and it also uses the services of external fund managers. Virtually all the assets are invested abroad so as to prevent inflation, Dutch disease and some other negative effects that increase in money could bring into the economy. The fund is invested in diversified assets without requesting for higher than normal returns on its investment. According to Norway Ministry of Finance, 60 percent should be devoted to equities, 35 percent to fixed income assets, and 5 percent to real assets (Norway- Ministry of Finance, 2010). The fund is also prevented from being invested in any company that engage in any activities that violate fundamental human rights as well as the selling of weapons and tobacco. The operations of the fund are fully documented on the web pages of the ministry of finance and their central bank. There is high level of

transparency and strong institutions in the running of the fund.

In the Alaska Permanent Fund, there is high levels of public involvement in the decision making process concerning the establishment and evolution of the fund (Kasson, 1983). There were series of public debates on how the windfalls should be spent. This led to the creation of a dividend program in which each citizen of Alaska is entitled to a share of the wealth generated from oil sales. Funds are saved and real capital gains are distributed directly to the residents of Alaska as a "dividend", subject to federal and state income taxes (Lucke, 2010). Fund assets are managed by the Alaska Permanent Fund Corporation (APFC), aquasi-independent state entity that is designed to be insulated from short-term political influence but remain accountable to the Alaska state legislature. Assets are widely diversified in stocks, bonds, real estate, and private equity respectively. There is high level of transparency in the management of the fund through detailed annual and monthly reports on the performance and financial status of the fund.

Abu Dhabi Investment Authority (ADIA) is the largest Sovereign Wealth Fund (SWF) in the world with over US\$620 billion under management. The main objective of ADIA is to invest funds on behalf of the Government of the Emirate of Abu Dhabi to make available the necessary financial resources to secure and maintain the future welfare of the Emirate (ADIA review, 2011). Its assets are well diversified as it invests outside UAE and gulf regions. It allocates large percentage of its investment in developed countries equities, followed by emerging market equities and small capital equities, government bonds, real estate, private equities, infrastructures and cash respectively. Geographically, the investments are mainly in North America, Europe, Developed Asia and Emerging

markets. Largest percentage of the fund are managed by some selected external managers which have experience, sound past track records and innovative skills required to manage such funds. The Kuwait Investment Authority was the first SWF which was established in 1953. This fund is approximately \$250 billion as at 2012 (The Guardian, 2012). However, the Kuwait Reserve Fund for Future Generation is not transparent as it fails to publish information about its holdings and expenditures neither to the public nor to the legislature at regular intervals (Weinthal and Luong, 2006).

3.1 Managing Energy Resource in Nigeria through Sovereign Wealth Fund Plus

Nigeria has been operating an Excess Crude Account (ECA) which lacked clear legal basis on which oil windfall savings in the account should be shared by the three tiers of government. ECA was established in 2004 and its objective was primarily to protect planned budgets against shortfalls due to volatile crude oil prices. The increase in crude oil prices led to the Excess Crude Account rose by almost four-fold, from \$5.1 billion in 2005 to over \$20 billion by November 2008, accounting for more than one-third of Nigeria's external reserves at that time. By June 2010, the account had fallen to less than \$4 billion due to budget deficits at all levels of government in Nigeria and the steep drop in oil prices (Investopedia, 2013). The National Sovereign Wealth Fund was then introduced to replace the ECA in year 2011. Most of the resource rich countries of the world today have SWFs, and there are about 50 sovereign wealth funds that are in operation globally today in contrast to only 10 that were in existence before year 2000 (THISDAY, 2012). These 50 SWFs today jointly control approximately \$4 trillion in assets and keeps growing. Nigeria also joined

with \$1 billion from the Federation Account for the initial take-off of the Fund.

The newly established Sovereign Wealth Fund (SWF) is meant to address the problems emanating from the operation of the ECA. The objectives of the SWF as stated in many publications including Nwoye (2017) are to:

- defend the country against crude oil price shocks (stabilisation);
- build a savings base for future generations of Nigerian citizens (Savings) using a part of today's oil and gas revenues;
- and enhance the development of critical infrastructure (education, health, transport) across Nigeria.

In the design, 20% is expected to go to each of the three target funds while the board of Nigeria Sovereign Investment Authority (NSIA) would decide on what to do with the remaining 40%. The board is expected to operate independent of the Federal government. The NSIA's share ownership structure comprises the federal government – 45.83 per cent, states – 36.25 per cent, local governments – 17.76 per cent, and the FCT – 0.16 per cent (Okeh, 2018). Besides the initial provision of \$1 billion from the previous administration in 2012, and an additional \$500 million from the present administration, the NSIA has been able to grow the fund to the current \$2.53 billion as at May 2019 (PremiumTimes, 2019). Excess Crude Account (ECA) on the other hand has accrued over \$200 billion since its inception in 2004 (James, 2019) with lack of rules governing the deposits, withdrawals, and investments in ECA. This was against the initial objective for setting the sovereign wealth fund as most of the fund in ECA is expected to have been transferred into fund that is being properly managed with high level of transparency by

the NSIA. This led to the poor rating of Nigerian sovereign wealth fund by World Bank/IMF report released in April, 2019 whereby IMF ranked Nigeria second lowest among 33 countries using the sovereign wealth fund from their natural resources (PremiumTimes, 2019); although this is further clarified that the emphasis of the classification was based on the ECA which lacks transparency in the mode of operation. Due to a meagre injection of fund to the main sovereign wealth fund and lack of political will to move bulk of fund from ECA to SWF, there is a trust issue with the government on the proper commitment to SWF.

However, as a result of high level of inequality and lack of confidence in Nigerian government by her citizens, this paper is suggesting Sovereign Wealth Funds Plus (SWF-P) which is an offshoot of SWF. This SWF-P as suggested by the authors of this article, in addition to the three funds suggested in SWF, recommended the distribution of certain percentage (may be 40% that remain) to the entire adult citizens of the country in order to give all Nigerians equitable distribution of income and then tax them. The proceeds from the investments should be reinvested but once it reaches certain percentage of GDP (benchmark to be set by NSIA), then the proceeds beyond this benchmark should also be distributed to Nigeria citizens so as to reduce the level of poverty within the country especially in the rural areas. The idea of taxing people after the receipts of their dividends will create an endowment effect (Sandbu, 2006) that will enable the citizens to hold their government accountable for every penny paid as tax unlike when the government already squander the resource rent before it gets to people. According to Karl (1997), the dictum of “no taxation without representation” illustrates the idea that taxation generates pressure for more accountable government.

This idea tends to prevent the government from ‘rent seeking’, and makes the government judicious in her spending and also more accountable to the citizens.

SWF-P will also force people to be part of governance by monitoring what the oil companies pay as resource rent to government and what the government declares. This will make the Nigeria Extractive Industry Transparency Initiative (NEITI) very functional as it ensures that each of the parties fully declare the right figures. This creates ‘information effect’ by providing the citizens with the capacity to exert pressure on the government due to the ample information available to them about the resource rents and the tax revenue in the government account. An Alaska Permanent fund which distributes annual dividend from oil and gas proceeds via mandatory state investments provides a similar illustration (Weinthal and Luong, 2006). Non independence of this kind of boards from presidency usually collapses the fund (Nwoye, 2017; James, 2019). Nigeria Sovereign Investment Authority (NSIA) is also expected to diversify its assets by investing in various portfolio that have low risks such as equities, fixed income assets, real assets, private equities and short term liquidity assets. Unlike other developed countries SWFs such as that of Norway which invest almost all their assets abroad, Nigeria Sovereign Investment Authority cannot afford to invest largest portion of their funds abroad because of the level of unemployment, low incomes, poor infrastructures and poverty level in the country. Investing within the economy will help reduce some of these socio-economic challenges facing Nigerians. The Santiago Principles already set a Generally Accepted Principles and Practices (GAPP) for SWFs. For example the fourth GAAP Principle requires clear and public disclosure of policies, rules, procedures or arrangements in relation to

SWF's general approach to funding, withdrawal, and spending operations (James, 2019). On its part, the sixth GAAP Principle proposes clear division of roles and responsibilities under the SWF's governance framework to facilitate accountability and operational independence (The Vanguard, 2012). Nigerian government should also be committed to building strong legal, political and economic institutions upon which the operations of the fund will be based. The Critical Analysis of the mode of operation of the fund is an area for further research studies.

4. Managing energy resource through Renewable energy technologies

This section examines various renewable energy technologies and how they can be utilised to tackle energy poverty in Nigeria. There is no contention that the role play by energy in the development of any economy cannot be undermined. Energy is critical to the development of all other sectors of the economy as it is being used to drive their economic activities (Akinwale, 2018). Despite the huge reserves that Nigeria possesses in both conventional and renewable energy sources, the country is still suffering from epileptic power supply (Iwayemi, 2008). Approximately 42% of Nigerians have access to electricity (Ogundari et al, 2017), with only about 30% of their demand being met. According to studies (Adepoju et al., 2018; Sambo, 2009), natural gas power stations accounted for 68% of the grid electricity generations and large hydro power stations also accounted for 32%. Most of the rural areas in various part of the country do not have access to grid connection and lack renewable energy technologies which makes them rely mainly on wood for fuel (Akinwale et al, 2019). Even in the urban areas, about 90% of those in industrial sector and a

considerable number of household residential customers provide their own power either through petrol or diesel generating sets at a high cost to them and the entire economy (Akinwale and Ogundari, 2017). The electricity consumption per capita in Nigeria for the year 2015 was 145kWh while that of South Africa was approximately 4,200kWh (World Bank, 2019). The exploitation of renewable energy in both rural and the urban centres is extremely low which may be attributed to the poor knowledge of how to utilise these technologies. Some of the renewable energy sources in which technologies can be applied are Solar, Hydro, and wind among others. Few of the technologies that this paper focused on can be explained below:

4.1 Solar Technology

Solar energy involves using technologies that produce power from the sun. Globally, solar energy is abundant and has a huge potential for cleaner climate environment (Tsilingiridis *et al.* 2004). Solar heating technology is used to harness the power of the sun to generate heat for hot water, space heating and swimming pools among others. This solar heating can either be active, by providing specially designed mechanical systems to increase the heat gained from the sunlight, or passive, by simply using large windows to let in more light and warmth. Solar thermal collectors are the key component of active solar systems, and are designed to meet the specific temperature requirements and climate conditions for different end-uses. There are flat plate or transpired air collectors which are used in residential or commercial buildings that have applications that require temperatures below 200°F while evacuated-tube or concentrating collectors are use in those buildings that require temperatures greater than 200°F (USDOE, 2007; Jesuleye, 2010). Also, there is hybrid solar lighting

technology which collects sunlight and routes it through optical fibres into buildings where it is combined with electric light in hybrid light fixtures. Furthermore, there is Photovoltaic (PV) technology which is the technology that converts solar energy through the use of solar cells to clean, reliable and affordable electricity for a nation with little impacts on the environment (Muneer *et al*, 2003). The PV or solar cells generate direct current “dc” and convert it to alternating current “ac” using inverters. However, the performance of a PV system is dependent upon sunlight which means that once the climate is cloudy or foggy, it will affect the performance of the PV system because it will reduce the amount of sunlight that can be generated.

Nigeria lies within a high sunshine belt and the solar radiation is moderately cut across all parts of the country but its adoption is still very low across the countries (Akinwale and Ogundari, 2017). The Northern part of Nigeria has more solar energy potentials as it experiences more sunshine than any other part of the country (Sambo, 2005). There are some research institutes, such as National Centre for Energy Research and Development (NCERD), which have carried out pilot projects on the application of various solar technologies like solar cookers, traffic lighting, and solar chicken brooders among others. These technologies will go a long way to reduce energy poverty especially in the rural areas that are not connected and likely not to be connected to the national grid. Although the capital cost might be quite expensive but this paper suggests that Nigerian government should formulate and implement policy that will provide electricity through solar PV for the rural and urban dwellers. Likewise, interested villagers can also be trained on how to maintain and service the device. Many literatures have shown that the maintenance

cost is very cheap compared with some other energy sources.

4.2 Wind Technology

Wind energy technologies convert the energy from wind to power such as pumping water, grinding grain, charging batteries and generating electricity etc. Wind energy technologies can be used as stand-alone, connected to a utility power grid, or even combined with a photovoltaic system (hybrid system). A large number of turbines are usually constructed close to one another to form a wind farm that provides grid power so as to enjoy the economies of scale. Wind farms have been used by many electricity generators in the advanced countries to supply power to different households and commercial areas. Government of these advanced countries have formulated policies that support those that generate power from wind technologies. These have gone a long way to stimulate the generators in exploiting wind technologies. Electricity generation from the wind requires that the kinetic energy of moving air be converted to mechanical and then electrical energy. The cube of wind speed determines the quantity of kinetic energy in the wind that is available for extraction (Wiser *et al.*, 2011). Many countries have deployed small wind turbines for rural electrification and these turbines are usually used on stand-alone or combined with other supply options such as solar and diesel.

Nigeria, especially the northern part, has huge untapped potentials for wind energy. The wind speed in some cities in the North varies between 4.0 to 5.12m/s, and usually reach its peak between April and August (Ogundari *et al.*, 2017). However, the speed is not as much in the southern part of the country when compared with the northern part. The technologies for harnessing this energy have been attempted in Nigeria mainly

for water pumping in many secondary schools in the northern parts of the country (Sambo, 2009). Despite the huge potentials of wind source of energy, its utilization is still very low in the country. There is need for Nigeria government to fund the research institutes such as Sokoto Energy Research Centre (SERC) and also provide an enabling environment for the private sectors to fully harness wind energy in solving energy poverty especially in the rural areas.

4.3 Hydropower Technology

Hydropower is derived from the energy of water moving from higher to lower elevations. Aliyu and Bawa (2011) noted that hydropower systems rely on the potential energy difference between the levels of water in reservoirs, dams, lakes and their discharge tail water levels downstream. Its conversion efficiency is among the best globally which is approximately 90% (International Energy Agency, 2014). Despite the fact that its capital investment is high, it has a very low operation/maintenance costs which makes it a price-competitive technology.

In Nigeria, the current hydropower generation is about 14% of the nation's hydropower potentials and represents about 30% of the total installed grid connected electricity generation capacity (Ogundari et al., 2017). This means that this technology has been used in Nigeria but attention needs to be given to small hydropower stations which will enable each state and various regions to provide their own electricity through the various dams available in their locality. The small hydropower plants can supply electrical energy of either less than 15KW (micro-hydro) or more than 15KW but less than 15MW (Mini-hydro). In order to solve the electricity poverty at the community level; state and local government must support setting up of

small hydropower systems which can serve various households and small firms in such vicinities. Furthermore, there is need for the government to train some members of these local areas so as to develop capacity building in hydropower technologies at the community level (Akinwale et al., 2019).

5.0 Conclusion and Recommendation

This paper critically examined how energy resources could be better managed and reduces poverty through proper management of oil fund and the deployment of renewable energy technologies in Nigeria. It makes recommendations from the experience of selected countries' resource fund management. The paper suggested that in addition to the sovereign wealth fund recently established by Nigeria government which focus on stabilisation, savings for the future generation and development of critical infrastructure; the fund should also include distributing certain percentage of the oil wealth at the end of the year to all the adult citizens of Nigeria so as to reduce unequal distribution of income. It also discusses some of the areas where the fund could be invested and emphasized on the independence of Nigeria Sovereign Investment Authority so as to ensure transparency of the fund. The strong institutions required in the nation should be built and the fund should also operate according to Santiago Principles which set the Generally Accepted Principles and Practices (GAPP) for SWFs globally. Political commitment is needed from the Buhari-led administration to move fund from the excess crude oil account to NSIA which is in a better position to properly manage SWF in Nigeria.

The paper also discusses how energy poverty can be reduced in Nigeria through various renewable energy sources and technologies such as solar, hydro and wind. The country has lots of untapped potentials in

various renewable energies, and this paper recommends that government should finance the deployment of renewable energies especially in the rural areas that are not connected to the grid. Government should create enabling environment for the private firms to operate as this will make the renewable energy products/services cheaper and affordable for the community people.

Moreso, there is need for the provision of incentives for the universities/ research institutes which engage in renewable as this would facilitate capacity building of the citizens in renewable technologies. Small hydropower should be provided in various local communities as this will go a long way in solving electricity poverty in these areas.

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