

Renewable Energy Can Help to Reduce Climate Change in Nigeria:
Evidence from Previous Studies

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Abstract: The purpose of this study was to know different ways and techniques of producing energy like renewable energy sources that may reduce carbon emissions and it leads to helping not only Nigeria but all other countries to reduce Global warming. Climate change is the term mostly used for changes in climates of Earth and its impacts and it can be local, regional, country, globally. The change in climates is due to different activities of humans such as deforestation, increases in industries and usage of fossil fuels which increased carbon emissions in the environment and became caused by the change in climates. Different countries have different climates and temperatures and those activities of humans cause Global warming. Global warming is used and referred to as an average rise of global temperature. Almost 97% of published articles on climate change referred that the only reason and dominant cause of Global warming are humans' activities since the 20th century. Based on rigorous analysis of past studies, it is concluded that CC is affected worldwide in general and in Nigeria, in particular, and it has direct and indirect impacts on human health and projected that it will continue to change. The direct change of climate had dramatically huge impacts on each living organism in Nigeria, which include animals, humans, and plants. This is due to rising temperatures which increase respiratory ailments in humans and the increased frequency of storms which became the cause of serious injury, death and psychological disorder in Nigeria.

Keywords: Climate change: Climate change includes when Global warming change and change by either humans' different activities like the use of chemicals and others or weather patterns of Earth, so climate change also change.

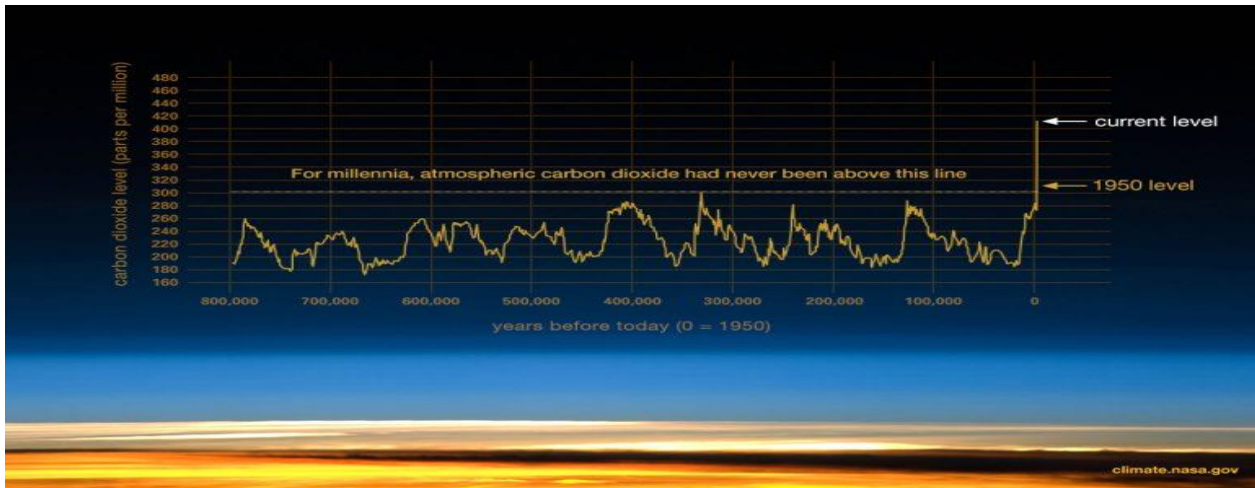
Global Warming: Global Warming means the climate of Earth changes by the high level of heat in the long term.

Renewable Energy and Sources: It is also called clean energy because it comes from natural sources such as solar, wind or others.

Introduction

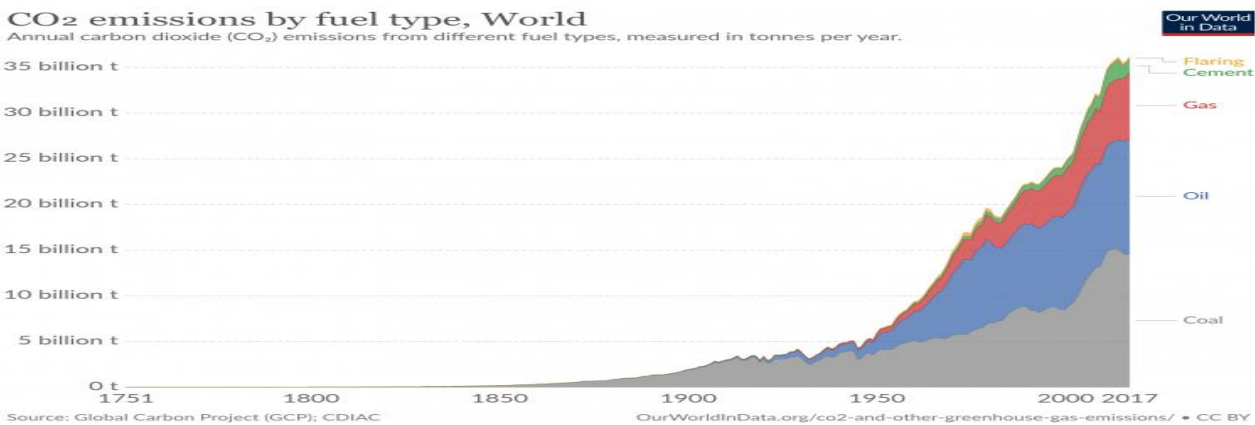
Background

Climate change is the term mostly used for changes in climates of Earth and its impacts and it can be local, regional, country, globally. The change in climates is due to different activities of humans such as deforestation, increases in industries and usage of fossil fuels which increased carbon emissions in the environment and became caused by the change in climates. Different countries have different climates and temperatures and those activities of humans cause Global warming. Global warming is used and referred to as an average rise of global temperature. Almost 97% of published articles on climate change referred that the only reason and dominant cause of Global warming are humans' activities since the 20th century. In Pre-industrial time the concentration of dioxide was only 280 parts per million (ppm) and it became 413 ppm in the early 20th century and the rate is continuously increased till now, so scientists suggested that to stabilize global warming the rate should be 350 ppm, and this will happen when humans increase and working on green environment activities (Akuru et al., 2013).



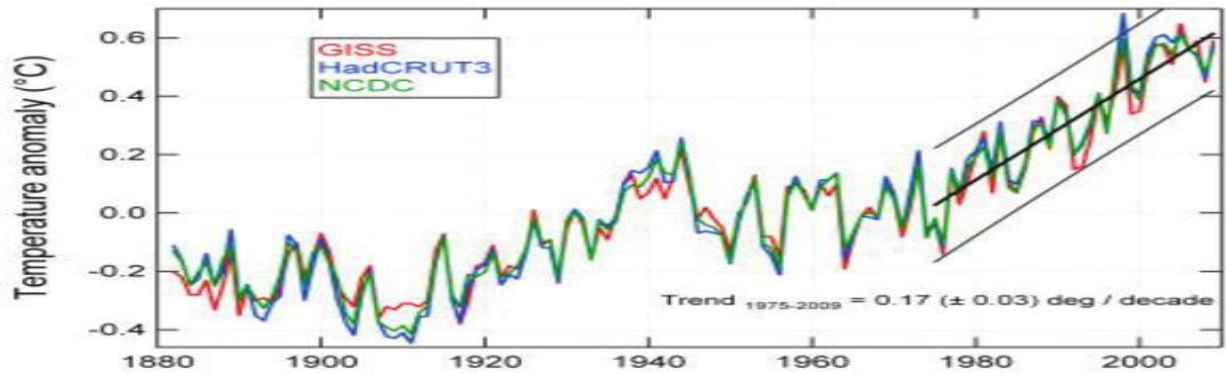
Source: studentenergy.org/influencer/climate-change

Climate change is affected worldwide, and it has direct and indirect impacts on human health and projected that it will continue to change and increase worldwide. The direct change of climate had dramatically huge impacts on each living organism (animals, humans, plants) due to rising temperatures which increase respiratory diseases in humans and increased frequency and storms which became the cause of serious injury, death and psychological disorder. On the other hand, indirect impacts of climate change on human health occurs due to results of pollution in the environment, increase in sea level and surprising changes in weather that decreased of quality of water which increased diseases of waterborne, economic development affected and increased public health issues. In 2019, almost 81% of primary energy's sources worldwide were fossil fuels, (natural gas, coal, oil and others) which increased the usage of carbon gas in the environment and continuously increased demands and usage of these fossil fuels became the cause of the increase in temperature worldwide (Gbatu et al., 2019).



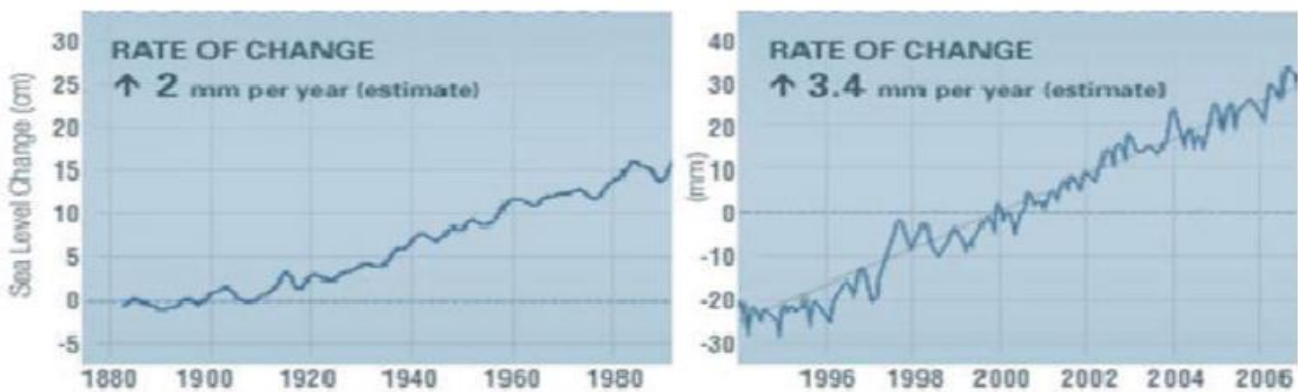
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The temperature on earth increased by 1.0°C (1.8°F) from last decade and it is measured by thousands of weather stations in the world and resulted that per decade 0.1°C increases and 2005 has become the warmest year on the earth. Global warming is not constant, but it changes according to the results by 0.1°C per decade. It is predicted that global temperature will increase by 1.5°C between 2030 and 2050 because humans' activities increased continuously. According to the report by Global Climate change data compared with 1800 to 2018 that 2016 recorded was the warmest year with 0.95°C, 2015 was 0.91°C and it followed as to previous years. In addition, the report by three different datasets GISS (Goddard Institute for space studies), NCDC (national oceanic and atmospheric administration) and HadCRU which showed an upward trend (from 1900-2000) in temperature means Global warming increases. Below the figure is a summary of the increase in temperature worldwide (Owusu and Asumadu, 2016).



Source: intechopen.com/online-first

Another reason for Global warming and climate change is the rising sea level. The Quantity of water increased because of thermal expansion of water and also glaciers and polar ice are melting down was became the cause of the increase in water and thermal expansion. The below figure showed the change in sea level from 1880 to 2008. From the last century level of water rose by almost 18cm and the average per year rate is 2mm but now it increased to 3.4mm which predicted that Global warming would increase (Ritchie and Roser, 2021).



Source: intechopen.com/online-first

Global warming affected different countries and it has negative impacts on the health of humans. From last century, 0.6°C per year temperature increases in southeast Utah, 2.0°C in Alaska, and 1.0°C increases in Nebraska like that different countries or regions have impacts of Global warming. In Asia, it is predicted that by 2050 the availability of freshwater will decrease because of pollution in the environment and industrial factors. In Africa (2020), almost a 200million people had the problem of water and its agricultural productivity decreased by about 50%. Europe also faced challenges that their crop productivity reduced because of an increase in floods, sea level rises and reduced in snow level. Heatwaves increased in North America because of decreasing in snowpack and increased frequency level. So, on average almost all countries face the challenges of Global warming and its impact not only on humans but also wildlife, environmental and economic affected, thus it becomes a Globally problem in this era (Tenny, 2020).

According to a study conducted it is concluded that Mozambique, Zimbabwe and the Bahamas, these countries affected due to extreme weather in 2019. Different weather events also had an impact on Puerto Rico, Myanmar, and Haiti and about 475,000 people died and resulting in a heavy loss of almost \$2.56trillion between 2000-2019. In 2019, due to storms, floods and landslides, different countries were affected and faced economic, environmental and social losses. Countries like Haiti and the Philippines have been affected due to extreme weather conditions and one major cause was catastrophic events like a sudden increase in floods, storms or others which had dramatically huge impacts on these countries. Another fact that Covid-19 gave a lesson to all the countries is that all are independent if one is affected then it surely affects the other one.

Another study shows the data from United national agencies, National Meteorological and Hydrological Services and scientists' experts that Global warming and climate change seriously affected different countries (Callen, 2008). The study shows that how the earth is changed over the past few years and resulted in impacts on food production, increased pollution, ecosystem affected, and temperature increased due to human activities. Moreover, the ice melt rather snowed Canadian glaciers on the peak of melting snow. In Canada and different parts of the USA, heatwaves increased so the temperature reached 50°C. In California, Death Valley's temperature also reached 54°C due to heatwaves in the southwestern USA. Another fact and figure that, due to heavy rain in China and Europe became the cause of the flood and it took hundreds of lives of different people. And a mighty flow of rivers hit agriculture and reduced the production of food in Sub-tropical South America. In concluding all the countries are independent if one is affected then it will impact others. So, the Provisional State of Climate change 2021 report stated that after negotiation the union will analyse and set different strategies to reduce greenhouse gas concentration, extreme weather, sea level, ocean warming and other problems (Tenny, 2020). Thus, these issues and problems continuously increase per year due to Global warming so different organisations, Unions, and non-profit organisations working on it to reduce climate change issues. Renewable energy is alternative that adopted by different countries to reduce Global warming and fulfil their needs by these Renewable energy sources such as solar energy, geothermal energy, wind energy, Biomass from plants, hydropower and other sources that have a low impact on climate change other than coal, carbon and other natural gases. Different organisations like Asia Pacific Adaptation Network (APAN), Earthjustice (US), Greenpeace (International), Health and Environmental Alliance (Europe), The Economic Community of West African States (ECOWAS) and others working on climate change issues and adopting renewable energy sources to reduce Global Warming.

In 2015, Sweden aims to become a Free nation from Fossil Fuels by 2040 and the country increases investment in solar, wind, hydropower energies to reduce carbon emissions. Costa Rica which almost achieved 95% Renewable energy from solar, wind, hydro and geothermal over from past 4 years. Nicaragua achieved 90% renewable energy from different sources and have the aim to free from carbon emissions. Scotland achieved 98% electricity from wind sources and Germany has a target to achieve 65% energy by 2030. China also working on renewable energy and target to achieve 35% by 2030. Thus, all countries working on renewable energy to produce electricity and other energy from sources renewable energy because Global warming has a negative and dramatically huge impact on overall the world (Council, 2021).

The location of Nigeria is in the centre of the Upper Guinea Rainforest Region along with the West Coast of Africa. Nigeria suffered from heavy rainfall and changes in climate along with increases in temperature due to Global Warming. So, Climate change and Global warming become serious issues for Nigeria because rainfall and changes in climate had an impact on the agriculture sector from past years. The Government of Nigeria continuously working on different sources of energy such as Hydropower, wind, and other (renewable energy sources). Thus, the Government working on a Renewable Energy Access Project to produce electricity and provide an affordable price. The project started in Jan 2016 and will end in Dec 2023 and the project main objectives are to avail electricity for all and reduce the impacts of climate change and global warming.

Statement of Purpose

Humans' activities towards industrial sectors, new technologies, increase in the usage of chemicals which increased carbon dioxide and other harmful gas which change the climate of environment and create Global warming. Due to Global warming sea levels increased, temperatures rose, pollutions and shortage of pure water increased that dramatically impacted humans, wildlife and other living organisms and different types of diseases were born and this was because of humans' unethical activities so it affected all over the world. For this purpose, different organisations like The Economic Community of the West African States and others slowly change their ways of producing energy by adopting renewable energy sources such as Hydropower, solar energy, wind source, geothermal and others which help different countries to produce energy from these sources without affecting the environment and it also helps to reduce Global warming in the world. Likewise, Nigeria also facing climate change issues such as heavy rainfall so it may affect their economy, food production and others. So, renewable energy is the solution to this Global warming not for only Nigeria but for all countries to reduce Global warming and stabilise climate change.

Purpose of this Study

The whole world facing issues of Global warming and climate change because of increased temperature, sea level increase and other problems which have negative impacts on humans, wildlife and other living organisms and the main reason is human activities that change the climate. So, the purpose of this study is to know different ways and techniques of producing energy like renewable energy sources that may reduce carbon emissions and it leads to helping not only Nigeria but all other countries to reduce global warming (GW).

Research Objectives

To what extent are fossil fuels being used in energy production and associated activities in Nigeria.

What are the indices used to measure the impact of climate change and to what extent has/could it affect Nigeria?

To evaluate the impact of Renewable energy sources on carbon emission in Nigeria.

To assess the major steps, taken by the renewable energy industry of Nigeria to fight against increasing greenhouse gas emissions.

To compare the cost of fossil fuel and renewable energy in Nigeria?

To compare the contribution of Fossil fuel and renewable energy to carbon emissions.

Significance of the Study

The whole world facing the issue of Global warming because of increase in temperature, sea level, pollution rate and others which dramatically had huge impacts on humans so the importance of this study is that it will highlight alternative ways of producing energy like renewable energy sources which help not only Nigeria but also other countries to use these sources to decrease carbon and other harmful gases and stabilize the climate change.

Limitations

The limitation is that this study is cover only Nigeria as a country and its issues.

This study has focused on renewable energy and its sources.

Literature Review

The reduction of carbon dioxide emissions and the role that the global renewable energy industry might play in this regard.

Climate Change (CC) is progressively knowledgeable internationally, its effect being obvious and wide. The whole globe presently approaching after (RE) technologies that can be utilized to replace conventional in highly energy taking polluting and great energy use lifestyle to decrease CO₂ environmental attentiveness, making research and RE development an emergent problem (Pinson, et al., 2017). RE technologies are beam increasingly competitive in the form of costs, but a lot of states motionless have to grow community support schemes to countervote rising their part. Such as, the savings on the year turbines have continued to decrease in the pry past some year's relative to other presented technologies. WE have reached a level that can rival conventional means (Sims, 2004). Control systems depend meagerly on fossil fuel burning, by 2030 being anticipated small modification regarding the role of means of energy to full fill the cater the demand. The implications of RE technologies fast development, mandatory to replace original fossil fuel founded control systems are often speaking only on small timeframes. The sustainability of these RE systems over extended feasibility and eras of a change required to be fast needed a diver method. This mostly contains demonstrating development decorations mandatory to attain a sure connected making volume, seeing life maintenance and expectancy master plan (Quaschnig, 2019). Of complete Greenhouse Gas releases, almost two-thirds are shaped by energy industry procedure. Provide that energy request demonstrations a rising trend, the numerous energy-related glitches, for example, greenhouse gas releases, global atmospheric and warming hazards also upsurge. (EU ETS) signifies the biggest carbon market crossways the globe, being one of the principal implement to decarbonise the European energy industry. Anthropogenic carbon dioxide

releases meagerly consequence from fossil fuel burning. From 2015 to 1990, globe coal-related carbon dioxide releases develop at 2.3 per cent yearly, and energy-related CO₂ releases produced at 1.9 per cent year. Energy consumption is at the heart of world heating and the core of blend (Owusu, and Asumadu-Sarkodie, 2016). Boosting the part of RE (or plummeting the part of fossil fuels) is an important amount to alleviate energy-related carbon dioxide promotion and releases economic green alteration. RE means refill themselves obviously and, when likened to an imperfect stock of fossil fuels, are therefore maintainable for the future and present economic, growth, and social stresses. RE means refill themselves obviously without being exhausted in the ground; they comprise geothermal bioenergy, energy, hydropower, solar energy, RE and ocean (wave and tide) energy. The main RE forms and their utility are available in flowing.

Energy Sources

Energy conversion and usage option

Hydropower	Power generation
Mordent biomass	Heat and power generation, pyrolysis, gasification & digestion
Geothermal	Urban heating, power generation, hydrothermal & hot dry rock
Solar	Solar home system, solar dryers & solar cookers
Direct solar	Photovoltaic, thermal power generation & water heaters
Wind	Power generation, wind generators, wild-mills & water pump
Wave and tide	Numerous design, barrage, tidal stream

(Renewable energy et al., 2012) Explain maintainable energy as, a lively agreement amid the reasonable presented of energy-intensive services and goods to all preservation and person of the earth for future generations (Lin, and Zhu, 2019). The globe rising energy require, alongside cumulative populace led to the repeated utilize of fossil fuel-based energy means (Gas and Coal, Oil) which beam difficult by making numerous problems such as reduction of fossil fuel assets, greenhouse gas releases and other atmospheric anxieties, military and geopolitical battles, and the repeated fuel fund variations. This issue will make unmaintainable conduction which will finally consequence in possibly permanent threat to people civilizations (UNFCC, 2015) Notwithstanding, RE means are the most unresolved other and the only answer to the developed problem (Elum, and Momodu, 2017). In 2012, RE means complete 22 per cent of the complete globe energy cohort which was not likely a period ago.

RE supply is vital in all frugality for reheating, manufacturing lighting, transport, gear, etc.

RE supplies decrease the release of greenhouse vapours meaningfully if substituted with fossil fuels. Since RE supplies are got obviously from continuing flows of energy in our environs, it must be maintainable. For RE to be maintainable, it should be provided and limitless non-harmful distribution of atmospheric services and goods. Such as, a maintainable biofuel should not upsurge the net carbon dioxide releases, should not unfavourably impact food safety, nor loom biodiversity (Asutosh, et al., 2020). Despite the unresolved benefit of RE means, certain failing exists for example the break of a cohort because of cyclical differences as most RE resources are climate-dependent, that is why its misuse need complex strategy, arrangement and power optimization way. Luckily, the incessant technological loans in computer software and hardware are authorizing technical findings to grip these optimization problems utilize computational resources appropriate to the sustainable and renewable energy field (Gerhardt, 2017).

As per the EIA (2013), OECD European republics are betrothed in decreasing carbon dioxide emissions to 20% by 2020 and between 80 and 95% by 2050. To attain this goal, the combination of RE in the energy matrix has been quoted as fundamental (Fräss-Ehrfeld, 2009) due it is domestic than conventional energy means in the form of carbon dioxide emissions (Lupu, et al., 2016). As per a report available by the Global RE Agency in 2017, cumulative energy competence and RE manufacture international can reach the need releases' level to preserve the world infection fellow 2 centigrade, thereby absconding the plainest belongings of climate change.

The cumulative level of CO₂ emissions carbon dioxide has set off a fear sign international, producing major anxiety in the party-political context and civilization in general (Pinson, et al., 2017). The Latin American (LAM) republics have seen main upsurges in carbon dioxide emissions, which have greater than folded during the end three decades (Keleş, and Bilgen, 2012) such as, in 2010, the area accounted for about 11 per cent of international Greenhouse Gas (Gerhardt, 2017). Despite this incessant upsurge, the LAM region is a little donor to the global greenhouse gas

(Gielen, et al., 2019), but must still be a lively player in fighting climate change. The effect of RES rules on carbon dioxide releases has hardly been found in the literature.

The educations on RES rules have been placed in seven policies (Paun, and Paun, 2017) specifically: (i) carbon taxes, (ii) feed-in funds (FITs), (iii) best costs, (iv) quota systems, (v) auctions, (vi) cap systems, and (vii) skill systems. There is evidence in the literature that these policies have cemented the method for RES and aided in confining carbon dioxide emissions. The literature indicated that best expenditures, share systems, cap trade and systems, i.e. all RES rules have cemented the method for RE and, therefore, have donated to the extenuation of GHG releases (Hohmeyer, 1992) travelled the link between RE and CO₂ emissions in SSA from 1995 to 2011 while worker health expenses as one of the descriptive variables. Findings presented that renewable energy consumption decreases carbon dioxide emissions. Likewise (Aguirre, and Ibikunle, 2014), had previously inspected an alike relationship for 24 SSA republics from 1980 to 2010. Apart from learning no direct connection between carbon dioxide renewable energy and emissions investing, the effect of the advanced on the previous was negative though not important. (Arent, et al., 2011) examined the causes of renewable energy for 17 SSA republics. From their research, fossil fuel funds, populace development, carbon dioxide, and imports releases were the major fences to renewable energy ingesting in SSA. (Sims, et al., 2003) discovered that renewable energy practice can original decrease carbon dioxide emissions after investigative the connection between both for 128 republics from 1990 to 2014. But, carbon dioxide releases were significantly advanced in Europe than in the other five areas careful for the research. (Pathak, and Shah, 2019) said a negative association between renewable energy ingesting and carbon dioxide productions for BRICS, G20 and 85 developed and emerging economies individually. (Bilgen, et al., 2004) said the conflict for 5 North African nations. In their research renewable energy, ingesting different carbon dioxide releases. For 16 EU nations (Proskuryakova, and Ermolenko, 2019), discovered that carbon dioxide emissions had been lessened because of renewable energy ingesting after accepting the board PMG as employment for data examination. The Paris Climate Agreement United and Nations Sustainable Development Goals initiate to stop the strengthening of worldwide promote, and warming sustainable growth, chiefly in the RE field (Foster, et al., 2017).

Since 2015, savings in emerging nations for all renewable bases other than hydroelectricity had ongoing to exceed those in industrialized nations. China, a still-emerging economy including a fifth of the globe populace, would play an important role in the world movement towards plummeting carbon releases. The goals of the Paris Contract may attitude or decrease with China, both for its influence and the example it would set the grow globe. China's Role in Reducing Carbon Emissions deliberates the forecasts for China attaining fundamental discounts in carbon emissions, within the setting of the present political and economic scenery. With a specific focus on technologies for examples such as year control, solar control and electric cars, Toke inspects how China is transitioning to a national of stable energy ingesting via a service-based heavy and cheap asset in non-fossil energy source.

The book achieves that China may be normal to reduce its carbon releases by about two-thirds by 2050. The requirement to decrease carbon dioxide releases from the manufacture of other and energy manufacturing doings has conventional augmented world care in the new wind. The same is correct for the significant part of RE— that are free of carbon releases — to produce electricity, cumulative mechanisms of the world energy manufacture systems. RE is our share of the energy means that have been donated and could contribute even additional in the future, to plummeting carbon emissions (Martins, et al., 2018).

Compares the costs of renewable energy systems with fossil fuels-derived energy services and considers how placing a value on carbon emissions will help provide convergence

Transitioning to a maintainable energy system is a significant constituent of world maintainable growth object 1), and significant importance within these objects is the discount of the utilize of fossil fuels and following releases of greenhouse gases, to decrease the option of extreme climate change 2). Extenuation or reduction cost curves are frequently utilized to liken the possible economic absolute and keenness extenuation possible of other events 3). The important supposition behindhand the rank of RENE is connected to its low carbon therefore and content inferior contaminating skill. Accordingly, a lot of analysts support its use as another to fossil fuels in plummeting energy poverty (Ouyang, and Lin2014). The African Development Panel (2017) notes that RE could be labelled as the 'golden thread' to the SDGs as it assists to connect development, environmental and equity sustainability.(Droege, 2002) inspected the differences of atmospheric contamination for six SSA find and countries provide for the quarrel that honesty to trade indorses atmospheric pollution. (Leonard, et al., 2020) deliberated the

reasons of carbon releases for 170 nations and report that energy and urbanisation ingesting donate to atmospheric pollution. An insufficient other educations go beyond full energy to rot into the nonrenewable and RE part to classify their different belongings. such as (Pinson, et al., 2017), worker panel approximation techniques on the energy-CO₂ connection for the ten largest electricity creators in SSA over the time 1980–2011 and report that while RENE reductions emissions, NRENE had the opposite result. Alike, (Sims, 2004) examine the circumstance for 24 SSA nations over a 31 year time (1980–2010) and prove that trade and RENE have a positive result on atmospheric excellence.

Some educations have examined how the official or governance substructure touches the energy-carbon releases connection. Such as (Quaschnig, 2019), travel the effect of energy ingesting on carbon releases in South Africa for the time 1971–2017 and invention that while fossil fuel upsurges CO₂ releases, political and RENE official variables had a conflicting result. (Owusu, and Asumadu-Sarkodie, 2016) also report that together political and RENE official excellence (slow as economic liberty) have a positive influence on atmospheric excellence. The first element of literature examines the fundamental connections between carbon dioxide releases, economic energy and development consumption (Renewable energy, et al., 2012). Over the past decades, economic growth in the world has come at the expense of wide energy utilize (mostly fossil fuel burning), which caused deteriorating energy safety, unstable energy rising and funds carbon dioxide emissions (Lin, and Zhu, 2019).

Original, per capita releases of carbon dioxide, has augmented from 1.5 metric loads in 1980 to 7.5 in 2014 56 (World Bank) (Elum, and Momodu, 2017), which is mostly because of a significant upsurge in the utilisation of fossil energy. 57 OF China destined to upsurge the contribution of RE making to full energy manufacture. In 58 2010, the parts of original non-fossil energy had reached 9.1 per cent By the last of 2013, China's 59 of REpower connected capacity had approaching 3.8 million accounted and kilowatts for 30 per cent of the 60 full connected volume of the whole nation. RE making volume approaching 10853 61 kilowatt-hours, secretarial for 20 per cent of the nation's full control cohort. To attain the board of 62 cumulative the nationwide parts of non-fossil energy to 15 percent in 2020, the Chinese government has set fresh 63 boards in its Twelfth Five-wind program for atomic and RE growth in China 2015. 64 instant of now increasing connected volume as before, the fresh program also stresses the 65 goals of energy substructure. The energy condition in China is also branded by a heavy 66 need on petroleum with parts of 76.5 percent in the nation's primary energy ingesting in 2012, 67 bellowed by oil (8.9 percent natural gas (4.3percent and nuclear/hydro (9.1 percent) (China Energy Statistics 68 Yearbook, 2013) correspondingly.

RE was available to the globe as the energy means of the future for maintainable growth since 1972. RE means comprise energy resulting from the year, open-loop biomass, closed-loop biomass, geothermal, astral, little irrigation control, municipal buyer hydropower, and waste hydrokinetic, and marine means? This energy means (Asutosh, et al., 2020). are watched as main mechanisms of maintainable growths for the bellowing details: They reason less negative atmospheric effect than non-renewable means; their practice has the possible to speech future and current atmospheric anxieties on GHG releases, for example, CO₂, of sulphur and nitrogen and particulate substances subsequent from the utilize of control made from oil, local, and natural gas. Also, RE means are not delicious in a person time, and this is indifference to fossil fuel capitals that reduce with consumption and extraction (Gerhardt, 2017).

The correct social prices of energy comprise not only the funds that are reproduced in market conversation but also the other indirect and direct nonmarket benefits and costs (externalities) related to the gaining, change, procedure, and utilize of that energy. International heating, acidic statement, adulteration groundwater, and personal health belongings are now some of the atmospheric prices related to the working utilize of fossil fuels that are not reproduced in their market funds. Since the onset of the industrial rebellion in the mid 19th period, some 290 Gt C have been oxidised from fossil fuels and free to the environment. The known fossil fuel reserve base signifies a further carbon capacity of any 5000 Gt C (clathrates methane excluding) representing there are nice assets of coal, oil and gas (as well as uranium), while there is motionless some doubt. The technical possible of RE bases is far upper with the help of it presently full-fill only about 20 per cent of the world energy request, meagerly as conventional hydro and biomass control. Modern RE schemes have the technically possible to give all world energy facilities in maintainable method and with little or nearly zero greenhouse gas releases. In relative to globe electricity making, coal nation to have the biggest parts at 38 per cent bellowed by renewables (mainly hydro control) at 20 percent atomic at 17 per cent usual gas at 16 percent and oil at 9 percent Power manufacture is predictable to nearly dual by 2020 (Table 1). But regular carbon releases per unit made will weaken over period meagerly due to utilizing first-hand technologies with better change competencies New renewables have long-drawn-out considerably

throughout the 1990s in total footings counting year by 21 percent per solar and wind photovoltaic (PV) by 30 percent per wind. Geothermal and Biomass schemes are too facing good development.

So in Hans, renewables are predictable to stay produce till 2020, but without important government interference, they would still only source fewer than 2 percent of the electricity market parts. Numerous electricity cohort technologies were compared and analysed for together their carbon and costs extenuation possible. Previous educations tried to liken control generation technologies to charge alone (Fräss-Ehrfeld, 2009). The OECD data was caused from a review of control positions because of the conclusion between 2005 and 2000 in a year cross-section of nations. It presented that price can vary significantly between schemes because of regional and nationwide changes counting the require for more substructure, the trade-off between capital efficiency and costs, the capability to run on base weight and the availability and cost of numerous fuels. The prices of plummeting greenhouse gas releases would also vary due to local erraticism in the prices of the zero cohort technology selected (crushed petroleum or CCGT) and the other technologies presented RE technologies could decrease CO₂ releases by substituting fossil fuels in the control cohort transport and industrial manufacturing. Life-cycle carbon dioxide releases RE technologies are much inferior to fossil fuels. The life-cycle equilibrium is also careful to be a significant issue in the heat and transport industry. Founded on an examination done by the IEA, renewable control cohort allowed nations to save 1.7 Gt of carbon dioxide releases in 2008, a number that is greater than the complete control industry carbon dioxide releases in the European area (1.4 Gt) (Ölz, 2011).

This analysis shows that hydropower technology establishes the biggest parts for redeemable carbon dioxide emissions with 82%, bellowed by wind and biomass with 7 and 8%, correspondingly. As per the IEA examination, the possible investments for the BRICS and OECD nations is unevenly 5.3 get in the wind 2030, nearly the same as is predicted for power-related carbon dioxide productions in the WEO 2010 bang for these nations in 2030 below a 450 ppm condition (5.8 GT). Number (10) demonstrates the carbon dioxide redeemable underneath the WEO 450 situation likened to a no RE situation in 2030. The important opinion is that the greatest carbon dioxide investments are focused in the OECD China and other countries. As per the IEA bang, carbon dioxide investments in China on a 450 ppm situation will be 2.2 Gt, establishing 64% of the economic and BRICS nations' full savings (Lupu, et al., 2016).examined the technological feasibility penalties of attaining GHG found and targets that these boards are low sufficient to be possible, both economically and technically. They specified that this fatefully is contingent on the specific technology. Such as, the obtainability of carbon custody storing technology is very significant in the elimination of carbon dioxide from the air. Also, they contended that extra-institutional and party-political basics are needed to attain the boards (Pinson, et al., 2017). Examines the United Conditions as a case search country reticent petroleum in the kindness of renewable alternatives (Keleş, and Bilgen, 2012). Her researching propose that coal superannuation proposals have a chance to change to renewable energy generation which would upsurge pliability while plummeting releases at an inferior charge than the treatment quo. With the help of a rule-based method, it is recognised that energy competence and the addition of renewable energy into a receptive network would brand atmospheric and economic atmospheric advantages to businesses and households. In an examination of the Chinese change to a maintainable energy system, Sun et al measure 5 industries counting the systemic industry of full excess and volume cohort, one economic factor of total annual costs, one environmental industry of CO₂ emissions, and one social industry, straight task creation (Gerhardt, 2017). This little usual of the industry is utilized to measure sustainability, based on situation energy combinations, and the authors classify the requirement for rule interference to inspire better renewable energy cost and growths as a fence to a spotless energy change. In measuring the change an additional maintainable, inferior release cohort source in growing nations.

Germany's Energy Companies: From Nuclear Energy to Fossil Fuel or Renewables?

By July 2012, after the announcement of Merkel, RWE, the next biggest energy supplier within Germany, had moved its route, conditions that for reasons of financial it resolute to separate from nuclear energy (NE) both domestically and RWE phased out its designed work on new nuclear reactors, internationally (Gielen, et al., 2019) and globally, such as, within the United Kingdom (UK Energy Plans in 'Tatters' 2012). Chief Executive Officer of RWE, Peter Terium, admits it was an error to have discarded solar energy (SE) for such a long duration (Paun, and Paun, 2017). This losses' movement for NE and a move to renewable energy (RNE) has continued. Lastly, Vattenfall, the fourth largest energy producer of Germany and supplementary of a company of Swedish the same name, has as well moved to RNE. In October 2014, Vattenfall broadcast that it will search to trade its lignite power plants (LPP) and supply in previous East Germany. Consistent with the Times of Financial, [Vattenfall] was

searching to trade the German lignite commerce to control to RNE and decrease its CO₂ productions (Hohmeyer, 1992). Utilizing 1900 as a baseline, the EU has given a 20 % decrease of its CO₂ productions by 2020 as an element of its so-called 2020 preparation (Aguirre, and Ibikunle, 2014). The United States has supplied a 17 % decrease. 6 It sounds close up to the EU's present, except that the United States utilizes 2005 as its baseline time, thus misrepresenting the quantity of its CO₂ decreases. Utilizing a 1990 baseline, the presence of the United States quantities to a paltry 3 to 4 % decrease. Bypassing the Electricity Feed-in-Law in 1990, Germany make a policy of public on the introduce early on. By relationship, 25 years later on the United States at rest has no such nationally rule and not a lot of countries rules (Arent, et al., 2011). Early authorization resources that RNE industry of Germany has expected national credit and support of finance by having a federally needed certain electricity buyer created by consumers for over 25 years. During the Electricity Feed-in-Law Germany gave incentives of finance and feed-in-tax to support air, hydropower and bioenergy early on (Sims, et al., 2003).

Towards Fully Renewable Energy Systems: Experience and Trends in Denmark (Pinson et al., 2017)

While thoughts of RNE in Denmark, one obviously has the power of air in the brain, mostly, as the state found the usage of energy of air to gather its power of electronic utilization. These originate from a selection in the 1970s to spend in this resolution to help abatement of CO₂ productions. The Danish reproduction is reasonably exclusive, as it has previously been one of the more developed states in conditions of helping deployment of the power of air creation abilities. Starting from 1979, the capability boosted progressively, and only stops for a small period within the early 2000s, observe Fig. 2. Looking towards the outlook, the main power of air growth are designed majorly within the company of middle to big offshore air ranch (many hundreds of megawatts all) and during the repowering of big aground farms of air. As of at present, the power of the air is complemented by non-insignificant power of solar capabilities, almost accomplishment 800 MW at the last of 2015.

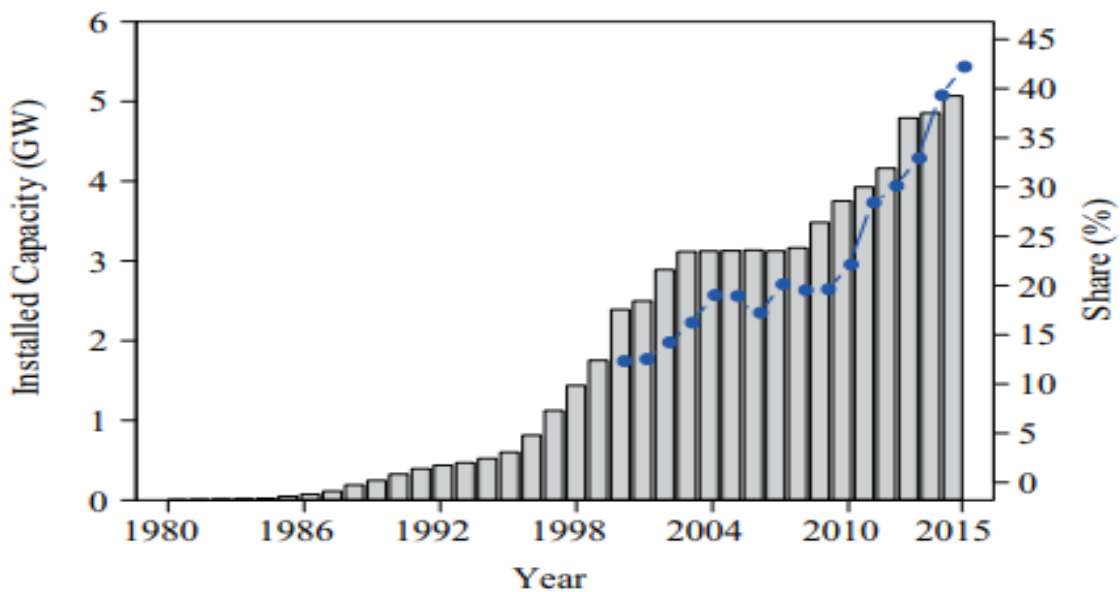


Fig. 1. Evolution of installed wind power capacities as well as wind power penetration in Denmark.

The Danish model is fairly unique, as Denmark has historically been one of the most successful countries in supporting the deployment of wind-power generating capacities. Starting from 1979, capacity increased steadily display in (Figure 1). Major wind-power developments are planned. As of today, wind power is supplemented by non-negligible solar-power capacities, reaching nearly 800 MW by the end of 2015. The successful deployment of capacities and subsequent integration of renewable energy generation is part of a broader evolution from a centralized to a decentralized system of power generation in the country (Pinson, 2017). The developed use of capabilities and consequent incorporation of RNE creation is an element of a broader development, from a decentralized to a centralized system for the generation of power within the state. This process of decentralization indicates that, when Denmark had an incomplete amount of comparatively big power plants within the 1980s and

1990s, the creation of power landscape quickly evolve with the use of distributed creation capabilities, more recently solar panels, obviously including wind turbines, but as well joined warmth and power (CHP) plants.

Renewable energy sources in Turkey for climate change mitigation and energy sustainability

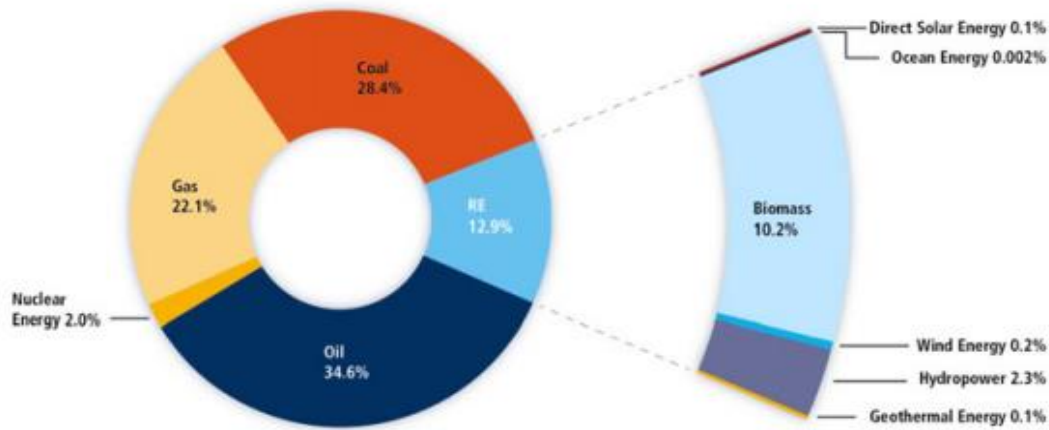


Fig. 2 Shares of energy sources in total global primary energy supply in 2008

Deployment of RNE has been boosting quickly in new years (Pathak, and Shah, 2019). In most situations, boosting the distribution of RE in the power mix would need rules to motivate alterations within the system of energy. The policy of the Government, the declining price of several RE technologies, alterations in the costs of fossil fuels and more issues have helped the enduring boost in the usage of renewable. When RNE is at rest comparatively little, its development has gone faster in new years, as appear in Fig. 2 (Bilgen, et al., 2004).

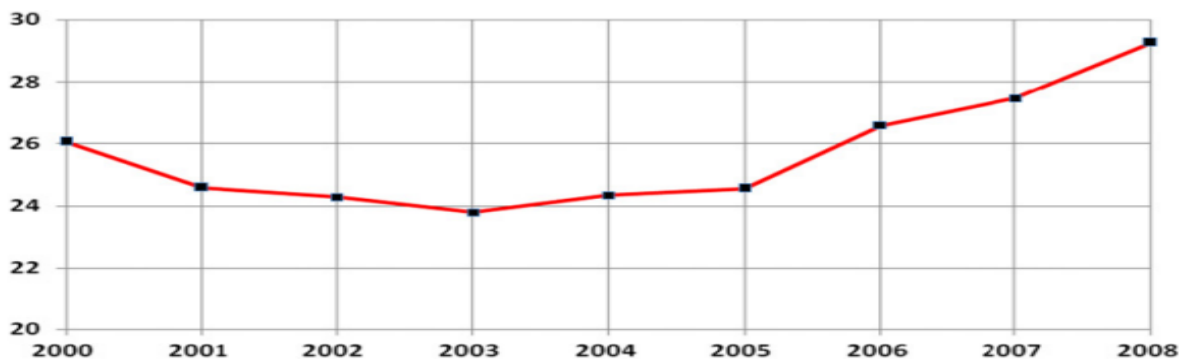


Fig. 3. Primary energy production in Turkey (Mtoe) [14].

Fig. 3. Primary energy production in Turkey

Most RNE technologies have short definite productions of CO2 into the environment in relation to fossil fuels, which creates them valuable instruments for addressing CC (Proskuryakova, and Ermolenko, 2019). For a renewable means to be sustainable, it has to be unlimited and not injure the environmental goods deliverance and services counting the system of climate. To be sustainable, power has to as well be reasonably reasonable above the enduring; it has to meet public requirements and be well-suited by social standards now and within the outlook. It is significant to tax the whole lifecycle of all energy means to guarantee that all of the measurements of sustainability are meet (Foster, et al., 2017). Turkey is a quickly developing state whose profits level is touching towards that of the rest of the OECD region (Martins, et al., 2018). This gets closer to the procedure that has been connected with the fast development of GG productions. However, carbon productions from any state role similar to the force on the international climate (Ouyang, and Lin, 2014).

Financial system-wide GG productions from energy-burning jumped 65percent within the 1990s, indifference to the much self-effacing development in the rest of the OECD region. The government of Turkey is now in the procedure of improving a plan to decrease the development of GG (Droege, 2002). Turkey would have the responsibility to apply policies and measures to alleviate GG productions but would not be necessary to gather an exact GG production goal.

Turkey has attained decoupling of SO_x, NO_x and CO productions from financial development. Due majorly to the quick development of main energy use and the boosting usage of SO₂ emissions, in particular, domestic lignite, have developed quickly within new years in Turkey. The main resource of SO₂ productions is the power industry, rolling over 50% of all productions (Leonard, et al., 2020). In 2008, found SO₂ productions are 2.1 million tons, developed by 7percent between 1990 and 2008, when GDP and fuel utilization developed by 32 and 28percent, respectively. SO_x production concentrations (for each unit of GDP) decrease by 14percent between 1990 and 2008. But, SO_x production power is at rest above 3 periods biggest than the OECD standard. Main providers to SO_x productions carry on to be power plants (64.3%) and combustion of industry (25.6%).

Over half of the renewable utilized in Turkey are flammable fuels and the rest are mainly hydro, waste, geothermal and solar. Turkey is ornately capable of wind, geothermal and hydropower resources. Sectorial researches have meant that little-scale hydropower is below improved, and total probable creation of 33 TW h of electrical energy for each year (Pinson, et al., 2017). It is expected that Turkey has the probable for up to 48,000 MW of airpower ability, able of creating regarding 25 TW h of electrical energy for each year within the outlook (Sims, 2004).

SWOT analysis of the renewable energy sources– case study: solar energy

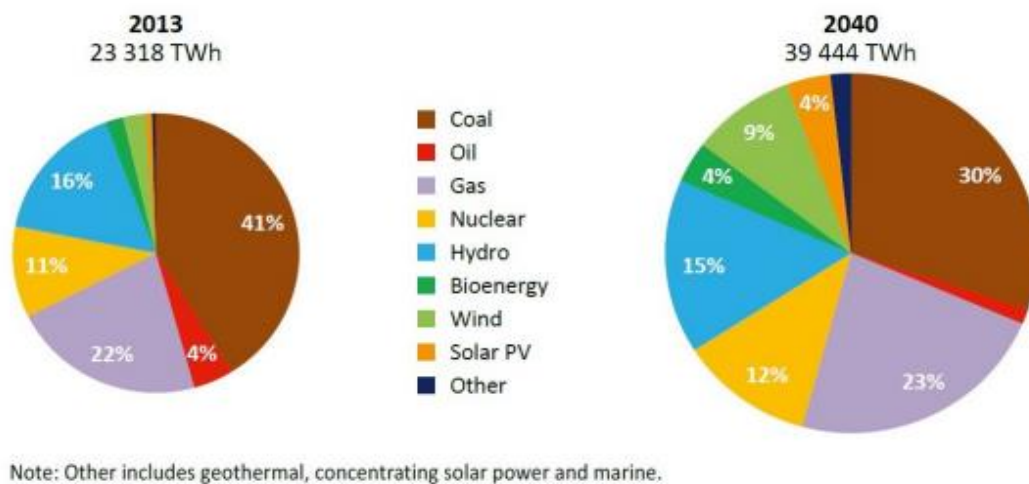


Fig 4. World electricity generation by type

Though it appears that the 20-20-20 goal is especially close to being attained (previously at 18.8percent in 2015), very significant surveillance has to be built at this position. Regarding 80percent of the total RNE share of globe electrical energy creation is given by the big-scale hydro industry (number 4), which is not readily obtainable in each location of geography and comes by significant first savings prices. The newer target establishes a more significant contribution for the green especially the wind, solar areas and renewable energy sectors, also as in micro-hydro and geothermal industries.

A comparable study is suitable for Romania's case, as the state goal was previously reached in 2013, (Quaschnig, 2019). Arithmetical data from the Commission of Europe (EU Country factsheet, June 2015) display the high renewable energy potential of Romania, especially in the hydro and biomass industries. Additionally, through the past years, significant savings were established in the other sectors of renewable, solar, geothermal and wind. Statistical data (SD) is offered up to 2013, number three (Owusu, and Asumadu-Sarkodie, 2016), Biomass and hydro industries offered reasonably invariable energy production towards use above the past decade, as degree becoming at least four to 20 periods bigger than the other RNE sectors. Consequently, these data were disqualified from number three to obviously capture the new growth in solar and energy of wind.

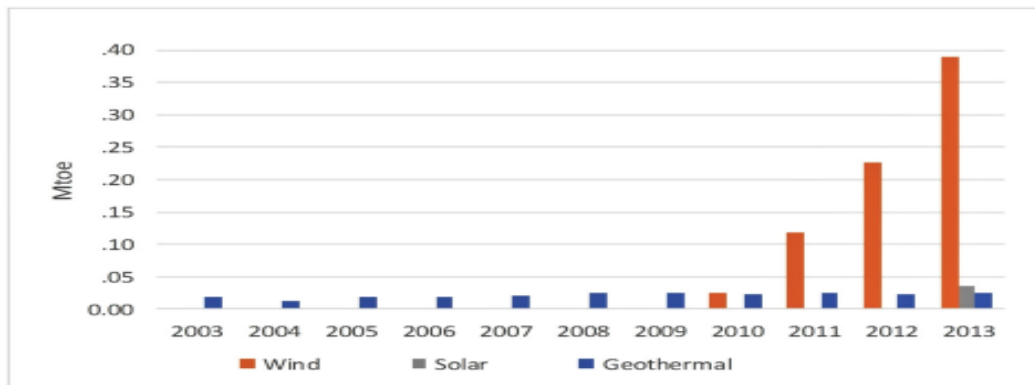


Fig 5. Renewable energy in Romania, other than hydro and biomass

The hydropower potential of Romania is influenced by 2 main problems: the multiannual standard flow speed of the river, which is comparatively short (upper limit 225 m³ /s), and the elevation at the means, that is regarding 1400 m. Because of these problems, they could say that the hydropower probability of Romania is comparatively self-effacing. By source of this legislation, the energy of hydropower is motivated to produce and install simply on a micro-scale (MS). Hydropower workers up to 10 MW take delivery of 3 Green Certificates for all MW h delivered and produced by the supplier and/or last customers if one Green Certificate if the plants are new, or the hydroelectric plants are retrofitted Romania necessary to have a 24percent share of RNE means from the all energy formed. To motivate the growth of RNE creation, Romania adopts a figure of lawmaking events and made a nationwide strategy. The major lawmaking event was Law No. 220/2008 (Lin, and Zhu2019), which should not be useful not including the permission of the European Commission. Law No. 139/2010 (Elum, and Momodu, 2017), which adjust Law No. 220/2008 law, explain assured feature that created it delayed its performance awaiting then.

One of the major features of these rules was to make a maintain scheme for creators of RNE by assigning Green Certificates. This guide to a quick growth in electrical energy creation from renewable means, in exacting air, small hydro and photovoltaic power. . Regarding 54percent of the hydropower potential of Romania is now agreed, and there are policies to attain 63.5% by 2025. The total CO₂ production in Romania number to 78.7 million tons. The shareholders in Romania favour to grow more wind and hydropower services more than other different (i.e. facilities of photovoltaic) that create dangers, have climate require and restrictions knowledge. The electrical energy created in Romania, between 2011 and 2015, developed by about 4.5percent, and the decrease in GHG productions from the electrical energy creation procedure reduced by 5.8 million tons. If it would compare GHG liberate from 1990 by those from 2012 they see a fail of over 40percent (Asutosh, et al., 2020). This reduces replicates the exchange in the electrical energy creation procedure, particularly coal, from fossil fuels, in particular, to electricity generated from renewable sources, wind and hydropower (Gerhardt, 2017).

The major topic in accessible writing is to discuss the character and significance of RNE not including paying more concentration to connections by more elements of the financial system. (Fräss-Ehrfeld, 2009) investigates sectorial differentiation among fossil fuels and biofuel with regard to creation prices, subsidies, economies of scale, and other financial encouragement in improving states. He explains that the growth of the biofuel financial system in the improving states was encouraged by increasing oil costs and concerns of the environment since the 1970s energy disaster (Lupu, et al., 2016). Launches the prospective and growth of bioenergy technology of China. As could be seen from the over, while the contribution and condition of the RNE financial system have been well acknowledged, higher researches of the econometrics and economics of RNE, mainly with a focus on Africa especially Nigeria, are at rest in their childhood. When there is most to be done by researchers to give a best considerate for Africa RNE financial system. In addition, RNE profit–cost study are not correctly and lengthily researched even though it is the basis for one to approximation chances of substitution and demand for sustainable and renewable energy growth. Though the United States and Brazil biofuel creation profit and cost analyses have been well-planned (Pinson, et al., 2017), researches have not resulted from any profit and cost analysis for African RNE creation. To best understand Africa especially Nigeria RNE financial system, it is vital for the paper to take on thorough and wide research into such as the replacement possibilities among fossil energies and renewable energies; the energy markets, effects of renewable energies on the environment, state gross domestic growth of the product.

Such wide study is necessary for the reason that Nigeria RNE financial system is still in its childhood and there are a lot of problems that require be investigating and applying.

Methodology of the Study

Research Design

The research is based on quantitative study design to evaluate the the response of renewable power reaction to climate change (CC). The current study is based on the theory design methodology which is making by analyzing, gathering, and presenting quantitative data which permits the study to give insight into the why and how by study. The present research assist others best understand the requirement for the study as the effects of CC within Nigeria in the coming years are predictable to find from worldwide changes within climate. This alter in order be based on boosts within the attentiveness of the greenhouse gases (GG) including nitrous oxide, methane and carbon dioxide. Boosting attentiveness of GG within the environment improves the potential of the environment to protect warmth and therefore carry regarding global warming. Therefore, boosts in the need of renewable energy to fight against carbon emissions which is the function of consumption of fossil fuels, among other factors (Keleş, et al., 2012). The research philosophy based on positivism to describe the objectives of the study.

The research approach was deductive as the study goes from general to specific phenomenon. The current study reflected the quantitative study which was based on descriptive nature as it describes the events and patterns of renewable energy usage in response to increase carbon emissions. Using descriptive quantitative data, the study described the sources of Renewable energy and how it was affecting climate change in Nigeria. By comparing cost analysis of fossil fuel and renewable energy on carbon emissions helped to explain the response in Nigeria. Therefore, the method adopted here, although descriptive, relies a lot on minor data consisting mostly of accessible documentation and records in different companies together with data together from the power industry within Nigeria, OECD, World Bank, the National Population Commission and more sources related to the research. The common method to observe data from accessible sources. The different sets of data were then analyzed and interpreted into personable formats utilizing graphs, tables and charts (Gerhardt, 2017).

Procedure

The study based on secondary data that gathered from different government records, and National statistics database. Analysis of carbon emissions and renewable sources listed in Environmental protection Agency The data analysed of 60 years from 1960 to 2020. Annual and monthly statistical data extracted from government website has further been used for analysis through the observational instrument. Incomplete information eliminated to ensure the reliability of the results (Gielen, et al., 2019).

Sampling Method

The study of research is mainly focus on the response of renewable energy to climate change in Nigeria. In this study, Carbon emission, Sources of Renewable energy distribution, fossil fuel, consumption of energy and different investment of renewable energy industry benefits to Nigeria nation. The industry of renewable energy industry and climate change has been taken as sample which are selected based on convenient sampling techniques as the data is easily accessible. Other variables which were not included in sample because of newly listed in the international records and non-availability of the data in Nigeria (Paun, and Paun, 2017).

Data Collection

The method adopted here, although quantitative, relies a lot on minor data consisting mostly of accessible documentation and records in different companies together with data both from the power industry within World Bank, Nigeria, International Energy Agency (IEA), the National Population Commission OECD, and more sources related to the research. The elected data comprise of Renewable energy consumption, Fossil fuel energy consumption Trade CO2 emissions, and GDP per capita were extracting from the Quality of Government Institute Standard Dataset when data for Biocapacity and Ecological footprint were mine from Global Footprint Network by detailed to Nigeria. Utilizing disaggregate power utilization (and fossil fuels) independently more than within

collective company is helpful for researching the decoupling impact of power utilization from a rule viewpoint (Hohmeyer, 1992).

Data Analysis

This research collated yearly regularity data sequence spanning 1960 -2020 were elected based on accessible theories and the United Nations rule and methods for Sustainable Development. The study analysed the data trend over twenty years with descriptive research statistical capabilities. The study employed longitudinal data to explain the response of Renewable energy to climate change from 1960 to 2020 and how the nation converge from fossil fuel consumption to renewable energy sources consumptions. Data was collected through the Environmental Protection Agency, OECD, World Bank Group, and National Database. The unit analysis where the study was conducted in Nigeria where the study used different variables to describe the current status quo of Nigeria in combating climate change through the use of different renewable energies. The general approach to reuse mostly the results of the available data that have been previously published and model them to suit the objectives of the current research (Aguirre, and Ibikunle, 2014). Data analysed through various tables, graphical and visual representations, summaries and different data charts. All the variables of the interest for explaining the response of renewable energy industry to carbon emissions and energy consumption by citizens analysed through observations to interpret the results.

Hypothesis

There is significant impact of solar energy on carbon emissions in Nigeria.

There is no significant impact of solar energy on carbon emissions in Nigeria.

There is significant impact of fossil fuel on carbon emissions in Nigeria.

There is no significant impact of fossil fuel on carbon emissions in Nigeria.

Ethical Considerations

The study based on observation method in the Nigerian nation respected the privacy and psychological well-being of the Renewable energy sources. Additionally, a particular respect for social norms and cultural values taken into account. The databases followed World Bank and United Nations guidelines to ensure data quality. With the multi-dimensional of accessible secondary data, the study ensured replicability of such findings and provided greater validity, transparency and integrity of research procedure (Arent, et al., 2011).

Findings and Discussion

The section identifies the descriptive analysis of Renewable Energy in response to increasing climate change in Nigeria. The results identified from the trend analysis of different variables from 2000-2020 are presented in a table, graph and charts to make a better understanding of the status quo of Nigeria (Sims, et al., 2003).

The connection between the Nigerian population and energy has been reported by (Gbatu ET AL., 2019). The link associates to change in economic growth is approximated by income or Gross Domestic Product per capita (Callen, 2008). In the case of Nigeria, Gross Domestic Product is increasingly rising so does per capita energy use (Tenny, 2020). The second association, however, stresses that the volume of energy used by a country depends on structural characteristics of government policies, climate and fuel prices. Normally, Nigeria growth rate is a factor in identifying how the infrastructural requirements of society are produced and consumed (Collinson et al., 2020) (Pathak, and Shah, 2019).

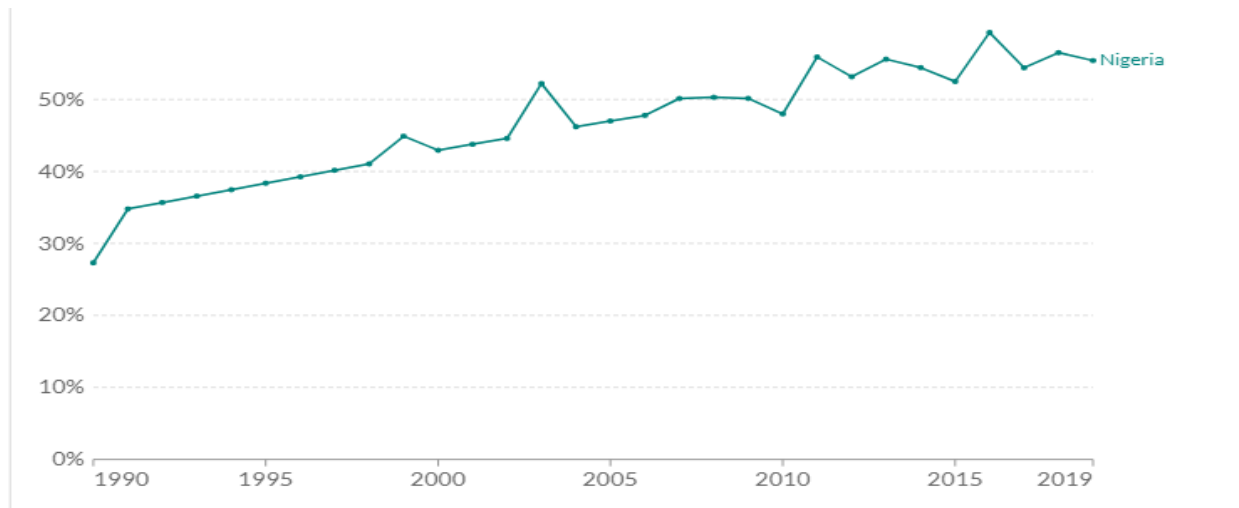
Gross Domestic Product of Nigeria

The Gross Domestic Product per capita is formulated as Gross Domestic Product/Population. In this case, GDP is the gross product of Nigeria while the population the entire society of Nigeria. GDP is the true measure of prosperity, living standard and overall well-being of Nigerian society. The results indicate that the GDP per capita of Nigeria has been moderately risen from 2000 to 2013 and has steadily declined from onwards which shows that Nigeria is struggling to supply its population with the basic need of goods and services (Bilgen, et al., 2004).

Population of Nigeria

The Nigeria population is continuously risen from an estimated 1.5% in 1960 to about 2% in recent times. Though the rate of change is already declining in 2000, the rate of population is still very relatively high (Proskuryakova, and Ermolenko, 2019).

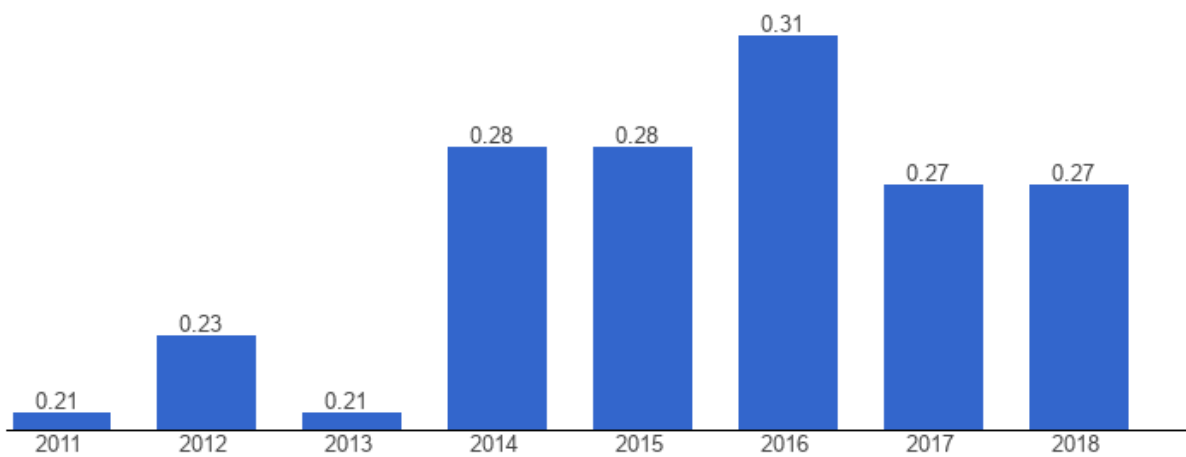
Energy Consumption by Nigeria



Source; (Council and Council, 2021)

In the figure presented above, the energy consumed by Nigeria from 1990 to 2019 is 30% to reaching above 50%. The result identified that there is a close relationship between population growth and energy consumption. The most important measure in the energy consumption of Nigeria is the total consumption of 279.00 million kWh of energy annually. The chart also provides a shred of evidence that there is the result now provides evidence that energy consumption per capita increase with GDP per capita and they're a significant relationship between GDP per capita and energy consumption. So Nigeria is typically consuming more energy per person. To extend the three graphs namely GDP, Nigeria Population and Energy consumption, the trend also shows the threat from carbon emissions and other environmental degradations particularly from fossil fuels based economy (Foster, et al., 2017).

Carbon emissions per capital



Source; (Cu et al, 2020)

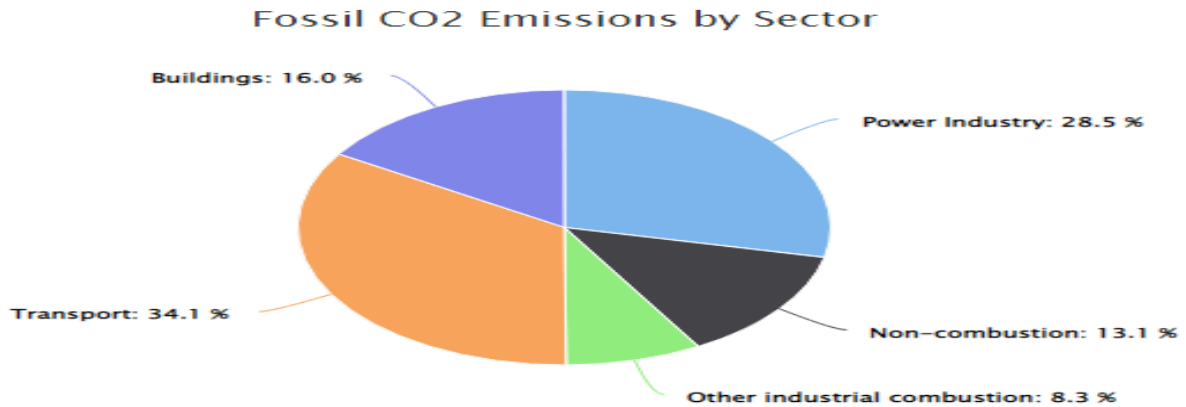


Source; (World Bank, 2021)

The above charts show the Carbon dioxide emission per capita of Nigeria from 2011-2018 and 1960-2018 from two different sources to make the validity analysis. The current data indicates that the average value for the country during this period was 0.42 metric tons with a smaller of 0.14 metric tons in 1960 and a higher of 1.11 metric tons in 1974. However, the recent figures from 2018 are 0.27 metric tons. For comparative analysis, both charts indicate that the Nigerian carbon emissions have risen since 2011 to a maximum figure of 0.31 in 2016. The figure has steadily declined from 2016 to 2.7 metric tons (Martins, et al., 2018).

Carbon Dioxide emissions by sector

The comparative analysis of Carbon emissions of Nigeria annually among different sectors such as power industry, transportation industry, buildings sectors, non-combustion and other industrial combustions sectors where the results indicate that power industry and transport industry are the major contributors in spreading carbon emissions in the environment (Gernaat et al., 2021). However, the figures got some interesting patterns in changing from increasing to declining from 1986 but the figure of the power industry is still rising. Similarly, the carbon emissions of other industrial combustion sectors have declined from 1984 to 2010 which further shows the effective contribution of the sector to the environmental sustainability of Nigeria (Gbatu et al., 2019).



Source; (Irena, 2021)

The above chart shows that carbon emissions generated from fossil fuels in Nigeria were 846658 tons in 2016. However, the figure increased by 3.49% during the previous years, presenting a growth of 28527 tons during 2015 when carbon dioxide emissions were 818131 tons. Carbon emissions per capita were equivalent to 0.18 per individual which was based on the population figure of 4586787 in 2016 without change in the figure of 0.18 per person in 2015 which represents a change of 0.9% in Carbon dioxide emissions per capita (Ouyang, and Lin, 2014).

Energy consumption in Nigeria

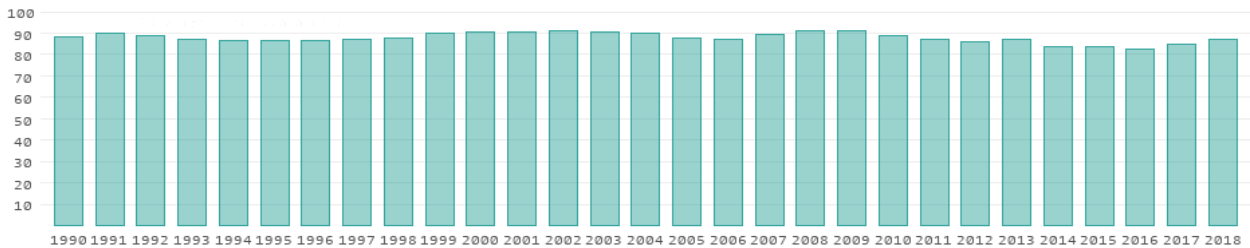
The Nigeria has electrical energy consumptions based on two parameters as the electricity is consumed by production and person own consumption (Oecd, 2021). The total consumption of electric energy was 279 million kilowatt-hours per year and per capita, of an average of 55 kWh which means that Nigeria is providing completely

self-produced energy to its nation. The total production of electrical energy is 300m kWh which is 108 of person own needs. The rest of the energy is either exported to other nations or obsoleted or unused. Along with the self-produced electricity consumption, exports and imports play a crucial role in Nigeria. Other sources of energy consumption are crude oil and natural gas. 28% of Nigeria population have access to electric energy while the share of rural areas was 7.6% (Droege, 2002).

Production capacities per energy source

The energy sources used by the Nigerian nation are fossil fuels with 753.97 million, nuclear power with 0.00-kilowatt-hour, water power with 568.79 million kWh, renewable energy 0.00 however, Nigeria has a total production capacity of 1.32 billion kWh but it is producing 300 million kWh electricity. The highest share in energy source used by Nigeria is fossil fuels with 70% share, followed by water power with 14% which means that the Nigerian nation is mostly reliant on fossil fuels for its energy consumption requirements that further degrade the environment and hinder sustainable development of the economy (Oecd, 2021). Similarly, the amount of energy has reached the full use of power plant capacities but in the case of Nigeria, the country is lacking as solar collectors less efficient under clouds. Water power and wind plants would not be operating under load. The values mentioned above are useful with a comparison of other energy sources (Leonard, et al., 2020).

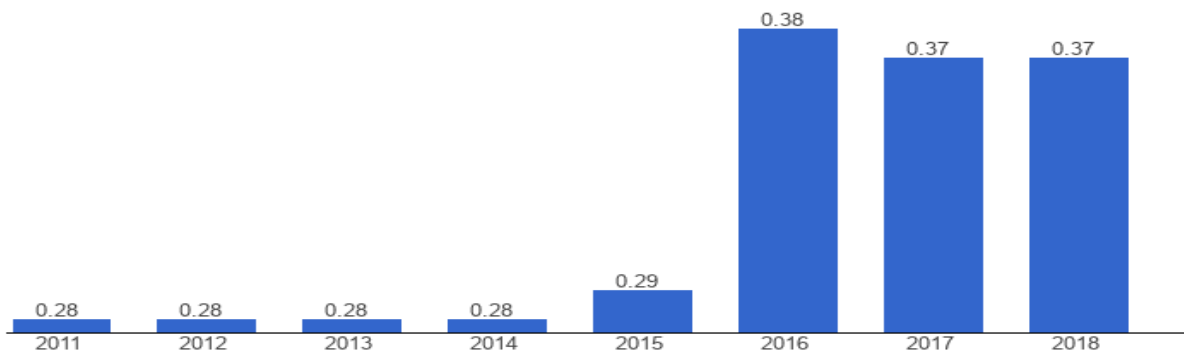
Usage of renewable energies



Source; (Oecd, 2021)

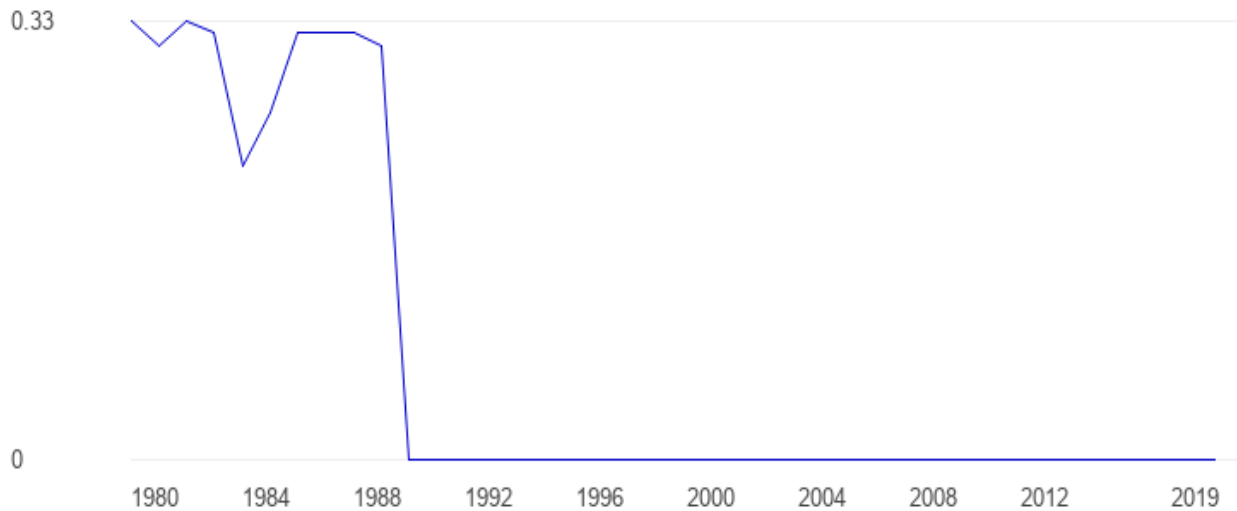
The above chart shows the proportional share of renewable energy from 1990 to 2018 where renewable energy includes solar power, wind power, geothermal energy and biomass which indicates that the sources of energy that renew themselves within the shortest period and will be permanently available to the eco-system. Hydropower produced energy is neutral renewable energy, the case with river and ocean power plants. Similarly, dams and reservoirs also form mixed results such as by pushing water into reservoirs and renewing energy from it when the nation has increased demand for electricity consumption. For Nigeria, it is not possible to determine the amount of renewable energy generation. The renewable energy of Nigeria is accounted for approximately 87.2% of actual consumption in 2018. The trend analysis shows a slight increase or decrease in renewable energy usage in Nigeria which could not identify clear patterns in these years (Pinson, et al., 2017).

Nigeria: Fossil fuels electricity generation, billion kilowatt-hours, 1980 - 2018:



Source; (Oecd, 2021)

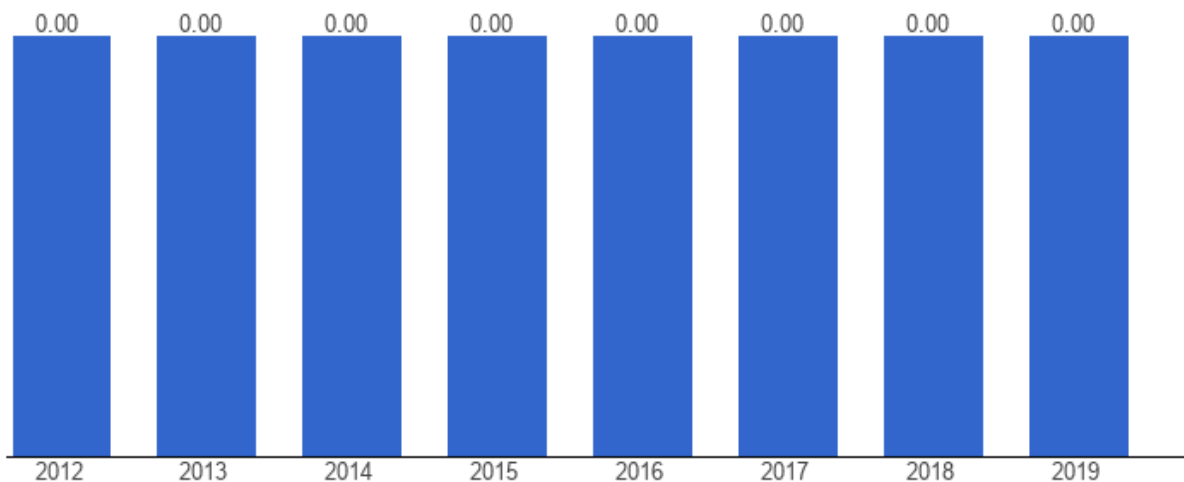
Renewable Power Generation of Nigeria



Source; (Oecd, 2021)

The above historical analysis indicates that electricity generation from fossil fuels in 1980-2018 where the average value was 0.32 billion kWh with a minimum of 0.2 billion kWh in 2000 and a maximum of 0.52 billion kWh in 1980. The recent value in 2018 was 0.37 billion kWh. for comparative analysis, the global average in 2018 was 84.90 billion kWh. the electricity generation from fossil fuels is rapidly increasing in Nigeria which also provides similar evidence mentioned above charts that nation is highly reliant on fossil fuels for its electricity generation. However, the share of renewable energy is low (Sims, 2004).

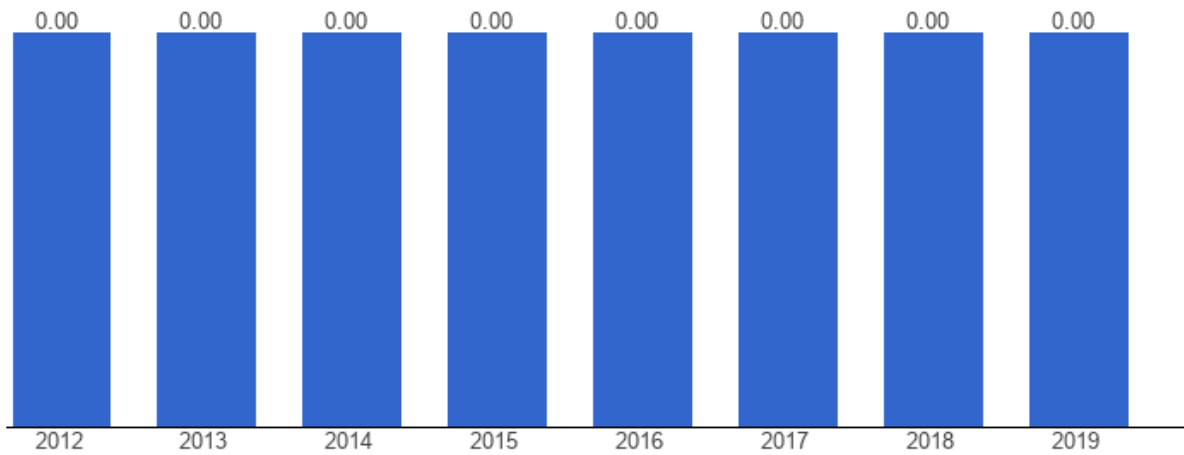
Wind electricity Generation



Source; (Global Economy, 2021)

In this chart, the results illustrate some renewable energy experimental facts and figures where the nation can produce electricity through renewable energy sources which are sustainable to the environment. The average value for wind electricity generation of Nigeria was 0 billion kWh with a minimum of 0 billion kWh and a maximum of 0 billion kWh from 2012-2019. The results clearly show that Nigeria is not generating electricity from the source of wind at all (Quaschnig, 2019).

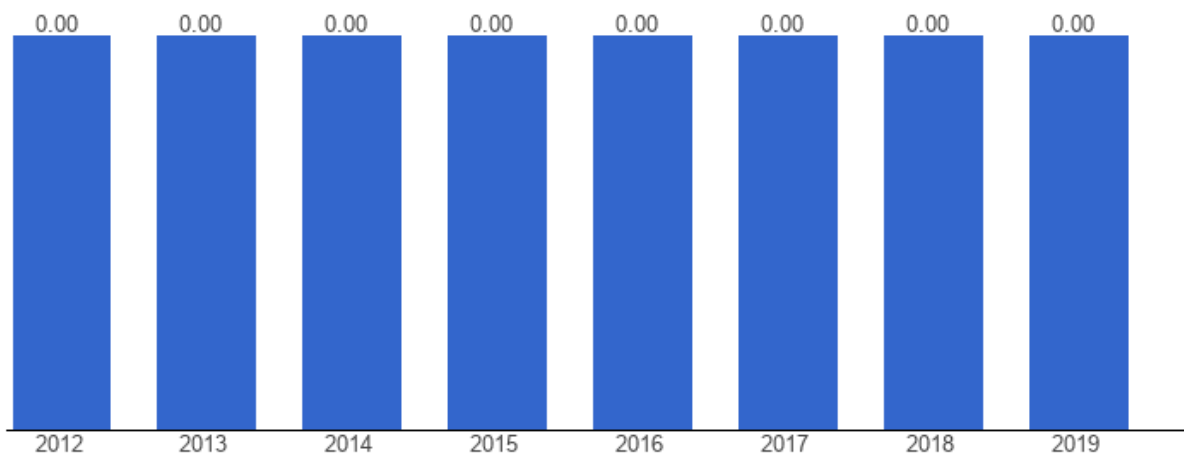
Nigeria: Hydroelectricity generation



Source; (Global Economy, 2021)

The average value for hydropower electricity generation of Nigeria was 0 billion kWh with a minimum of 0 billion kWh and a maximum of 0 billion kWh from 2012-2019. The results clearly show that Nigeria is not generating electricity from the source of hydropower plants at all. However, Nigeria has taken a major step in the year 2020 where the country hydroelectricity net generation was 0.53 billion kWh, increased from 0 billion kWh from the previous years with a change of 53% (Owusu, and Asumadu-Sarkodie, 2016).

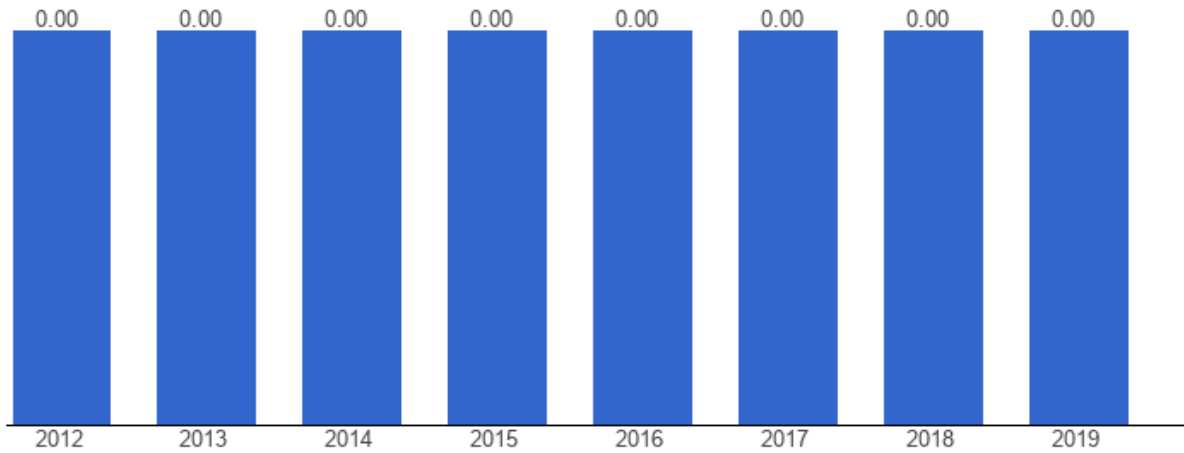
. Nigeria: Solar electricity generation



Source; (Global Economy, 2021)

The average value for solar power electricity generation of Nigeria was 0 billion kWh with a minimum of 0 billion kWh and a maximum of 0 billion kWh from 2012-2019. The results clearly show that Nigeria is not generating electricity from the source of solar plants at all which is also explained by the below chart in representing solar portions in electricity generations. However, Nigeria has taken a major step in the year 2020 where the country solar generation was 0.25 billion kWh, increased from 0 billion kWh from the previous years with a change of 25% (Lin, and Zhu, 2019).

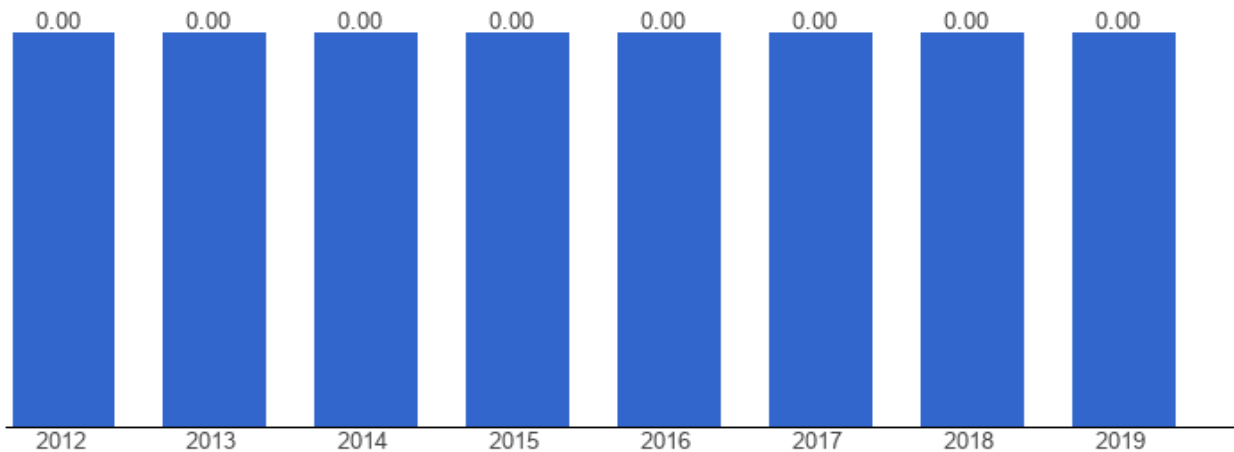
Nigeria: Nuclear power generation



Source; (Global Economy, 2021)

The average value for nuclear power electricity generation of Nigeria was 0 billion kWh with a minimum of 0 billion kWh and a maximum of 0 billion kWh from 2012-2019. The results clearly show that Nigeria is not generating electricity from the source of nuclear power plants at all which is also explained by the below chart in representing nuclear power share in electricity generations. However, Nigeria has taken a major step in the year 2020 where the country solar generation was 0.10 billion kWh, increased from 0 billion kWh from the previous years with a change of 10% (Elum, Momodu, 2017).

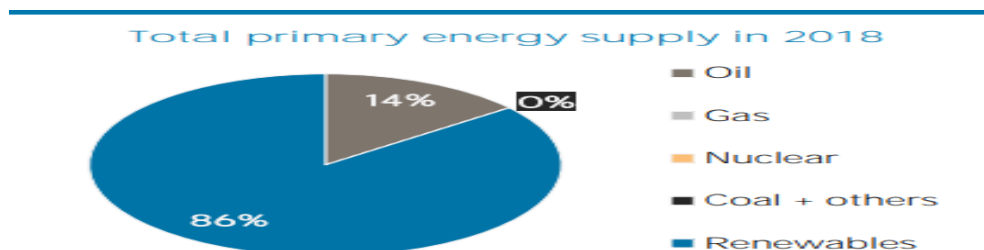
Nigeria: Geothermal electricity generation



Source; (Global Economy, 2021)

The average value for geothermal electricity generation of Nigeria was 0 billion kWh with a minimum of 0 billion kWh and a maximum of 0 billion kWh from 2012-2019. The results clearly show that Nigeria is not generating electricity from the source of Geothermal energy completely where heat is produced within the earth and people use this heat for bathing and generating electricity. Similarly, the country is not taking major steps towards its geothermal capacity utilization. Approximately, 21% of the total production of electricity in Nigeria came from renewable energy sources in 2010. However, the figures are continuously decreasing from onwards. The country has future potential to produce electricity through wind, solar, and hydroelectricity energy sources. However, the country intended to produce 70% of the national electricity by renewable resources till 2030 (Asutosh, et al., 2020).

Energy Supply



Source; (Irena, 2021)

The above chart shows that Nigeria total primary energy supply was Renewable by 86% followed by oil with 14% in 2018. However, other sources are negligible in their effects.

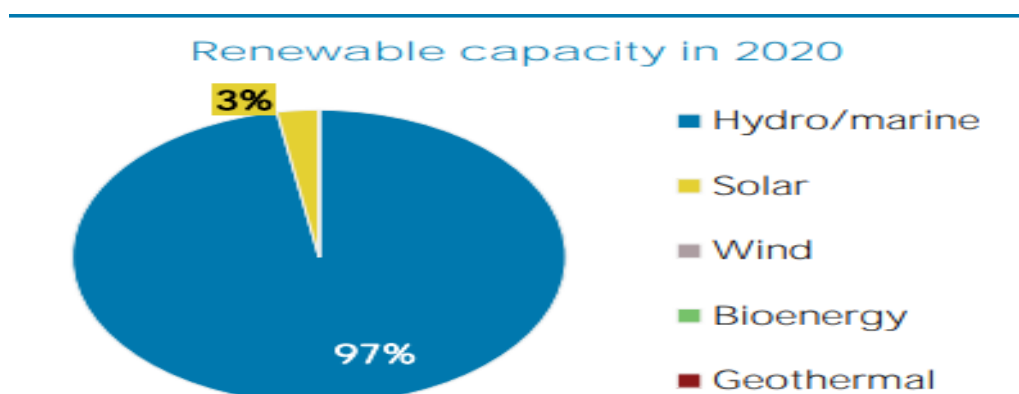
Electricity Generation by Sources

Generation in 2019	GWh	%
Non-renewable	98	43
Renewable	128	57
Hydro and marine	124	55
Solar	4	0
Wind	0	0
Bioenergy	0	0
Geothermal	0	0
TOTAL	226	100

Source; (Irena, 2021)

The above table shows the breakdown of energy generation through renewable and non-renewable sources in 2019 where the results indicate that Nigeria was generating enough renewable resources through hydro and marine power plants with 57% following that the figure of solar power with just 2% and non-renewable resource with 43%. So, the share of renewable energy is slightly high as compared to non-renewable energy sources (Gerhardt, 2017).

The renewable energy capacity of Nigeria



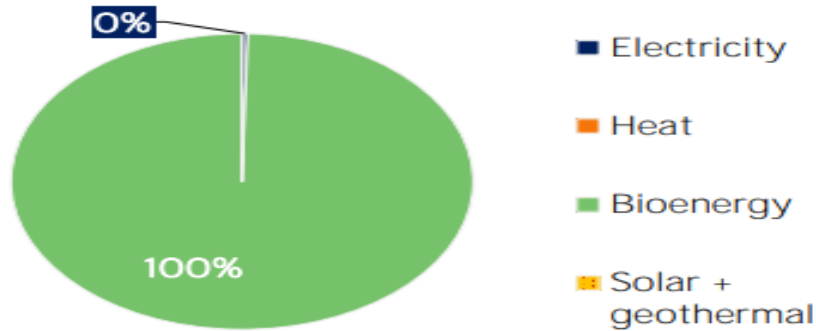
Source; (Irena, 2021)

The above chart shows the future trend analysis of Nigeria potential in generating electricity from renewable resources. The country had significant Hydro/marine future renewable capacity potentials in 2020 which is also justified by the above charts that the country is taking sustainable steps towards generating electricity through

renewable sources in 2020. The country has currently hydroelectric potentials namely Cavalla River, Cestos, Lofa and ManoSt John River, and St Paul river which is conducive for hydroelectricity development. The results show that Nigeria could export electricity if the country hydro potentials are substantially utilized (Fräss-Ehrfeld, 2009).

Renewable energy consumption of Nigeria

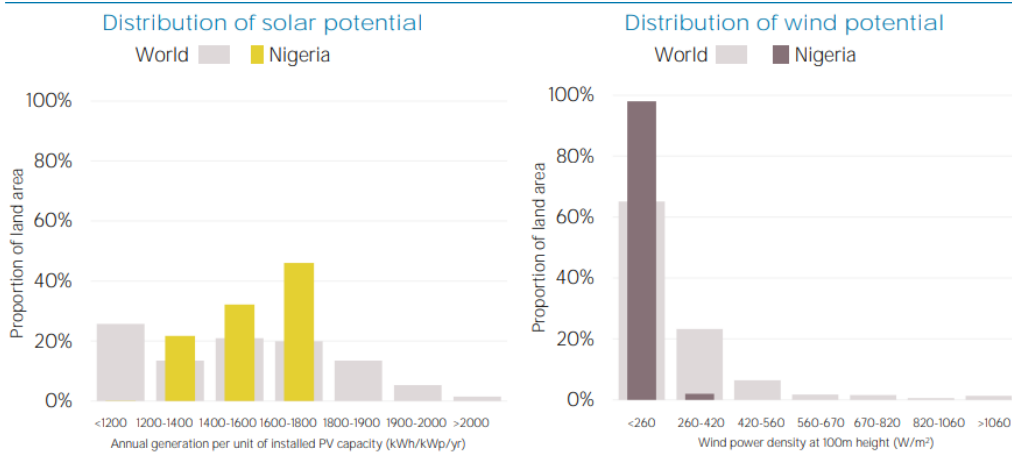
Renewable energy consumption in 2018



Source; (Irena, 2021)

Nigeria is blessed with a large variety of biomass natural resources which is believed to be higher than to assist country electricity requirements if produced. Around 85% of recent energy consumptions in the region of Nigerian coal is charcoal and 9% of firewood. Where the locality consumes up to 90% firewood and around 9% charcoal as the form of fuel for heating, cooling and drying. However, other sources include heat, solar and geothermal were lacking in the nation in 2018.

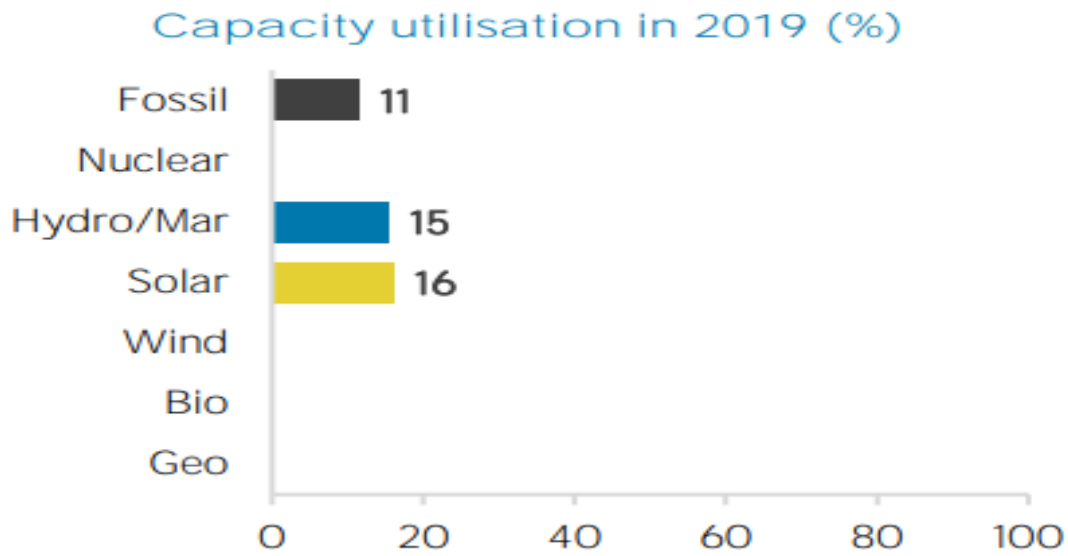
Renewable Resource Potential



Source; (Irena, 2021)

The above graphical representation shows that it is very limited or we can say no potential for wind energy which could be commercially exploited by Nigeria. Similarly, limited potentials might be existing at some coastal areas where unsystematic data could be accessed on wind energy for future prospective. On the other hand, the country has a strong potential for solar energy as the country is falling at the equatorial belt which is lying between 15 degrees and 15-degree latitudes and receives the second-highest solar radiation on earth per year. The solar energy potential of Nigeria with hydroelectric power could meet the requirement of electricity need if the nation is substantially sustained. Despite having such enormous solar and wind energy potential in Nigeria, limited investment in power investment has been done to produce electricity from solar and wind (Lupu, et al., 2016).

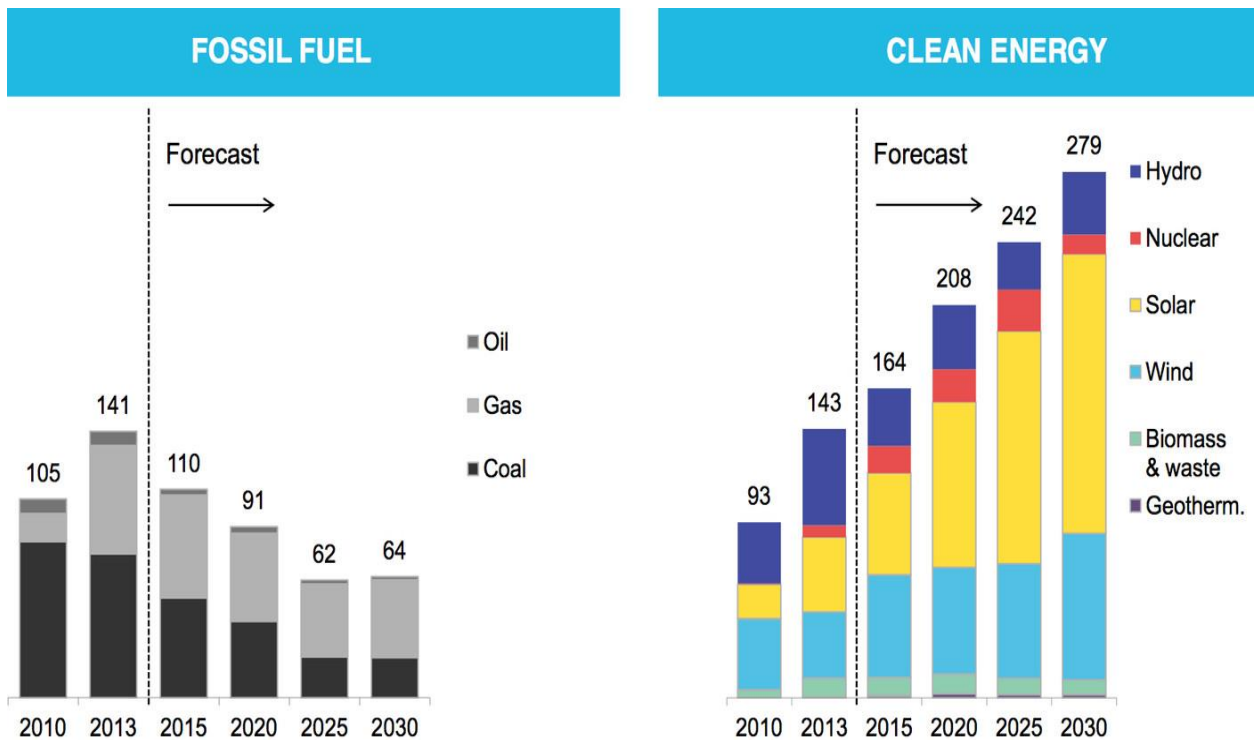
The capacity of Renewable Resource Utilization



Source; (Irena, 2021)

The above chart shows that capacity utilization of solar was being utilized very effectively by renewable resource power industry with around 16% while other Hydro/marine and Fossil fuel also had a high share in capacity utilization by 15% and 11%. The connection between the production of output and the given resources or the potential output which could be manufactured with these resources was moderately utilized. However, the share of wind, bio and geo capacity utilization were not contributed by the renewable resource sector.

Comparison between Renewable energy and Fossil fuel

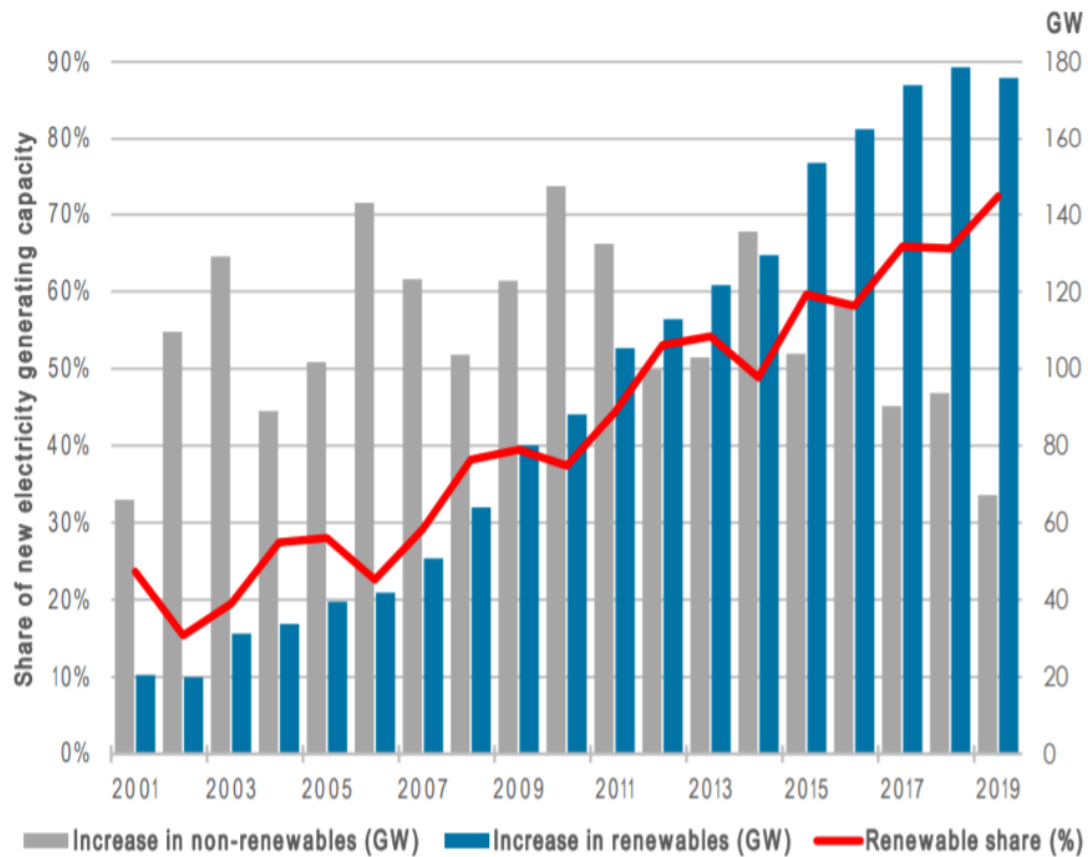


Source; (Irena, 2021)

The chart shows the comparison of electricity generation via fossil fuels and renewable energy where the trend analysis indicates that Nigeria share of fossil fuel usage namely coal was declining followed by gas since 2013 and the figure will be declined further by 2030. However, the usage of renewable resources namely solar was taking the huge lead, followed by wind, biomass, hydro and nuclear. The future trend analysis shows that Nigeria will be utilizing its natural resources mostly solar and wind to produce electricity for future years including 2015-2030 (Pinson,v et al., 2017).

Expansion of Renewable power capacity.

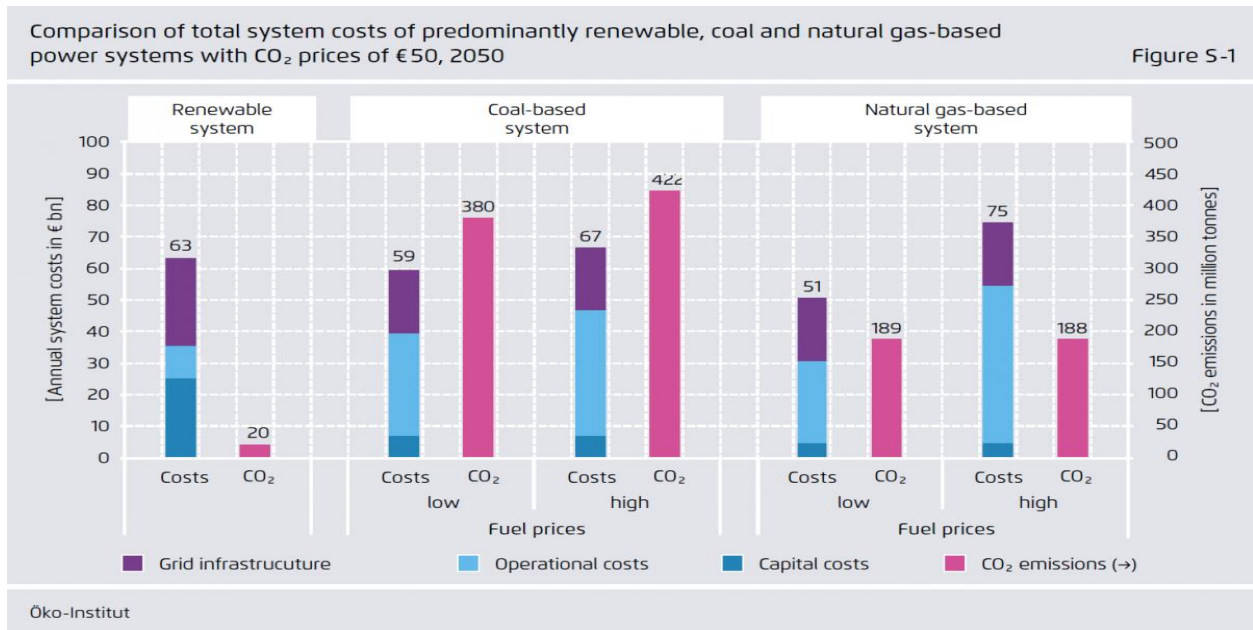
Renewable share of annual power capacity expansion



Source; (Irena, 2021)

The above chart shows the annual power capacity expansion by Nigeria where the data from 2001-2019 shows that increase in non-renewable resources was rapidly increasing and moderately declined with some slight change. However, the data of increase in renewable energy expansion was rapidly increasing since 2001. The percentage share of renewable was continuously taking the lead between renewable and non-renewable resources with lightly decline that justified the Nigerian expansion on renewable resources for the following years (Keleş, and Bilgen, 2012).

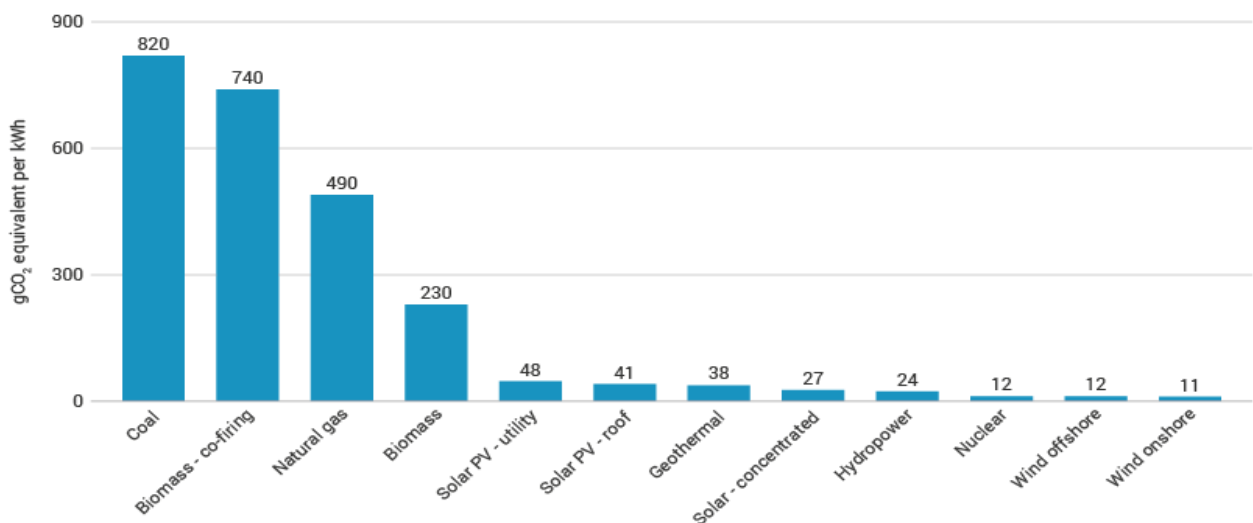
Cost and benefit analysis of Renewable resource and Fossil Fuel



Source; (Oecd, 2021)

The above figures show the comparison analysis of Renewable resources and Fossil fuels concerning benefit and cost analysis for Nigeria where the data clearly shows that renewable system has cost around 6.3 billion which further lead-carbon emissions to lower 20 million tons. The major benefit of using renewable energy is lower operational cost. Similarly, Coal based systems have cost around 59 and 67 billion and the highest carbon emissions by 380 and 422 in the low and high fuel prices. The major benefit of using a coal-based system is lower capital cost but the major disadvantage of using this source is the increasing cost of operations and carbon emissions. However, using a natural based gas system which also has similar evidence as to the cost of operations and carbon emissions increased. The benefit and cost analysis of renewable sources with coal-based systems and the natural gas system indicates that the benefit of utilizing renewable resources are the highest and drawbacks are lowest concerning other sources (Gerhardt, 2017).

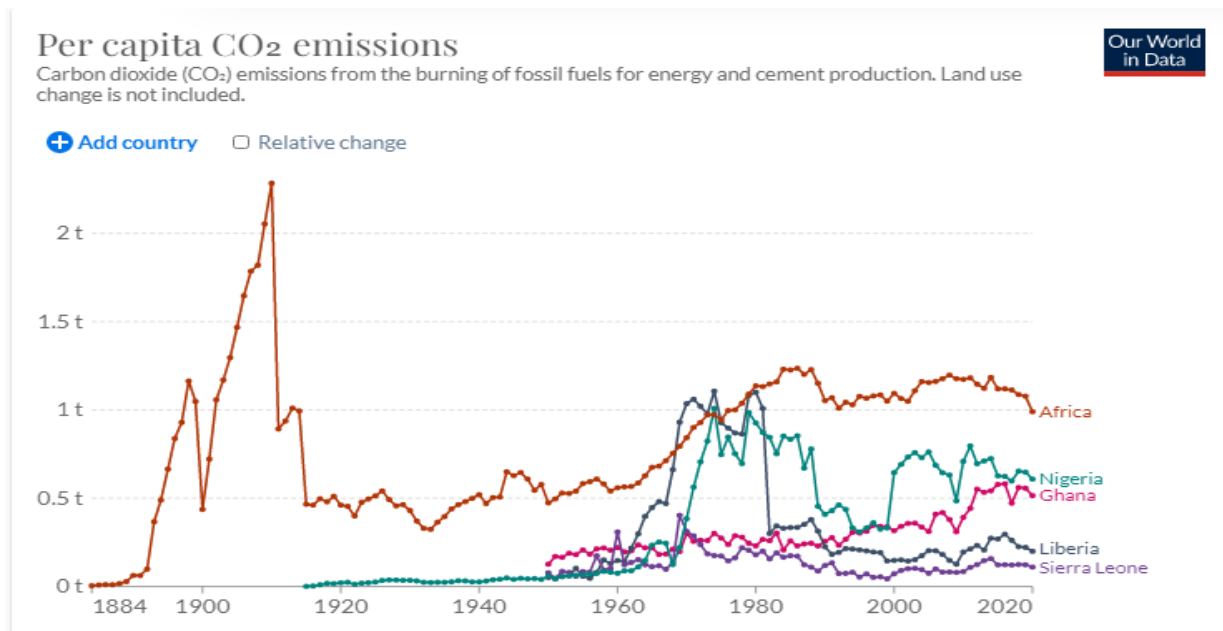
Carbon Intensity of Electricity Generations



Source; (Oecd, 2021)

The above chart shows the carbon intensity of electricity generations from different sources where the results indicate that the usage of Coal, oil and natural gas is contributing more carbon emissions to the environment with comparison to Solar power, Geothermal, Solar CSP, Biomass, Nuclear, Wind, Ocean and Hydro. Similarly, the results show that to keep decarbonisation requires keeping global temperature below around 1.5 degrees centigrade, which will help the economy to combat climate change with the increasing role of nuclear power as the source of renewable energy nuclear is reliable and may be exploited at a larger scale. Nuclear power could be replaced by the plant of fossil fuel easily without the need for fossil fuel combustion for electricity generation. The energy of nuclear utilization avoids carbon emissions around to removing 1/3rd of the global car off the road (Paun, and Paun, 2017).

CO2 emissions per capital



Source; (Oecd, 2021)

The above graph shows the comparative analysis of carbon emission per capital of Nigeria with Africa as a whole, Nigeria, Ghana and Sierra Leone. The results show that the carbon emission of Nigeria was continuously rising from 1950-1980 but later the figure was declined rapidly for the following years. However, the carbon emissions of the continent of Africa as a whole was dramatically increased from 1960 and declined since 2019. Similarly, Nigeria carbon emissions per capita is the highest contribution of Carbon footprint followed by Ghana which also contributes to rising carbon emissions. The countries namely Nigeria, Ghana, Nigeria and Sierra Leone made up the whole of Africa which accounts for only 2%-3% of the global carbon dioxide emissions from industrial and energy sectors. However, the population share of Africa is just only 16% of the world. However, the temperature was expected to increase 2 times higher than the rest of the globe by the end of the 21st century. Nigeria see shorter wet spells which leading to droughts and floodings, directing food production reduction as the nation is lacking infrastructural support (Hohmeyer, 1992).

Discussions on Findings

The findings from past studies (Akuru et al., 2013; Pinson et al., 2017; Sims, 2004) reveal that different countries have different temperatures and climates and those practices of humans cause global warming (GW). GW is used and referred to as an average increase of global temperature. Approximately 97 per cent of published research on CC indicated that the only dominant reason for GW is humans' activities since the 20th century. In Pre-industrial time the concentration of dioxide was only 280 parts per million (ppm) and it became 413 ppm in the first part of the 20th century and the rate is persistently increasing till now, so scientists recommended that to stabilize GW, the rate should be 350 ppm, and this will happen when humans start working on green environment practices. In addition, the past studies (Aguirre, and Ibikunle, 2014) have also confirmed that indirect impacts of climate change

(CC) on human health occurs because of the consequences of pollution in the environment, increase in sea level and sudden weather changes that decreased of quality of water which elevated the diseases of waterborne animals. The findings also confirm that economic development is affected and the public health issues are rising due to CC. The situation is the same in Nigeria, as the country is facing health and economic issues caused by the CC and GW. In 2019, almost 81 percent of primary energy's means in the world were fossil fuels, which include natural gas, coal, oil and others. Such resources increased the usage of carbon gas in the environment and continuously elevated demands and usage of such fossil fuels became the cause of the boost in the global temperature. Another study by -- confirmed that GW affected different countries and it has negative consequences on human health. From last century, 0.6°C per year temperature elevates in southeast Utah, 2.0°C in Alaska, and 1.0°C increases in Nebraska like that different countries have consequences of GW. In Asia, it is forecasted that by 2050 the availability of freshwater will decline because of pollution in the environment and industrial elements.

Likewise, the findings of (Sims, et al., 2003) confirm that Mozambique, Zimbabwe and the Bahamas, these countries influenced because of extreme weather in 2019. Different weather events also had an impact on Puerto Rico, Myanmar, and Haiti and about 475,000 people died and resulting in a heavy loss of almost \$2.56trillion between 2000-2019. In 2019, due to storms, floods and landslides, different countries were affected and faced economic, environmental and social losses. Countries like Haiti and the Philippines have been affected due to extreme weather conditions and one major cause was catastrophic events like a sudden increase in floods, storms or others which had dramatically huge impacts on these countries.

The findings of another study (Pathak, and Shah, 2019) confirm that in Canada and various parts of the United States, heatwaves intensified and temperatures reached 50 ° C. In California, temperatures in Death Valley also reached 54 ° C due to heatwaves in the southwestern United States. Another fact and figure is that due to heavy rains in China and Europe, hundreds of lives of different people caused flooding. And the mighty flow of rivers hit agriculture and reduced food production in the subtropical countries of South America. In conclusion, all countries are independent, if one of them suffers, it will affect the others. For example, the preliminary CC 2021 status report states that, following negotiations, the union will analyze and develop various strategies to reduce greenhouse gas emissions, extreme weather conditions, sea level, ocean warming and other issues. As in 2015, Sweden aims to become a fossil fuel-free country by 2040, and the country is increasing investments in solar, wind and hydropower to reduce its carbon emissions. Costa Rica, which has received almost 95 percent of its renewable energy in the past 4 years from solar, wind, hydro and geothermal energy. Nicaragua has achieved 90 percent renewable energy from a variety of sources and has set itself the goal of getting rid of carbon emissions. Scotland generates 98 percent of its electricity from wind sources, and Germany has set a target to produce 65 percent of its energy by 2030. China is also working on renewable energy sources and has set a target of 35 percent by 2030. Thus, all countries are working on renewable energy sources for the production of electricity and other energy from renewable energy sources, because GW has a huge negative impact on the world as a whole (Bilgen, et al., 2004).

The growing demand for energy around the world, together with the general population, has led to the reuse of fossil fuel-based energy sources (gas and coal, oil), which is exacerbated by many problems, such as decreasing reserves of fossil fuels (Foster et al., 2017), greenhouse gas emissions and other atmospheric problems. , military and geopolitical battles, as well as repeated variations of the fuel fund. This problem will lead to the impossibility of support, which will ultimately lead to a possible permanent threat to human civilizations (UNFCC, 2015). Nevertheless, renewable energy sources are the most unresolved and the only answer to the problem posed (Proskuryakova, Ermolenko, 2019). In 2012, renewables account for 22 percent of the global energy cohort (US Energy Information Administration, 2012), which is hardly the case before. Despite the unrealized benefits of renewables, there is a disadvantage, such as cyclical cohort rupture, as most renewables are climate dependent, so misuse requires complex strategies, organisation and capacity optimization. Fortunately, current technology loans in computer software and hardware provide technical advice to address these optimization problems using computing resources suitable for sustainable and renewable energy (Pinson, et al., 2017).

According to EIA (2013), the OECD European republics have pledged to cut their carbon emissions by 20 percent by 2020 and by 80-95 percent by 2050. To achieve this goal, the combination of RES in the energy matrix was called fundamental (Foster et al., 2017) due to the fact that it is a home energy tool than traditional carbon dioxide emissions. According to a 2017 report submitted by the Global Renewable Energy Agency, the combined energy competence and international renewable energy production can reach emission levels to keep a polluted world at 2 degrees Celsius, thereby obscuring the very core aspects of CC. The cumulative level of CO₂ emissions has caused

serious concern around the world in the context of political parties and civilization in general. The Latin American (LAM) republics have seen significant increases in carbon dioxide emissions, which have more than declined over the past three decades, for example, in 2010, this area accounted for about 11 percent of global greenhouse gas emissions. Despite the ongoing recovery, the LAM region is a small donor of the global greenhouse gas (Martins, et al., 2018), but still needs to be actively involved in the fight against CC. The influence of RES rules on carbon dioxide emissions has practically not been found in the literature. Renewable energy regulation is divided into seven policy areas, namely: (i) carbon taxes, (ii) incentive funds (FIT), (iii) optimal costs, (iv) quota systems, (v) auctions, (vi) quota systems; and (vii) skill systems (Pinson, et al., 2017).

The findings of (Owusu, and Asumadu-Sarkodie, 2016) reveal that since 2015, savings in developing countries across all renewable energy bases, with the exception of hydropower, have consistently exceeded those in industrialized countries. China, which is still growing and home to one-fifth of the world's population, will play an important role in the global drive to dramatically reduce carbon emissions.

The goals of the Paris Treaty may apply to China or diminish with it, both because of its influence and because it will become an example for a growing world. China's role in reducing carbon emissions discusses China's projections of achieving fundamental carbon savings in the context of the current political and economic environment. Focusing on technologies such as control of the year, solar control and electric vehicles, Toke explores how China is moving towards national sustainable energy use with a powerful, low-cost asset based on non-fossil energy services. The book argues that under normal conditions, China could cut its carbon emissions by about two-thirds by 2050. The findings also suggest that the demands to reduce carbon dioxide emissions from other activities and energy production have become an accepted addition to the new winds. The same is true for a significant portion of the carbon-free renewable energy sources for electricity generation, the cumulative mechanisms of the world's energy production systems. Renewable energies are part of energy donations that can further reduce carbon emissions in the future (Ouyang, and Lin, 2014).

To bring the country's cumulative share of non-fossil energy sources to 15 percent by 2020, the Chinese government installed 63 new boards as part of its Twelfth Five Winds program for China's nuclear and renewable energy growth in 2015. As before, the new assessment program also highlights the 65 objectives of the energy substructure. The energy situation in China is also driven by an acute need⁶⁶ for oil, 76.5 percent of the primary energy consumed in the country in 2012⁶⁷ was oil (8.9 percent of natural gas (4.3 percent and nuclear / hydropower (9.1 percent) (China Energy Statistical Yearbook 68, 2013) (Droege, 2002). Correct social energy prices include not only the means that are reproduced in the market conversation, but also other indirect and direct non-market benefits and costs (externalities) associated with the receipt, modification, procedure and use of this energy. International heating, acid pollution, groundwater leaching and personal belongings are now some of the atmospheric prices associated with working fossil fuels that are not replicated in their market funds. Modern schemes for the use of renewable energy sources have the technical ability to provide all the world's energy facilities with a reliable method and with little or almost zero greenhouse gas emissions. In terms of global electricity production, coal will account for the largest share at 38 percent, renewables (mainly hydropower) at 20 percent, nuclear power at 17 percent, conventional gas at 16 percent and oil at 9 percent. But standard specific carbon emissions will decrease slightly over time due to the use of first-hand technologies with better opportunities for change. New renewable energy sources were sharply limited during the 1990s, averaging 21 percent year on year for solar and wind photovoltaic installations and 30 percent for wind. Geothermal energy and biomass schemes are also under development (Leonard et al., 2020).

The findings prove that (Elum, and Momodu, 2017) the largest share of recoverable carbon dioxide emissions comes from hydropower - 82 percent, wind and biomass - 7 and 8 percent, respectively. Potential investment across the BRICS and OECD countries is uneven, according to an IEA study ppm condition (5.8 GT). The number (10) shows the offsetting of carbon dioxide emissions in the environment WEO 450 compared to the situation without renewable energy sources in 2030. An important point of view is that the largest investments in carbon dioxide are concentrated in the OECD countries, China. According to the IEA plan, investments in carbon dioxide in China at 450 ppm will be 2.2 Gt, which is 64 percent of the total savings of the economy and the BRICS countries (Pathak, and Shah, 2019). (Asutosh, et al., 2020) also confirm that the United States provided a 17 percent cut. ⁶ This sounds very similar to the current time in the EU, except that the US uses 2005 as the base time, which distorts the volume of CO₂ emissions reductions. Compared to the 1990 baseline, the US presence has declined by a paltry 3-4 percent. Bypassing the Electricity Supply Act in 1990, Germany adopted a policy of early implementation by the

government. Based on the relationship, 25 years later, the rest of the United States does not have such a national rule, and there are not many national rules (Bilgen, et al., 2004). The early authorization resources that the German industry RNE seeks in the form of a government loan and financial support from a specific federal electricity buyer created by consumers for over 25 years. During the passage of the Electricity Law, Germany gave incentives in the form of funding and an income tax to support air, hydropower and bioenergy at an early stage. Hence, the developed exploitation of the opportunities and the subsequent incorporation of the establishment of the RNE is part of a wider development, from a decentralized to a centralized energy production system in the state. This decentralization process shows that when Denmark had an incomplete number of relatively large power plants during the 1980s and 1990s, the creation of the energy landscape developed rapidly using distributed generation capabilities, more recently solar panels, including wind turbines but also joined the CHP (Proskuryakova, Ermolenko, 2019).

Conclusion and Recommendations

Conclusion

Based on rigorous analysis of past studies, it is concluded that Climate Change (CC) has/and is affecting Nigeria, in particular, and it has direct and indirect impacts on human health and projected that it will continue to change. The direct change of climate had dramatically huge impacts on each living organism in Nigeria, which include animals, humans, and plants. This is due to rising temperatures which increase respiratory ailments in humans and the increased frequency of storms which became the cause of serious injury, death and psychological disorder in Nigeria. In addition, the location of Nigeria is in the centre of the Upper Guinea Rainforest region along the West Coast of Africa and it suffers from heavy rainfall and changes in climate along with increases in temperature because of Global Warming (GW). So, CC and GW are serious issues for Nigeria because rainfall and changes in climate affect the agriculture sector of the country.

The Government of Nigeria is continuously working on various means of energy such as Hydropower, wind, and other (renewable energy sources). With the help of a rule-based method, it is recognized that energy competence and the addition of renewable energy into a receptive network would brand atmospheric and economic atmospheric advantages to businesses and households. RNE deployment has been gaining momentum in recent years. In most situations, increasing the distribution of renewable energy in the energy supply will require regulations motivating changes in the energy supply. Government policies, price cuts for some renewable energy technologies, changes in the cost of fossil fuels and many other problems have contributed to the steady increase in the use of renewable energy sources.

While the carbon dioxide emissions in the capital of Nigeria in 2011-2018 and 1960-2018 from two different sources for reliability analysis. Current data show that the national average during this period was 0.42 metric tons, less than 0.14 metric tons in 1960 and over 1.11 metric tons in 1974. Carbon emissions from fossil fuels in Nigeria amounted to 846658 tons per year. 2016. However, in previous years, this figure increased by 3.49 per cent, which is 28,527 tons more than in 2015, when carbon dioxide emissions were 818,131 tons. Per capita carbon emissions were equivalent to 0.18 per person for a population of 4, 586,787 in 2016, unchanged to 0.18 per person in 2015, corresponding to a 0.9 percent change in carbon dioxide emissions per capital. In Nigeria, electricity consumption is based on two dimensions: electricity is consumed by production and consumed by people.

The total electricity consumption was 279 million kilowatt-hours per year, and per capital an average of 55 kWh, which means that Nigeria fully supplies the country with its own electricity. The total production of electricity is 300 million kWh, which is 108 own needs of a person. The rest of the energy is either exported to other countries or is obsolete or unused. In addition to its own consumption of electricity, exports and imports play a decisive role in Nigeria.

The energy sources used by the Nigerian nation are fossil fuels - 753.97 million, nuclear energy - 0.00 kilowatt-hours, hydropower - 568.79 million kWh, renewable energy - 0.00, however, the total production capacity of Nigeria is 1.32 billion kWh, but it produces 300 million kWh of electricity.

The largest share of the energy source used by Nigeria is 70 percent fossil fuels, followed by hydropower at 14 percent, which means that the Nigerian nation relies heavily on fossil fuels to meet its energy needs, further

degrading the environment and hinders sustainable development. Nigeria possesses a wide range of natural biomass resources, the amount of which is believed to be higher than to meet the country's electricity needs, if produced. About 85 percent of energy consumption in the Nigerian coal region recently comes from charcoal and 9 percent of firewood, with about 90 percent of wood and about 9 percent of charcoal being used for heating, cooling and drying. In addition, the carbon intensity of electricity generation from various sources, the results of which show that the use of coal, oil and natural gas contributes to more carbon emissions into the environment compared to solar energy, geothermal energy, solar energy, biomass, nuclear energy and hydro. Likewise, the results show that to maintain decarbonisation, global temperatures must be kept below 1.5 degrees Celsius, which will help the economy combat carbon emissions with the growing role of nuclear power as a nuclear renewable energy source that is both reliable and more useful scale.

Recommendations According to Findings

The research of different organisations like Asia Pacific Adaptation Network (APAN), Earthjustice (US), Greenpeace (International), Health and Environmental Alliance (Europe), The Economic Community of West African States (ECOWAS) and others working on CC issues suggest for adopting renewable energy sources to reduce GW.

The strategies on environmental change should facilitate decision-making at the surrounding, provincial and community levels in Nigeria. While making decisions about how to respond to environmental changes essentially involves qualities, morals, and trade-offs, science can shed light on those choices and guide them. Science can help discern potential game plans, assess the benefits and challenges of different solutions (calculating trade-offs, invisible side effects, and co-benefits of different options), stimulate new choices, and continue to develop available options. It can also help improve new, more powerful dynamic loops and devices. Achieving these goals requires smart cycles involving two researchers and a leader to recognise points of inquiry and develop methods to link logical exploration with navigation. Dynamic dialogue with partners at district, provincial, community and global levels can similarly enhance the usefulness, validity and support of logical research.

The policies on environmental change must be flexible, ready to respond to changing information needs, and amplify a multidimensional threat to governance and repetitive decision-making in Nigeria. Indeed, even if the logic continues, future projections will always include multiple vulnerabilities. In addition, in light of the fact that environmental change is associated with so many options for assets and structures, from a power plant plan to a reduction in construction time, it is necessary to create and implement responses to environmental changes, taking into account the constantly changing conditions. In addition, as steps are taken to limit and adapt to future environmental changes, leaders need to understand and consider the viability and potential negative outcomes of these activities. As a direct consequence of these complexities and vulnerabilities, all responses to environmental change, including the coming era of logical research, will require focused learning by doing.

A thorough and comprehensive review of environmental change and warming in Nigeria should be undertaken. A thorough and far-reaching survey should be used to identify existing and organised observational resources and to determine the basic needs for environmental validation and assessment. A commentary framework methodology for modern environmental change research should take into account not only existing and ordered resources, which have generally been created without significant management input, but also the views that are expected to contribute to a sustainable response to change environment. In considering available assets and sources of information, government projects should work with partners around the world to identify opportunities for joint energy efforts, use and collaboration with observing systems in different countries.

Recommendations for Further Research

Research on environmental change in Nigeria must be comprehensive and interdisciplinary. Achieving better harmonisation of examinations will require a critical expansion of interdisciplinary scientific constraints among researchers, administrators and policymakers. This will require changes in society within and between different institutions, including colleges, government, the private sector, research foundations, experienced community organisations, and other non-governmental associations, including the National Research Council. It will also require the creation of new businesses to carry out the necessary research at the right scale and in the right contact with leaders.

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As I laid out my first academic write-out (article), I graciously stand in gratitude to every one of you in a singular voice to say, salute.

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