NEED FOR A POLICY FRAMEWORK FOR SUSTAINABLE RENEWABLE ENERGY TECHNOLOGIES IN NIGERIA: BIOGAS UTILITY.

DR. S.E IMOISI & DR. CHI. JOHNNY OKONGWU *

Abstract
Biogas unlike fossil fuel is a renewable energy source. It is environmentally friendly and can be generated in every part of Nigeria where people live. Wastes are common in Nigeria as the populace generate wastes everyday which sometimes poses challenges to government and the people themselves. Biogas technology is available in Nigeria. Yet Nigeria is unable to tap the full potentials of the availability of this resource. This is due to many factors. However, for a sustainable renewable energy technology development through the utility of biogas technology, there is the need for a biogas policy framework for Nigeria. The aim of this paper therefore is to examine the policy framework for sustainable renewable energies technology in Nigeria through the utility of biogas. The methodology for this research is the doctrinal method. The paper finds that there is no existing policy or legal framework for biogas utility in Nigeria. The paper concludes that there is need for the current National Assembly to develop a roadmap for biogas utility in Nigeria by considering and passing a Bill to establish the National Biogas Commission.

Keywords: Biogas, renewable energy, policy framework, biomass resources.

Introduction
Renewable energy technologies (RETs) provide attractive environmentally sound technology options for Africa's electricity industry. RETs could offset a significant proportion of foreign exchange that is used for importing oil for electricity generation in most countries. In addition, renewables are modular and are well suited for meeting decentralized rural energy demand. The modular nature (i.e. can be developed in an incremental fashion) of most renewable energy technologies and the low investment levels makes them particularly suitable for capital-constrained African Countries. Most renewable energy Technologies utilize locally available resources and expertise, and would therefore provide employment opportunities for the locals[1].
Sustainable Energy Development Strategies typically involve three major technological changes: energy savings on the demand side, efficiency improvements in the energy production, and replacement of fossil fuels by various sources of renewable energy. Consequently, large-scale renewable energy implementation plans must include strategies for integrating renewable sources in coherent energy systems influenced by energy savings and efficiency measures. Renewable energy is considered an important resource in many Countries around the world, on a global scale less than 15% of primary energy supply is renewable energy, and the major part is hydro power

*__Dr. S.E IMOISI__, LECTURER, FACULTY OF LAW, EDO UNIVERSITY IYAMHO. Email imoisi.simon@edouniversity.edu.ng ; DR. CHI. JOHNNY OKONGWU.SENIOR LECTURER, FACULTY OF LAW, CHUKWUEMEKA ODUMEGWU OJUKWU UNIVERSITY, IGBARIAM CAMPUS, ANAMBRA STATE. Email lawleviokongwu@gmail.com

[1] Karekezi Stephen and Waeni Kithyoma, "Renewable Energy in Africa: Prospects and Limits," A workshop on African Energy Experts on Operationalizing the NEPAD Energy Initiative ,Novotel, Dakar, Senegal, June, 2003.1

and wood fuels in developing countries. Renewable sources, such as wind and solar, only constitute a very small share of the total supply[2].

The importance of energy to economic growth and social development cannot be overemphasized. In fact, it is the mainstay of any nation's economy and sustainability. Sadly, the near-total dependence on fossil fuel formany years to propel the national economy has resulted in adverse problems of global warming and ecological degradation. Hence, the urgent need for alternative, but cleaner and safer energy sources is the most recurring global issue in present times. Tapping the world's vast renewable energy resources such as solar, wood, hydroetc. is seen as the most viable and appropriate step towards salvaging our climate and ecosystems[3]. Not much significant effort has been made so far to explore the vast renewable energy resources available in Nigeria.

Despite the fact that Nigeria has abundant renewable energy potentials in solar, wind, biomass and small hydropower, the rate of penetration of these energy sources into the Country's energy grid has been very slow. Only major-hydro plants currently supply about 29% of total national energy generation[4].Unfortunately, the absence of any concise government policy or strategy for the diversification of Nigeria's energy resources has resulted in the only source of electric power supply system in the Country being stressed to maximum capacity[5] .

Nigeria is endowed with abundant energy resources, both conventional and renewable, which can potentially provide the country with a sufficient capacity to meet the ambitions of both urban and rural Nigerians of a full, nationwide electrification level. Yet, Nigeria has one of the lowest consumption rates of electricity per capita in Africa[6]. The abundance of biomass in Nigeria is yet to be fully utilized with a view to ensuring cleaner sources of energy, improvement in energy supply and ensuring a cleaner environment in Nigeria.

What Is Biogas?

Biogas is a renewable energy source in the category of biofuels and it refers to gas produced by the biological breakdown of organic matter in the absence of oxygen. Biogas has been defined as methane produced by the process of anaerobic digestion of organic materials by anaerobes. In other words, biogas is the anaerobic digestion or fermentation of bio degradable materials such as biomass, manure, sewage, municipal wastes, green waste, plant material and crops[7]. Biogas is a form of renewable energy. It is a renewable source of energy in the category of biofuels.

[2]Lund, Henrik. "Renewable energy strategies for sustainable development." Energy 32, no. 6 (2007)Elsavier Ltd, Denmark: 912.

[3]Uzoma, C. C., C. E. Nnaji, C. N. Ibeto, C. G. Okpara, O. O. Nwoke, I. O. Obi, and O. U. Oparaku. "Renewable energy penetration in Nigeria: a study of the South-East zone." Continental J. Environmental Sciences 5, no. 1 (2011)Wiloloud Journals, Nigeria: 1

[4]Sambo, A.S.,. Science and Technology Vision. 2005.12. Available at http://www.isesco.org.ma/ISESCO_Technology_Vission/NUM01/A.S.Sambo/A.S.Sambo.pdf Retrieved on 30/7/2019

[5]Uduma, Kalu, and Tomasz Arciszewski. "Sustainable energy development: the key to a stable Nigeria." Sustainability 2, no. 6 (2010): 1560. Available at www.mdpi.com/journals/sustainability. Accessed on 30/7/2019

[6]Shaaban, Mohamed, and J. O. Petinrin. "Renewable energy potentials in Nigeria: meeting rural energy needs." Renewable and Sustainable Energy Reviews 29 (2014): 72 available at https:// doi.org/10.1016/j.rser.2013.08.078. accessed on 29/7/2019

[7] Yong, Zihan, Yulin Dong, Xu Zhang, and Tianwei Tan. "Anaerobic co-digestion of food waste and straw for

Biogas refers to gas produced through the biological breakdown of organic matter in the absence of oxygen. It is also the anaerobic digestion or fermentation of biodegradable materials such as biomass, manure, sewage, municipal waste, green waste, plant material and crops. It is an alternative energy source[8].

Renewable Energy (Re) Technology In Nigeria

One significant factor that is generally recognized as the best indicator of any nation's level of development, industrial strength and wealth is the amount of energy that is available and used by that Country[9]. Nigeria as a Country, relies heavily on hydro-electric power to generate energy to power its industries, government activities and individual consumption. This accounts for the insufficiency in power supply which is put at about 4000mwatts. Renewable energy is therefore the way to go to enable Nigeria improve on its power supply and ensure a cleaner environment.
Renewable energy which can also referred to as 'clean energy' simply means energy which is not depleted when used. In other words, renewable energy comes from natural sources or processes that are constantly replenish able. It is a new technology that harnesses nature's power which can be used for heating, transportation, lighting etc. It is an alternative to 'dirty energy' which includes fossil fuels like petrol, diesel, gas, coal etc. The different types of renewable energy include solar energy, wind energy, hydroelectric power, biomass energy, geothermal energy, ocean energy, syngas, solid bio fuels, and algal biofuels.

So much has been said and written on renewable energy in Nigeria; from public perception, very little has been done in practical terms. Perhaps there are few installations for private house hold users in the informal sector, but lack of a vigorous policy plan still hampers vast public-based renewable energy projects to stimulate local economic growth[10]. Among the reasons for almost a lack of renewable energy resources consciousness and presence in Nigeria are: a low level of awareness of the socio-economic and environmental benefits of RE technologies and lack of policy initiative in that direction[11].

Development of Biomass Resources in Nigeria

Agriculture forms an integral part of the Nigerian economy with great potentials for employment generation, food production, poverty alleviation and wealth creation. In spite of these considerable contributions towards economic growth and development, the sector still encounters grave challenges which include Poor storage facilities, inadequate mechanization, Unavailability and poor utilization of improved planting materials. Although some of these challenges have been receiving varying levels of attention from the Federal Ministry of Agriculture, management of agricultural wastes has not been made a priority. Agricultural activities generate different types of wastes in its daily operations which include Solid wastes

biogas production." *Renewable energy* 78 (2015) Elsevier, England: 528
[8]Hosseini, Seyed Ehsan, and Mazlan Abdul Wahid. "Feasibility study of biogas production and utilization as a source of renewable energy in Malaysia." *Renewable and Sustainable Energy Reviews* 19 (2013) , Pegamon-Elsevier Science ltd, Oxford, England: 454
[9] Note 6, 1560
[10] Note 4, 3
[11]*Ibid*, 3

and Liquid wastes. These contribute as much as 20% to the global anthropogenic methane emission.[12]

Methane is a greenhouse gas that has a global warming potential of 23 over 100 year period[13]. It therefore follows that there is an increasing global concern for proper waste management. Also, the concept of waste as a useless material is rapidly changing to that of a valuable resource[14].
Biomass is a non-fossil material of biological origin. Biomass resources in Nigeria can be identified as wood, forage grasses and shrubs, animal wastes and wastes arising from forestry, agricultural, municipal and industrial activities, as well as aquatic biomass. Biogas digesters where proficiently deployed has the potentials for satisfying domestic, industrial and communal energy demands. It is also fundamental that the residual biomass material at the end of digestion is a superior manure than the original waste. The consistent deployment of bio digesters has the potential to decrease the prevailing substantial dependence on chemical fertilizers [15] and also ensure good agricultural yield.

It has been established that wastes contain a lot of valuable chemical components with both energetic and fertilizing properties[16]. Among these agricultural waste are animal excreta such as cow dung chicken excreta etc which can constitute environmental hazard. Yet these wastes are veritable sources for the production of biogas as alternative energy source in Nigeria. Simonya and Fasina[17]estimates that Nigeria is capable of producing 2.01 EJ (47.97 MTOE) of energy from the 168.49 Million tones of agricultural residue and wastes that can potentially be generated yearly whereas according to the International Energy Agency,[18] the estimated total energy consumption in Nigeria as at 2009 was about 4.6 EJ or 111 MTOE.
The drivers for increasing the use of biomass for energy[19] include:

(i) Possibility of reduced carbon emissions and meeting climate change commitments,
(ii) Reduction in fossil fuel consumptions,
(iii) Rural development through employment and increased livelihood and market opportunities,
(iv)Security of supply through local production and / or processing and
(v) Technological developments because bioenergy could be used to bridge the gap between current fossil fuels technologies and future technologies
(vi)Prevention of ecological imbalance through Eco safety. This is because waste constitutes ecological and economic challenges

[12] International Energy Agency Report, 2005. (Paris, France)
[13]The Intergovernmental Panel on Climate Change, 2001. This is the United Nations body for assessing the science related to climate change. (Netherland)
[14]Igoni, A. Hilkiah, M. J. Ayotamuno, C. L. Eze, S. O. T. Ogaji, and S. D. Probert. "Designs of anaerobic digesters for producing biogas from municipal solid-waste." *Applied energy*85, no. 6 (2008): 430.
[15]Khaisan, M.U, '' Sustainable Biogas Energy in Nigeria, Prospects, Policies, Challenges and Economic Viability," paper presented at the HEPSSA Knowledge sharing workshop held at Edo University Iyamho on 25th March, 2019, 3
[16]'Agricultural Waste: a valuable resource, 'Available at https//www.biorefine.edu/agricultural-waste-valuable-resource. Retrieved on 5/8/2019.
[17]Simonyan, K. J., and O. Fasina. "Biomass resources and bioenergy potentials in Nigeria." African Journal of Agricultural Research 8, no. 40 (2013): 4975 (doi: 10.5897/AJAR 2013 6726) accessed on 30/7/2019
[18] International Energy Agency Report, 2012 (UNDEP)
[19] Food and Agriculture (FAO) Report,2008

The conversion of biomass to energy will be rewarding, given the large availability of biomass resources in Nigeria[20]. Drawing from the EU example, Nigeria apart from meeting its energy demands through alternative sources, must also tackle the issues of globalization with respect to the development of policies to tackle its over dependence on imported oil and gas, reduction of greenhouse gas emissions and replace the use of fossil fuels in the long run. According to Percze and Balazs[21], the central importance of energy policy in helping the EU meet the challenges of globalization was confirmed by the Union's heads of state and government at the informal Hampton Court summit in October 2005 where the Commission was requested to prepare proposals for the development of a reinvigorated European Energy Policy. One important element of such an approach would be means to address Europe's over- dependency on imported oil and gas and to develop a coherent approach, based on a robust economic, environmental and social impact analysis, on how to progressively reduce this dependency[22]. The EU is supporting biofuels with the objectives of reducing greenhouse gas emissions, boosting the decarbonisation of transport fuels, diversifying fuel supply sources and developing long-term replacements for fossil oil[23].

Existing Biomass Policies in Nigeria

The existing Biomass Policies in Nigeria are as follows[24]:

a) The nation shall undertake a comprehensive mapping of agro-ecological suitability for energy crops for obtaining a regional view of production potentials and contribute to decision making on support for handling facilities.
b) The nation shall incorporate waste-to-energy strategy in its overall waste management framework.
c) The nation shall effectively harness non-fuel wood biomass energy resources & integrate them with others.
d) The nation shall promote the use of efficient biomass conversion technologies.
e) The nation shall improve measures required to support initiatives aimed at reducing forest thinning, and to enhance collection and use of forest residue.
f) The nation shall enhance the demand side measures that support the use of biomass for the production of RE.
g) The nation shall set a limit on the amount of biomass used for energy, to ensure that the overall demand can be accommodated alongside other demands for land, for example, food production on biodiversity conversation.
h) The nation shall undertake the life cycle analysis of all biomass feedstock in relation to climate change.

[20] Note 18, 49781

[21]Percze, Attila, and Péter BALÁZS. "EU BIO-FUEL TECHNOLOGIES AND POLICIES: AN ENVIRONMETAL BENEFIT FOR SUSTAINABLE ENERGY." *Cereal Research Communications* 36 (2008): 1591-594. http://www.jstor.org/stable/90003023. Accessed on 29/7/2019

[22] European Environmental Agency, 2005: "How much biomass can Europe use without harming the environment", briefing 2/2005 (European Union)

[23] European Commission (2006): Communication from the Commission: An EU strategy for biofuels. COM (2006)34 final of February 8, 2006.(Published by the European Union, Brussels)

[24] National Energy Policy, 2013 (Nigeria)

Biomass Policy Objectives

a) To promote biomass as an alternative energy resource especially the rural areas.
b) To promote efficient use of agricultural residues, animal and human waste as energy sources.
c) To reduce health hazards arising from combustion of biomass fuel.
d) To focus biomass utilizations close to production, for community heating schemes and domestic heating, particular off the national grid network.

Existing Renewable Energy Programs

The Renewable Energy Master Plan (REMP) is basically structured into the following programme with short (2013-2015) medium (2016-2020) and long term (2021-2030). The programme under the master Plan includes:

a. National biomass Energy Programme
b. National Solar Energy Programme
c. National Hydropower Programme
d. National Wind Energy Programme
e. Emerging Energy Programme
f. Framework Programme for Renewable Energy Promotion.

In all these programmes developed by the Federal Government of Nigeria, no provision is made for the development of Biogas technology or utilization of same. In other words, there is no National Biogas development programme or Policy for the Federal Republic of Nigeria. Even under the Emerging Energy Programme, biogas is not captured in spite of its enormous benefits and advantages such as efficiency, availability of technology, ecological compatibility and so on.

Importance of Biogas Technology

The importance of biogas technology to the development of Nigeria's economy cannot be over-emphasized. Though a new technology, governments worldwide have tried to develop biogas technology because it is a sustainable energy and its raw materials are waste.[25] Biogas technology can be used to recycle organic wastes into stable soil additives[26]. Unlike other forms of renewable energy sectors, biogas production did not emerge from concerns on energy but rather from concerns on the environment (elimination of pollution, treatment of waste, control of greenhouse gas emissions etc.).[27] In Nigeria there is abundance of waste that are not properly managed. These wastes could become sources of raw material for the biogas digesters if properly handled. According to Nielsen and Oleskowicz[28]biogas can be produced of nearly all kinds of organic materials. It is closely linked toagricultural activities and human consumption. Wherever there is a large population,and thereby a comprehensive quality food production of a broad mixture of vegetable and animal foods, the right conditions exist for biogas production[29].

[25]*Ibid*, 2.
[26]Panwar, N. L., S. C. Kaushik, and Surendra Kothari. "Role of renewable energy sources in environmental protection: A review." *Renewable and Sustainable Energy Reviews* 15, no. 3 (2011) (Routledge, London): 1513.
[27]*Ibid*, 2
[28]Jens Bo Holm Nielsen and Piotr Oleskowicz-Popiel, "The Future of Biogas in Europe: Visions and Targets Until 2020." The Future of Biogas in Europe III (2007) Published by University of Southern Denmark, Esbjerg, Denmark: 102.

[29]*Ibid*, 44

Nigeria has not been able to develop its biogas resources due to the fact that the government has not taken it as a priority project. There is even no government plan for biogas development neither is there a policy direction. The European Union (EU) for example, under its Bio-fuel Directive[30]set an indicative target of 5.75% substitution by biofuels by the year 2010 and 22% renewable electricity in gross consumption by the year 2020 under the Renewable Electricity Directive.[31]Furthermore, the EU policy concerning renewable energy has set forward a fixed goal of supplying 20% of the European energy demands from renewable energy[32].

There is therefore the need for government support particularly the Federal Government of Nigeria through the development of a Biogas policy/plan and an appropriate legal and Institutional Framework for the development and deployment of biogas Technology in Nigeria. According to Kottner,[33]sustainable biogas production is possible in Nigeria if the Federal Government can have the political will to put the legal framework in place. Germany has developed its biogas infrastructure since the past 25 years. Tanzania, China and India have also developed their biogas at industrial level.

Biogas can be produced at different scales- Small Scale (for house hold use, lighting and cooking) and Large Scale (for industrial use). In Switzerland, courses exist at different levels to teach biogas plant operators and waste managers of treatment plants who are given a Federal Certificate[34] at the end of the course.

Biogas can be utilized for the following[35]:

1. Production of heat and/or steam
2. Electricity production / combined heat and power production (CHP)
3. industrial energy source for heat, steam and/or electricity and cooling
4. Vehicle fuel
5. Production of Chemicals
6. Fuel cells

Raw Materials for Production of Biogas

Biogas can be obtained from the following raw materials:

1. Sewage sludge
2. Food waste
3. Waste from food industry
4. Manure from cows, pigs etc
5. Residue from agriculture
6. Distillery byproducts
7. Organic fraction of municipal solid wastes
8. 'Energy' herbs and plants like maize

[30] See Directive 2003/30/EC of the European Union
[31] See Directive 2001/77/EC of the European Union
[32] Note 29, 102.
[33] Michael Kottner, "Expert gives conditions necessary for Biogas Production," The News. Available @ https//www.thenewsnigeria.com.ng/2017/09/exoert-gives-conditions-necessary-for-biogas-production/ Retrieved on 5/8/2019.
[34] Oliver Salvi and Samuel Delsine, "Biogas- A European Perspective on safety and Regulation", vol. 1 no.1, Journal of Risk Analysis and crisis Response, Atlantics Press, University Jent, Belgium, July, 2011, 2.
[35] Note 29, 106.

Parameters For Anaerobic Digestion Process

1. Humidity of the substance: wet or dry
2. Temperature range: mesospheric or hemophilic
3. Stage of fermentation: single stage or multiple stage
4. Stock flow: continuous or discontinuous
5. The pH control and temperature control

Legal Framework For Biogas Development In Nigeria

There is no existing legal framework for the regulation, development and deployment of biogas in Nigeria. Though these laws do not make specific reference to the development and deployment of biogas, yet they are important as they may play an important role in the development of biogas technology and protect the environment in Nigeria. Some of these laws are hereby highlighted as follows:

a) **The Constitution of the Federal Republic of Nigeria, 1999(as amended).** Section 20 thereof makes it an objective for Nigeria to protect the air, water, forest and wildlife. Other available laws, regulations, policy and programmes as highlighted earlier in this paper, only deal generally with renewable energy or biomass development with little or no reference to the development of biogas technology. For instance, in the short, medium and long term programs in the available Renewable Energy Master Plan for Nigeria which covers a period between the year 2013-2020, biogas development and utility are not specifically captured. For biogas to have meaningful impact in the Nigerian Economy, there is need for the development of enabling policies and government must capture biogas utility in its development plans.

On the contrary, Germany has made progress in the development of biogas technology due to the enactment of the Renewable Energies Act. Germany currently has the technical capacity to generate 72.2bn. kilo watt-hours (kWh) or 260 Peta Joule (PJ) heat energy from biogas.[36]

The sustainable growth of the biogas sector in Germany was initiated by the Renewable Energy Law first passed in 2000. The Renewable Energy Law was and still is a success due to following four core elements[37]:

1. Priority connection of installations for the generation of electricity from renewable energies (wind-, biogas-, water- and solar cell-based electricity) to the general electricity supply grids,
2. The priority purchase and transmission of this electricity,
3. A consistent fee for this electricity paid by the grid operators, generally for a 20-year period, for commissioned installations,
4. Nation equalization of the electricity purchased and the corresponding feespaid.

The Law in Germany ensures the increased use of environmentally friendly renewable energies, not through subsidies but through apportioning the costs. The grid operators and energy supply companies can pass on the difference in costs for electricity from renewable energies to the final consumer[38].

In the development of renewable energy technology in Germany, Biogas is specifically captured. This accounts for the rapid development and deployment of biogas in resolving some of the environmental and energy needs of Germany.

[36] Porsche, Gepa. "The impact of national policies and economic frames for the development of biogas in Germany." The Future of Biogas in Europe III (2007), published by University of Southern Denmark, Esbjerg, Denmark: 45

[37] *Ibid,46*

[38] *Ibid,46*

b) Environmental Impact Assessment Act[39]

Environmental Impact Assessment is an assessment of the potential impacts whether positive or negative of a proposed project on the natural environment. The Act makes it mandatory for an Environmental Impact Assessment study of any public or private project likely to have a significant (negative) impact on the environment to be carried out before the project is executed[40]. Environmental Impact Assessment is an assessment of the potential impacts whether positive or negative of a proposed project on the natural environment. Therefore in the development of biogas technology, there may be need for an environmental impact assessment unless it is excluded by government policy.

The Act makes it mandatory for an Environmental Impact Assessment study of any public or private project likely to have a significant (negative) impact on the environment to be carried out before the project is executed[41]. In the development of policies for biogas utility there is therefore the need to exclude biogas from those projects that require an environmental impact assessment as this in our view may work hardship on the part of intending investors in biogas technology in Nigeria.

c) National Environmental Standards and Regulation Agency(Establishment) Act[42](NESREA)

NESREA Act is the flagship law on the environment in Nigeria. It repealed FEPA Act
It created NESREA. By virtue of section 2of the Act, NESREA has the responsibility for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria's natural resources in general and environmental technology, including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulation, rules, laws, policies and guidelines.
In the development of environmental standards, regulation, rules, laws, policies and guidelines by NESREA, there is need to reflect biogas development and utility. There is currently no regulations rules, laws, policies or guidelines developed by NESREA on biogas utility.

Government Ministries That Should Be Involved in the Policy Formulation For Biogas Utility In Nigeria

There are some government Ministries that are critical stakeholder in the formulation of policies for biogas utility in Nigeria. These Ministries are highlighted hereunder as follows:

1. Ministry of Environment
2. Ministry of Justice
3. Ministry of Agriculture
4. Ministry of Lands and Survey
5. Ministry of Power, Work and Housing

These Ministries are critical to the development of policies for biogas utility in Nigeria due to the nature of the duties they carryout. For example, the Ministry of Environment is responsible for

[39] CAP.E12, LFN, 2004

[40] See section 2(1)of Environmental Impact Assessment Act, CAP.E12, LFN, 2004

[41] See section 2(1*), ibid*

[42] CAP N164 LFN, 2004

developing and executing policies that bother on the environment. Biogas is an activity that will impact positively on the environment. Ministry of Justice is responsible for drafting the enabling laws for biogas utility in Nigeria. It is also responsible for enforcement of the laws. Ministry of Lands is responsible for issues bothering on land acquisition for biogas plant establishment or the digesters. While the Ministry of Power, Works and Housing is responsible for policies relating to renewable energies technology in Nigeria.

In the development of biogas policies for sustainable renewable energies technology in Nigeria, there is need for the Ministries stated above and other stakeholders to synergize and work together for the development of an enabling biogas policy for Nigeria.

Institutional Framework for Biogas Utility in Nigeria

There is no specific institutional regulatory body for biogas development and utility in Nigeria. However, there are regulatory bodies in Nigeria that may have some form of general supervisory role in the development and utilization of biogas. The general regulatory body for the energy sector in Nigeria is the Energy Commission of Nigeria.

Energy Commission of Nigeria (ECN):

Energy Commission of Nigeria (ECN) is the major regulator of energy resources in Nigeria. ECN was established by Act no.62 of 1979 as amended by Act no.32 of 1988 and Act no.19 of 1989. Its statutory mandate is for strategic planning and coordination of National policies for energy development generally.

It is therefore the apex government body empowered to carry out overall energy sector planning and policy implementation, promote the diversification of energy resources through the development and optimal utilization of all, including the introduction of new and alternative energy sources such as biogas technology. It inspects, monitors and coordinate the performance of the energy sector, to ensure consistency with the National Energy Policy (NEP).

The Energy Commission Act (Amendment) Bill, 2018 is currently before the National Assembly which is a welcomed development particularly at a time when the development and utilization of biogas is on the front burner. This Bill seeks to amend the Energy Commission (Amendment) Act of 1989 to confer powers on the Commission to accord priority to promote, regulate and standardize the development and utilization of renewable energy. There is however no specific reference to the development and utilization of biogas technology.

National Renewable Energy Action Plans (NREAP), 2016

In the year 2016, several Ministries, Departments, Agencies and Representatives of the 36 states of the Federation of Nigeria developed the NREAP[43]. The plan was basically to increase the use of alternative energies such as solar, wind and biomass.
The plan did not specifically include the development and utility of biogas in Nigeria.

[43]Philip Thomson and Julia Deric, ''Global Legal Insights, Energy 2019,'' 7th Edition, Washington DC, United States of America

Findings

The findings of this paper are as follows:

1. Biogas development is a veritable instrument for solving the problem of waste management and energy needs in Nigeria
2. There is no political will on the part of government to develop biogas in Nigeria
3. There is no existing legal framework for the development and utilization of bio gas in Nigeria
4. There is no institutional framework for biogas development and utilization in Nigeria.

Recommendations

In order to ensure sustainable biogas utility in Nigeria, this paper recommends as follows:

1. The Federal Government should demonstrate political will in the development of biogas in Nigeria
2. A comprehensive Legal and Institutional framework should be enacted for the development and utilization of biogas in Nigeria. A bill should be sent to the National Assembly for the establishment of the National Biogas Commission. The Commission will be responsible for the coordination of all policies related to the development and utilization of biogas in Nigeria.
3. The Energy Commission Act (Amendment) Bill, 2018 currently before the National Assembly should be passed without further delay. This Bill which is pending before the current National Assembly, seeks to amend the Energy Commission (Amendment) Act of 1989 to confer powers on the Commission to accord priority to promote, regulate and standardize the development and utilization of renewable energy. The development of biogas technology should be included.
4. There should be interdisciplinary collaboration between the major stakeholders which should cut across all disciplines. This will help reduce bottlenecks and create a better synergy for biogas utility in Nigeria.

Conclusion

There is need for government support for biogas utility and development in Nigeria through the enactment or provision of a legal framework and appropriate policies. According to Michael Kottner[44], sustainable biogas production is possible in Nigeria if the Federal Government can have the political will to put the legal framework in place. The 9th National Assembly has been inaugurated. It will not be out of place if the bill to establish the National Biogas Commission is singled out and given expeditious attention and passage to cure the *lacuna* in the provision of a legal framework for biogas utility in Nigeria.

The Federal Government of Nigeria should made available an administrative body to monitor the implementation of Biogas Utility legal framework in the Country. They shall equal make laws to punish offenders who are likely to misuse and cause harm to our environment through the abuse of the Biogas. Also where there are needs to pay compensation and restore the affected environment through the misuse of Biogas. Government should ensure strict compliance.

[44]Note 34