THE EMERGING TRENDS IN ENERGY USE AND LEGAL POLICIES IN NIGERIA AND SOME OTHER JURISDICTIONS*

Abstract

Energy is an essential part of life. This essay examines the very most recent trends in energy use that portends towards achieving a decarbonised environment. While decarbonisation and a cheaper energy regime is a goal in the reduction of climate change, the ultimate focus of these new trends will be not just using renewable forms of energy along with their fossil counterparts, but in embracing the concepts of energy efficiency and conservation. This will mean that energy output will not only increase, but will last much longer, and save the consumptions of those forms that are in finite form. These goals are in line with some of the policy directions of the National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015.[1] It is recommended that a clear cut legal framework be fashioned out to capture all facts of this modern energy momentum. The road blocks to effective energy transition are more prevalent in countries that have abundance of fossil resources such as Nigeria. In distributing costs, the place of civil society must be considered. In Nigeria especially, those who live in the oil extractive zones such as the Niger Delta must be given prominence.

Keywords: Energy Use, Legal Policies, Nigeria, Some Other Jurisdiction, Emerging Trends

1. Introduction

The role of government, through a functional legal framework would be to put in place laws and policies to subsidize or totally take over the cost of energy generation from them.[2] Though a renewable energy framework has been suggested as a palliative, this can only be possible if the expense of distribution of renewable energy is reduced to affordable limits. In order to reduce the cost of electricity and make it more accessible, breakthrough innovation are also required. Such will relate, not just to power generation, but in efficient use of carriers, efficient storage and carbon removal techniques.[3] This in no small measure is helping to bridge the digital divide and reduce poverty by making laws and setting up the requisite needed institutions that will make the cities involved centres of excellence. This is facilitated by involving the populace in critical policy making decisions that will impact their welfare on a far term. [4]Policy makers are having a shift towards other regularly available alternatives outside fossil. It is hoped that this balance will achieve the requisite balance to sustain growth and cushion all monumental costs.[5] It has been shown worldwide that alternate forms of power have grown to an increase of 25% since 2017. By 2017 it is estimated that about 167 GW would have been added globally.[6]

2. Brief Overview of Existing Legal and Policy Framework Supporting Diverse Energy Use

The National Electric Power Policy (NEPP) was put in place in 2001 to look into Nigeria's power sector. The sector needed urgent reforms to address the existing operational and financial issues being experienced by the then National Electric Power Authority (NEPA). The Electricity Power Sector Reform Act of 2005 (ESPRA) was also initiated by the government to address to harness and properly streamline through policy formulation, regulation of operations, the Nigerian power sector, and position it in such a way to attract credible long term investors, while at the same time providing a legal framework for such actions.[7] The power reforms could only be suitable implemented by an independent regulatory body, and for this purpose, the Nigerian Electricity Regulatory Commission (NERC) was established.[8] Right now there are private generation and distribution companies, together with one Transmission Company.

Despite these reforms, nearly 35 % of the population in rural areas do not have access to the national grid. Then again, Nigerian goods are hardly competitive because of the regular reliance on generators for electricity, which

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[1] Benchmac and Ince, 'Renewable Energy in Nigeria' https://www.lexology.com/library/detail.aspx?g=e3a5d485-4f59-b9bd-ba5dd5ae31f5

[2] J. Barry 'Politicing Energy Justice and Energy System transitions: Fossil Fuel Divestment and a 'just transition' *Energy Policy*, Vol.108, Issue C, 2017 pp.451 - 459

[3] World Economic Forum, 'Fostering Effective Energy Transition 2019 Edition' Accessed 14 July 2019 http://www3.weforum.org/docs...

[4] UNEP, (UN Environment), 'Renewable Energy and Energy Efficiency in Developing Nations: Contributions to Reducing Global Emissions' https://wedocs.unep.org/bitstream....accessed 14 July, 2019

[5] Channing Arnat, Rob Davies, Konstantin Makrelov, Bruno Merven, Faaiqa Hartley, and James Thurlow, 'Economy –wide Implications of Energy Build Plans: A linked Modelling Approach' *Energy Procedia* 61 (2014) 2862 – 2866, (being excerpts from the 6th International Conference in Applied Energy – ICAE 2014)

[6] Dolf Gielen, (in conjunction with International Renewable Energy Agency – IRENA) , 'Renewable Energy Trends and Support Policies ' (Being a paper presented at the 21st session of the United Nations Commission on Science and Technology for Development (CSTD), Geneva, 14 – 18 May, 2018

[7] Electricity Power Sector Reform Act 2005

[8] NERC 'History' https://nerc.gov.ng/index.phb/home/nesi/401-history

impacts their profit levels. It is to correct this anomaly, and to reduce its carbon footprints and contribution to climate change that the government has set a 30% target as renewable energy component to be part and parcel of the Nigerian energy climate by the year 2030.[9] This paper also concerns itself with other modern measures that the government in Nigeria and other modern economies are taking to secure energy efficiency and affordability.
The enabling policies that have made it possible to actualize some modern energy initiatives include the Renewable Energy Master Plan, 2005, and its 2012 update as well as the National Renewable Energy and Energy efficiency Policy (NREEEP).[10] Most of these policies attempt to put in energy efficiency measures in very clear terms to serve as a guide for potential investors. At the international level, some of the legal policies include India's Integrated Energy Policy (IEP) which was put in place to allow a wider base of sources of energy generation outside the traditional fossil sources. [11]

3. National Perspectives

Many nations have worked out individual ways to generate power to service their industries and for domestic purposes. The goal is to put in place affordable energy without compromising the delicate and intricate balance of nitrous oxide, carbon and other atmospheric gases. We must also bear in mind that the rate of development across many nations differs. The more capitalised Europe and Asia are major emitters of atmospheric gases, and so the imperative to generate less must be a top priority in that stratosphere. It is therefore articulate that this paper takes a look at particular jurisdictions to see how their energy sector is packaged, with their own growth policies and structural emphasis that align with individual policy legislations and direction.

Australia

The legal policies and framework is made in such a way that it takes cognisance of income levels. The Australian economy has a huge population that depends on coal extraction for their livelihood. The goal of policy is to ensure that their jobs are not put at risk.[12] In Australia, though policy implementation supports transiting from a coal economy to a renewable energy framework, there has somewhat been reluctance on the part of the Australian government to completely abandon coal. The primary reason for this is to cushion the effect that a ban on coal use will have on the economies of the populace who depend on coal resource for their livelihoods. A drastic coal ban will increase the inequality gap as the lower cadre of society, despite their income levels may not be able to get the requisite energy to afford a decent lifestyle.[13] In Australia, investment in large scale renewable energy is an on-going project, with the government steadily committed to yearly improvements to widen its reach. The model of the Australian alternate power sector is built on the tenets of efficiency and lowered costs. The purpose of this is to attract investors who are willing and able to garner the necessary funds for the speedy construction of the facilities. Also such projects will be easier to embrace by the consumers.[14] Also records provided by the Clean Energy Regulator (CER)[15] show that solar rooftop panels are in use in numerous households and businesses. It is estimated that as at 2018, 6 panels were being installed every six minutes. Most of the energy generated is backed up by battery storage such as the model Varta.[16] The present state of affairs right now is that the renewable energy sector in Australia is not backed up by adequate legislation and policies. Presently, the policy on renewable energy is divided due to various energy visions of the numerous political actors and politicians. Nevertheless, various solar and wind farms are under construction in the various states with capacities ranging from 5 – 270 M. This is not to say that that the renewable energy sector is entirely devoid of regulations and legislative policies. Several initiatives have been organised by the Federal Renewable Energy Targets (RET) and many other inclusive state regulations. Such state policies are generally geared towards supporting innovative renewable energy projects and drive new investments.[17] The Australian Capital Territory (ACT) is a model for other states since it vividly projects the governments drive towards zero level of carbon emissions. There are several programmes that support the government's 2011 - 2020 Sustainable Energy Policy.[18] Nations like Australia have also imbibed sustainable transportation system, to keep their country as eco- friendly as possible with balanced regional emissions, that

[9] C. Ebii 'Can Nigeria meet its electricity goals by 2030? https://ngng.boell.org/en/2019/10/11can-nigeria-meet-its-electricity-goals-2030-we-found-out
[10] Benchmac and Ince, (n.1)
[11] Khaitan & Co. 'Renewable Energy in India' < https://www.lexology.com/library/detail.
[12] M. Khan, and D. Senshaw, 'Aborted Fuel Tax Initiative in France: Its Ramifications for Green Growth', *Inter press service* 27 December, 2018 available at http://www.ipsnews.initiative-france-ramifications-greennn-growth/.
[13] World Economic Forum, (n.3)
[14] Clean Energy Council, 'Clean Energy Australia Report 2019 accessed 30 August 2019
[15] Clean Energy Regulator (CER) media release, 'Record Year of Investment Means Australia's 2020 Renewable Energy Target will be met' 23 January 2018 www.cleanenergyregulator.gov.au/RET/pages/News%20and%20updates
[16] Varta Storage, www.varta-storage.com
[17]G.M. Farr, news.com.au 'Renewable Energy Could Offer up to 60,000 Australian Jobs' 21 November, 2018, www.news.com.au/finance/work/careers/renewable-energy_could-offer-up-to60000-australianjobs/news
[18]ACT Government, ACT Sustainable Energy Policy:2011 -2020, September 2011 www.environment.act.gov.au/_data/assets/pdf_file/0003/58111664/EDS_ACT

allows for appropriate rate of economic development with also maximum health benefits to the people. Legislations such as the Transportation Integration Act of 2010 actively encourages that its cities integrate sustainability issues into sectors that consume energy such as transportation.[19] The planning for this program to work is centred on concepts such as car pool sharing, hybrid and electronic cars as well as low energy modes of transportation such as bicycles.[20] The Australian Clean Energy Council is also ensuring that energy generated from new projects is promptly transmitted. Other supporting resources are being made available to investors and operators in sub renewable energy sectors such as geothermal and battery storage installers. [21]

India

Traditionally, India is known for her huge population. China monumentally improved the lifestyle and value of existence of her populace to new heights by reducing her birth rate. But it is not so easy to do that in India. Most Indians live off the grid and contribute in very low terms to carbon emissions. This is because its emission rates are at par with the level of income. Most households still depend on biomass and other traditional fossil sources such as kerosene for their daily needs.[22] The International Energy Agency (IEA) estimates that India emission levels, despite its huge population will only grow at 4 percent per year.[23] Such energy is utilised for items and activities in a manner that far outstrips what is needed to supports basic living.[24] Domestic use of energy is on the low side while industries such as iron, steel and cement take up a notable percentage of final energy use. However there is efficient energy utilization within these industries such that within the year 2005, energy use dropped from '42 to 30GJ/Ton (a decrease of 2.4 percent pa) over 1990 – 05.[25] Most Policies in India on energy conservation are backed up by the Energy Conservation Act of 2001.[26] India has experienced a steady population growth, especially in recent times. Because of the ever increasing population growth and economic activities, India experiences a constant pull on its available energy supply. This has made it necessary to increase the existing output. The only way to achieve this is through power sector reforms. This was facilitated by the Electricity Act 2003.[27] Renewable energy has also added to the efficiency of the Indian power sector which now has higher transmission voltages of up to 765 KV.[28] In India (New Delhi), the waste to energy initiative is firmly in place to achieve the double bill of waste management and energy conversion. Most of the waste that is collected finds its way to waste to energy plants and facilities. Aside from providing jobs for workers at the plant, it contributes to air purification and reduces the mountain of heaps at landfills. [29] Very recent innovations and trends in the India Energy sector include deregulation of coal prices in year 2000, and market deregulation of petroleum prices to include private sector pricing.[30]

China

China has a very high consumption rate of renewable energy which accounts for about 26% of all its total energy output. Despite this, China for a long time continues to be totally dependent on fossil sources such as coal, that constitutes almost 79.2% of the country's' total energy consumption.[31] China, as well as India are countries where 'clean tech' is encouraged. Solar energy is cheap and affordable, given the infinite nature of the sun. China is committed to doubling her GDP through investments in renewable energy. Aside from investments in solar

[19] Transportation Integration Act, 2010, passed by the State of Victoria in Australia.
[20] Damilola S. Olawuyi, *The Principles of Nigerian Environmental Law* (Afe Babalola University Press, Ado-Ekiti, Nigeria, 2015) pp. 328 - 329
[21] ACT Government, ACT Sustainable Energy Policy:2011 -2020 (n.18)
[22] Narasimha Ra, Girish Sant, Sudhir Chella Rajan (in conjunction with Prayas Energy Group), 'An Overview of Indian Energy Trends: Low Carbon Growth and Development Challenges' www.prayaspune.org/peg accessed 30 August 2019, (Prayas India, 2009).
[23] International Energy Agency (EIA) *World Energy Outlook* 2008
[24] Henry Shue, 'Subsistence Emissions and Luxury Emissions' *Law and Policy* (1993)
[25] Billy Kumar Ray et al, 'Decomposition of Energy Consumption and Energy Intensity in India Manufacturing Industries' WP -2007-020, IGIDR
[26] Energy Conservation Act of 2001
[27] Z.U. Gatugel, 'India and Nigeria: An Overview of Power Sector Reforms and Performance' *Journal of Energy Technologies and Policy* 5(9), pp.12 – 21; see also the Electricity Act, 2003
[28] Kalu Ukoha and E.K. Agbaeze, 'Deregulation of the Nigerian Power Sector on Performance: A Review' *European Journal of Scientific Research* Vol. 148 No.3 February, 2018 pp.377 – 385, available at http://www.europeanjournal of scientific research.com
[29] UNEP, (UN Environment), 'Renewable Energy and Energy Efficiency in Developing Nations: Contributions to Reducing Global Emissions' https://wedocs.unep.org/bitstream accessed 14 July, 2019
[30] Narasimha Ra, Girish Sant, Sudhir Chella Rajan (in conjunction with Prayas Energy Group), 'An Overview of Indian Energy Trends: Low Carbon Growth and Development Challenges' www.prayaspune.org/peg accessed 30 August 2019, (Prayas India, 2009); also available at http://pmindia.nicin/prelease/pcontent.asp?id=998
[31] Wang Fengyum and Wang Lufel, 'Research on Renewable Energy Policies and Pricing *Mechanisms' IOP Earth and Environmental Science* 186 (2018) 012068 (OIP Publishing)

energy, China has ventured into renewable wind generated energy with the construction of wind farms in strategic locations. It has also invested massively in hybrid vehicles. [32] It must be noted however that when it comes to its position on clean energy, China presents a paradox of two extremes. Most financial and lending institutions such as the World Bank are moving away from coal. Coal is considered a bad investment as many institutions who have lent money as upstart to coal fired plants have accumulated bad debt. China does not plan to limit its loan portfolio to the fossil energy sector. Not only is China making new finance available as a bail out to such defaulting bank creditors, but is also massively giving out new loans to new coal plants. Most of these plants are at the pre-construction stage. [33] Such Chinese coal fired plants are predominantly located in places like Bangladesh, Vietnam and South Africa. Aside from being leaders in revolving financing, the Chinese, when they get to these locations also act as consultants, as well as engineers. But the Institute for Energy Economics and Financial Analysis (IEEFA) would prefer that the Chinese try to reclaim their former position as global leaders in renewable energy innovations, and be a reference point for other nations to follow.[34] The government of China, like other nations in the world are strengthening drive towards a green economy. Towards this, the strategy adopted as part of 2015 U.S. – China Joint Statement on Climate Change is a commitment to strengthen "green and low –carbon policies and regulations."[35] The implementation of this strategy therefore calls for a reduction in coal financing and other fossil related sectors of the economy which generate enormous amount of greenhouse gases.

Nigeria

In a bid to reduce global inequality gap, governments all over the world continue to subsidize priority sectors such as energy, agriculture and medicine. This trend ends up consuming a large part of its global budget. In places in African countries such as Nigeria, energy takes the larger part of the subsidy. This is because it is a dominant force to maintain a level of comfortable life as well as to power industries and other commercial projects that ensure economic growth.[36] This is a trend that has continued despite the fact the anticipated goal of narrowing the wealth divide remains a mirage. Rather, the gap continues to widen. This harrowing poverty has resulted in oil bunkering and artisanal refining which has expanded in the past ten years and is responsible for an about 150,000 barrels of unrefined oil which are at risk of being spilled into the environment. Apart from causing economic devastation, it also portends environmental degradation as a result of the crude manner of retrieving the oil, which often results in spills to surrounding areas. [37] The problem of aging pipelines has also made it much easier for oil bunkering to occur as well as oil spills to occur. Though innocent parties may suffer grave health incapacities from such bunkering activities', Section II (5) (c) of the Oil Pipelines Act of 1965 prohibits the paying of compensation to communities if the pipelines were bunkered by a third party that led to the spills. [38] It is commendable that where such incidences occur, there is in place the Ecological Funds which is 2% of the annual Federal Budget. Its main purpose was for provide funds for contingent issues in the surrounding biodiversity.[39] It is however recommended, as noted by the World Bank that such funds that are allocated, be specifically directed to solve environmental problems through proper utilization and management, such that a better output will be achieved.[40]

The government also embraces modern energy efficient technologies to supplement power supply through the generation of alternate power from other avenues like solar panels, wind turbines and hydroelectric power plants.[41] Though many cities worldwide have embraced the concept of *cities for climate change protection,* Nigeria is yet

[32]Green-Planet-Solar-Energy.com, 'Chinas Solar Generator: The Massive 1000 MW Project' available at http://www.green-planet-solar-energy.com/solar-generator.html

[33] Christine Shearer, Melissa Brown and Tim Buckley 'China at Crossroads: Continued Support for Coal Power Erodes Country's Clean Energy Leadership' (with the support of Institute for Energy Economics and Financial Analysis – IEEFA) www.IEEFA.org accessed 30 August 2019

[34] World Resources Institute, 'Will China Seize the Biggest Green Opportunity in the Coming Decade?' 8 November 2018, cited in Christine Shearer, Melissa Brown and Tim Buckley, ibid.

[35] Ibid.

[36]Priscilla Atansah, Masoomeh Khanden, Todd Moss, Anit Mukherjee, and Jenniifer Richmond, 'When do Subsidy Reforms Stick? Lessons from Iran, Nigeria and India' (CGD Policy Paper III, November, 2017 Washington D.C: Center for Global Development, available at https://www.cgdev.org/publication/when-do-subsidy-reforms-stick-lessons-iran-nigeria-and-india

[37] M. Obenade and G.T Amangabara, 'The Socioeconomic Implication of Oil Theft and Artisanal Refining in the Niger Delta Region of Nigeria (2014) International Journal of Science and Research (IJSR) Volume3, Issue 7, pp.2390 -2394

[38] F.B. Barry, Environmental Injustices: Conflicts and Health Hazards in the Niger Delta. (2010) Substantial Research Paper. Washington, D.C, pp.1-73

[39] USAID, 'Maximising Agricultural Revenue in Key Enterprises for Targeted Sites (MARKETS)' (2008)Nigeria Biodiversity and Tropical Forestry Assessment' available at http://www.pdf/usaid.go/pdf.docs

[40] World Bank, 'Indonesia Environment and Development' [1994], a world Bank Country Study.' Washington D.C.: The World Bank available at http://documents.worldbank.org/curated/en/1994/07/698196/indonesia-environment-development

[41] H. Christian Bugge & C.Voight, (eds.) Sustainable Development in International and National Law' (Europa Law Publishing 2008) p.88

to fully articulate the message with physical manifestations of the intended change. The energy sector is a dominant sector to be re-organised for any nation that wants to lower her carbon footprints. In this regard, her holding on to fossil fuel dominated energy resources such as petroleum for means of transportation has to be reviewed to inculcate newer trends such as electric cars and battery powered rail systems. There is also a need for guidelines for community research programmes to promote 'clean transport' technology such as electric cars. This is already being carried out in Nigeria.[42] Nigeria as a nation is known for importation of used cars such as 'Tokunbo' or 'Belgium' vehicles. Most of these vehicles are used for commercial purposes and provide cheap means of transport. Most office workers now prefer to use them to get to their various destinations during the week rather than using their own vehicles. This is an efficient way of reducing carbon emissions from vehicles.

Another alternate in Nigeria is methanol and ethanol that are derived from biomass. It is abundant in huge quantities. However not only does the technology to treat the biomass have to be in place to remove excess heavy metals, put studies already show that such fuel that are already in use lead to early engine life deterioration through corroding the engine parts.[43] With nations like Kenya, now lifting oil to places like Malaysia since August, 2019, there is likelihood that the oil supply market may become more saturated, and even demand may peak off in favour of renewable energy options. Nigeria is blessed with very high wind intensity. This therefore is the time for Nigeria to take advantage of its enormous wind capacity by resurrecting some dormant wind turbines. This will serve as alternative to or at least be also included in the energy mix to power homes and industries.[44]

The Nigerian National Policy on the Environment takes a critical look at various sub sectors that makes up the Nigerian state and has policies designed to ensure a comprehensive sustainable development of the development. These require a good number of complimentary strategies, the better known being that environmental impact assessment of possible outcomes of development projects are undertaken. The National Policy as it relates to energy, to ensure sustainable development in the sector makes provision for site selection that emphasises the right of way of transmission lines in such a way as to ensure minimal loss or disturbance of habitats, vegetation, wetlands and human habitation.[45]

The way forward for Nigeria is electricity generation is a mix of improved technology in harnessing the various energy sources. The power sector has been liberalised with new tariffs introduced by the Nigeria Electricity Commission (NERC). The Commission is doing its best to inform consumers of the new reform schemes, as well as present good incentives to investors.[46] Coal is a resource that is abundance in Nigeria. But because it is a fossil source Nigeria is moving up in its clean energy technological drive by encouraging sound utilisation of its coals reserves in a sustainable manner. As such the country is putting in place clean energy technology to reduce coal carbon content to acceptable levels.

The National gas policy contains some guidelines as to how the gas sector can be further unbundled. Gas is transported in gaseous or semi liquid form. This means that the facilities to transport it have to be specially constructed, especially for supply to the domestic sector. To this end, Nigerian Gas Master Plan (NGMP) is in place.[47] Also the National Gas Policy is putting in place regulations to "separate supply, transmission, distribution, pipeline ownership and network operation activities.'[48]

Nigeria and India share some similarities in terms of modern trends that affect energy use. Despite its huge population, India does not contribute much to global percentage of carbon emission because of the low purchasing power of the populace and inability to purchase energy for luxury purposes. But the population draws on the available energy resources. And so Nigeria also may have to take measures to streamline population growth so that there is a balance between population growth and the environment. This streamlining of population growth

[42] Damilola S. Olawuyi, (n.20) pp. 328 - 329

[43] Amari Omaka, Uchechukwu Uguru, Caroline Agom, Paul Nwode 'Liberalization and Privatisation of the Power Sector in Nigeria: Implications for Energy Security and National Development: A critique' (Faculty of law Ebonyi State University , Abakaliki, Nigeria, being a paper presented at the 50th Conference of the Nigerian Association of Law Teachers (NALT) held at Nnamdi Azikiwe Univeristy Awka Anambra state on 11 – 16 June, 2017)

[44] G. Ngala, m Alkali, and M.A. Aji 'Viability of Wind Energy as a Power Generation Source in Maiduguri, Borno State, Nigeria' (2007) *Renewable Energy 32* (2007) 2242 -2246

[45]Amari Omaka, 'Municipal and International Environmental Law' (Lion's Unique Concepts, 2012) p.393

[46]Nigerian Electricity Regulation Commission (NERC), established by Section 31 of the Electric Power Sector Reform (EPSRA) Act, 2005

[47]Advocaat Law Practice: Gas Utilization in Nigeria: Nigerian Gas Master Plan(NGMP), available at www.advocaatlaw.com

[48] Obioma Helen Onyi-Ogelle, 'The Legal Regime for Nigerian Gas' Nnamdi Azikiwe *University Journal of International Law and Jurisprudence* Vol. 8 (2) September, 2017 pp.155 – 156

will be implemented alongside the National Population Policy to ensure sustainable improvement in the quality of life.[49]

The United States of America

In the early 1980's, the US experimented with synthetic fuel. The United States Energy Security Act of 1980 encouraged the commercialization of synthetic fuel. Synthetic fuel acts as a substitute for petroleum or natural gas and may be in solid or liquid form. They are derived from other abundant resources such as shale, tar, sands and coal. Though the requisite technologies were used to transform them to synthetic fuel, the same technology back then, could not reduce their carbon content. Then again, the product was expensive. [50] In the US, there have been further adjustments to synthetic fuel in order to make them more environmentally friendly. The most advanced technology is coal gasification. This is the process whereby coal is heated together with steam in a 'gasifier' to produce a clean burning gas. The lighter component produced is also easier to distribute. However, it must be noted that today synthetic fuels are not very popular because of their expensive nature.[51] There are a host of modern technologies still being explored. Some of them involve the revamping of old technologies to operate in a more efficient and commercially viable manner. Cost of renewables is given consideration to ensure that consumers will afford them.[52] It is projected for the US by the US Energy Information Administration (EIO) that there will be significant increase in gas use – the price is expected to drop and will be in use for industrial heat and power. Fossil fuels are still significant and this is witnessed by the fact that the price of Brent crude keeps rising. Such is occasioned by international oil prices and not really by increased utility, as demand will decrease substantially from the current 2018 prices.[53] It must be noted however that the US industries and consumers continue to demand for electricity which today consists of a mix of coal, petroleum or natural gas, and nuclear generated electricity. [54]

The United States is home to so many new innovations that are designed to firmly introduce a robust energy mix, with more emphasis being placed on the renewable energy. There are several legislations enacted to ensure a seamless energy coalition which would intertwine so many benefits. Some examples include the Green Jobs Act. [55] Another example is the American Recovery and Reinvestment Act.[56] Another often overlooked trend in the US that has gained firm footing, but is not so popular in less developed jurisdictions is simply the process of conservation. Though alternate energy sources continue to compete favourably with the dominant fuel sources such as fossil fuel and nuclear power, the use of energy conservation as a means of gaining more ground is very distinct and is yielding enormous dividends. The benefits are derived not only from the fact that energy is consumed less, but the fact that energy is conserved as energy production and use becomes more efficient.[57]

4. Towards a Green Economy: Power Sector Reforms and Policies to Promote a Green Economy in Tandem with the United Nations Green Economy Report of 2011

The focus of this global energy assessment that is a Green Economy and its outlook is to be futuristic with policies and legislations that recognise that except a swift intervention takes place, by 2030, the dynamics of energy use may not vary much from what it is today. This is the concern especially in emerging economies such as Africa, South Asia and Pacific Asia that still rely heavily on fossil[58] sources and solid fuels for their energy needs. [59] The role of legislation also would be to put in place policies that would be tailored to ensure to ensure accessibility on a reasonable cost basis. This might require microfinance organisations to provide the requisite subsidies and financial backing. The private sector participation is also essential to maintain the momentum of growth and through spreading of knowledge and knowhow to every potential entrepreneur and investor.[60] The socio –political impacts of energy policy are quite numerous; for example putting in renewable energy infrastructure is quite

[49] Amari Omaka, 'Municipal and International Environmental Law' (Lion's Unique Concepts, 2012) pp.381 - 382

[50] Jan G. Laitos and Joseph P. Tomain 'Energy and Natural Resources Law' (West Publishing Company, 1992) pp. 488 – 493; see also The United States Energy Security Act of 1980

[51] Ibid.

[52] S. Valente, 'Sustainable Development, Renewable Resources and Technological Progress' (2005). 30, 1, *Environmental and Resources Economics* 115 -120; S. Schurr *et al, Energy in America's Future,* (Baltimore, John Hopkins University Press, 1979

[53] US Energy Information Administration (EIA) , 'Annual Energy Outlook 2019 with projection to 2050' www.eia.gov/aeo accessed 30 August 2019

[54] Ibid.

[55] Green Jobs Act of 2007

[56] American Recovery and Reinvestment Act (ARRA)

[57] Jan G. Laitos and Joseph P. Tomain (n.50)

[58] Shonali Pachauri, Narasimha D. Rao *et all*, 'Access to Modern Energy: Assessment and Outlook for Developing and Emerging Regions' (International Institute for Applied Systems Analysis, Laxenburg, Austria)

[59] Ibid

[60] Ibid.

expensive to build and makes a huge demand on each aspect of any nations' economy to put in place. [61] The implication of this can be described in terms of negative growth. This is because the final output is at first almost too expensive for potential consumers. This will impact on the amount of units that may be demanded for in future. There is also need for additional environmental outreaches to achieve and maintain public health over wide areas. This is being done in many nations worldwide to reduce public health risks of the biotic component of the environment in such a way that risk to the inhabitants of places with high risk energy facilities are minimized.[62] It is left for government through the right policies and legislations to subsidize such plants to keep them running. But more importantly, the need to imbibe an energy mix becomes more imperative. For example, in South Africa, the coal reserve is fast depleting. This has made policy makers through legislation to think about other competitive energy sources. It is hoped that this balance will achieve the requisite balance to sustain growth and cushion all monumental costs.[63] Brazil currently generates over 18% of its energy from renewable fuel such as biofuels.[64]

There are several other national adjustments to energy use that are geared towards sustainability, like the under listed:

Smart Homes

Many nations around the world have taken many paths achieving a green economy. This is only possible if they have well thought out strategies for steadily gravitating towards their desired goals. Dubai, for instance, apart from its impressive architecture and reputation as a business destination is also becoming a global technology hub by making ground breaking innovations towards efficient technology growth. Their drive towards being a green economy is propelled by the Dubai Clean Energy Strategy 2050.[65]

Up to date, its Green Fund has invested about $27.2 billion in solar power generation. This has significantly led to a massive drop in solar energy prices.[66]

Increased GDP using Lower Energy Demand

The startling thing to note about emerging energy trends is that growth in energy demand does not have the same parallel growth rate with global growth in Gross Domestic Product (GDP). This paradox is explained by the fact that various renewable sources of energy such as solar, wind and geothermal have been inculcated into national energy mix. So even though many nations are experiencing growth in in their gross domestic product, energy maximum utilization and preservation in manufacturing and industry means that energy demands remains stable and not subject to incessant fluctuation.[67]

Electric Vehicles

Electric cars will become more common across nations in the next five to ten years. The good thing to note is that heavy duty vehicles will now also be run by electricity. This will be made possible by improved battery technology.[68]

Improved Processed Gas to Remain as a Dominant Fossil Source of Energy

Though gas is a fossil fuel, the various improvements in gas processing, especially reduction in gas flaring means that gas use will be in great demand. However, such demand is expected to plateau around the year 2035 due to greater demand for renewables. It even projected that after 2035, cheaper cost of gas as an energy source will not substantially increase its demand.[69]

Reduced Cost of Renewable Energy Sources, leading to Increase in Use over Fossil

[61] Channing Arnat, Rob Davies, Konstantin Makrelov, Bruno Merven, Faaiqa Hartley, and James Thurlow, (n.5)

[62] Steven A. Herman, (being a Memorandum from EPA Office of Enforcement and Compliance Assurance, to Regional Administrative office, (1 May 1998) available at http://www.epa.gov/compliance/resources/policies/civil/seps/fnlsuphermn-mem.pdf

[63] Channing Arnat, Rob Davies, Konstantin Makrelov, Bruno Merven, Faaiqa Hartley, and James Thurlow, (n.5)

[64] O. Lichts, 'Industry Statistics: 2010 World Fuel Ethanol Production' Renewable Fuel Association

[65] Visit dubai.com, 'Planning for a Green Future', visitdubai.com/en/business-indubai/why/dubai/news-and-insights/dubai-building-a-brighter-sustainable-future. Accessed 30 August 2019

[66] Ibid.

[67]Mckinsey Energy Insights, 'Global Energy Perspective 2019: Reference Case' www.mckinsey.com/¬media/ accessed 30 August 2019

[68]Ibid.

[69] Ibid.

It is also anticipated that even though it is much cheaper to install renewables now, by around 2030, most renewables will reach tipping point. This means that most renewables such as wind, solar PV, and onshore wind will become almost as cheap as fossil fuels. The implication of this is that consumers will no longer be influenced by cost when choosing their energy sources. This means that greater campaigns have to be intensified to create awareness about the merits of renewable energy. By around 2035 and post 2035, it is anticipated that the use of renewables around the world may be as much as 50% of power supply.[70]

5. Conclusions and Recommendations

The modern trends that have been examined in this paper in the area of futuristic energy use are quite commendable. Despite these trends, rapid economic growth is still hindered by indices of an energy subsidised economy, often overwhelmed by massive population increase and rising tariffs. This deficit, according to the International Monetary Fund can be accounted for to the tune of about $29 billion every year. The easiest way out of this quagmire would be to increase tariffs by at least 50%.[71] However, the resultant effect would be that energy so generated, even though from alternate low carbon sources would be expensive, and may push people back to traditional sources such as coal and wood felling. The suggestion is therefore made here to improve awareness on benefits of Liquid gas over natural gas and other fossil sources such as oil and shale. Renewable energy which is the stipod on which most of these emerging trends stand are self-replenishing and can assure a modern and uniquely industrialised future. In order for this model to be completely entrenched in the systems examined in this paper, the governments must supplement fossil based power by allocating enormous land mass for proper implementation of the programmes. The initial high cost of installation should not be immediately transferred to the citizens, but should be borne by government. Even initial investor apathy can be surmounted through the Joint Venture Agreements and soft loans to herald more efficient power processing and transmitting facilities. [72] The Chinese government is in the forefront of facilitating the implementation of clean energy technology and projects with substantial loan disbursements to the sector. [73] There is an urgent need to diversify the income resource of the Nigerian nation from one in which export of oil and gas is dominant, due to its abundance, to one also sustained by the agricultural and mining sector, and even health tourism. This will reduce the dependence on fossil energy for power generation, and also act as a social shift from the dominant sources.[74]

Legislations can also be used to enhance inflow of capital from other countries. Foreign Direct Investment (FDI) is essential for accelerated rise of the energy sector. In The year 2014, there were major investments in the Nigerian economy, for example, the Western Metal Products Company (WEMPCO) set up a 52 mw power plant worth one billion Naira at Magboro, Ogun state. In a like manner, PZ Wilmer set up a 9 billion Naira refinery in Lagos, Lagos state. [75] All these new investments in energy sector have been made possible because of the Nigeria Investment Promotions Commission Act, 1995 (NIPC), the Nigerian Oil and Gas Industry Content Development Act, 2010 (Local Content Act).[76] The path for a mixed economy that will inculcate renewable energy outlooks has also been strengthened by inflow of new technological know-how. This is especially from the United Nations Industrial Development Organisation (UNIDO), which has facilitated such inflow through an Investment and Technology Promotion Office (ITPO) in Nigeria.[77]

[70]Ibid.

[71] S.A.Olowosejeje, 'Nigeria's Unreliable Electricity Costs its Economy $29 Billion a Year – Solar Power would Save Billons' QuartzAfrica 2019 <https://qz.com/Africa/1632978/nigeria-solar-power-could-fix-costly-electrcity-problems/>

[72]M.Oloja, 'What Happenned to the Power Sector Recovery Program? *The Guardian* 2018, https://guardian.ng/opinion/what-happened-to-power-sector-recovery-programme/

[73]C. Campbell 'China is Bankrolling Green Projects Around the World' (2019) https://time.com/5714267/china-green-energy/

[74] NESP, 'The Nigerian Energy Sector: An Overview with a Special Emphasis on Renewable Energy, Energy Efficiency and Rural Electrification' https://www.giz.de/en/downloads/giz2015-en-nigerian-energy-sector.pdf

[75] Ifediora C. Amobi, 'Government Policy and Foreign Direct Investment in Nigeria' (Being a paper presented at the Dutch Multinational Businesses, Dutch Government and the Promotion of Productive Employment in Sub- Sahara Africa: A Comparative Study of Kenya and Nigeria, Nairobi Kenya, 13 -14 November, 2014)

[76] Ibid.

[77] Ibid.