CHAPTER THIRTEEN

Solar Energy Potentials in Nigeria: An Alternative to Solving Nigeria Electricity Challenges at COVID-19

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Abstract

Nigeria as a developing country is experiencing a downward trend in economy, efficiency in production and competitiveness as a result of unreliable, poor and high costs of electricity supply, despite the fact that the country is blessed with both conventional and renewable energy resources. Nigeria being the largest country in Africa still suffers the lowest consumption rates of electricity per capita. In addition to this, the country's electricity generation is far below the demand even as at this period of COVID-19. It is however noted that the over dependent of fossil fuels has resulted in the country inability to exploit her huge natural renewable energy resources like solar energy. Solar energy in Nigeria is the most promising renewable energy resources as it remains apparently cheap and abundant. This paper presents solar energy potentials in Nigeria as an alternative to solving the country's electricity challenges. The existing government policies on energy that encourages solar energy generation were articulated. Solar energy is more reliable and efficient when resolving the electricity challenges through the use of battery storage technology. Batteries and Solar Power configuration for residential applications and small profitable consumers were also discussed. Recommendations that will improve Nigeria economic growth through the supply of cheap and reliable source of energy were made.

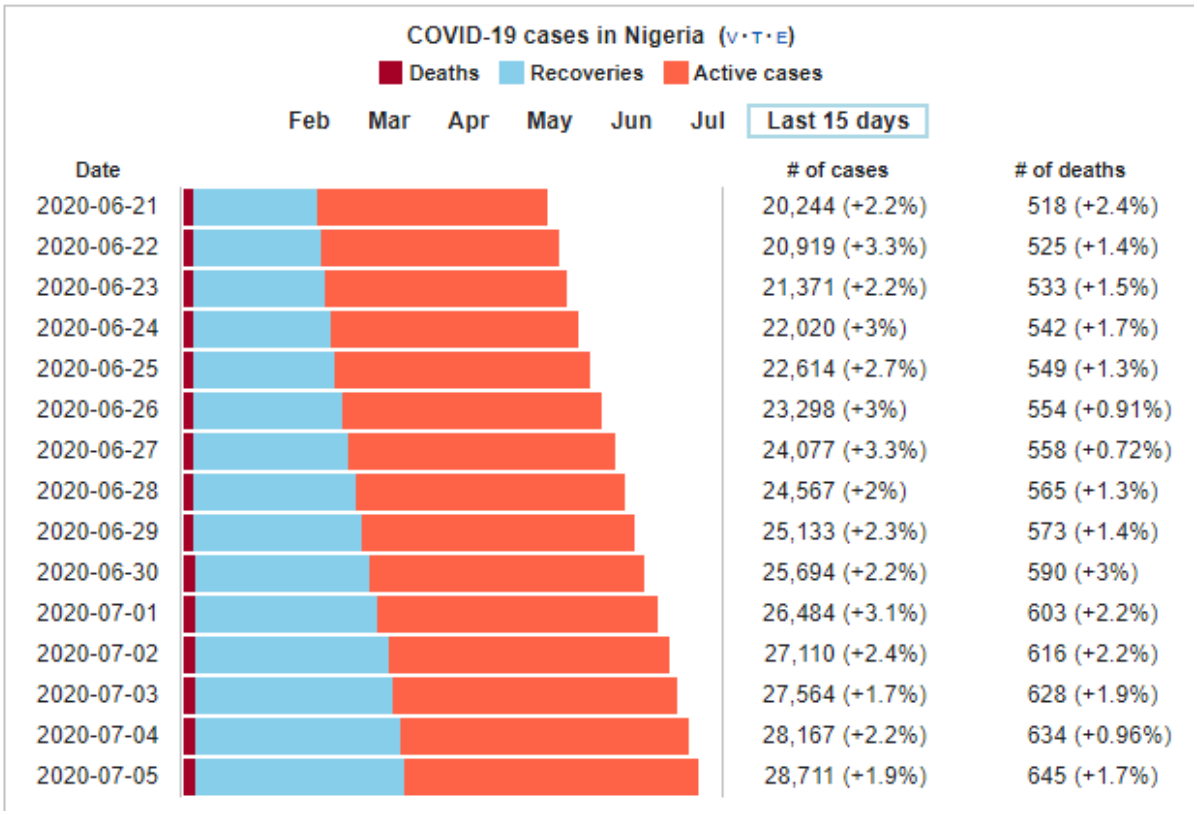
Keywords: COVID-19, Electricity Challenges, Solar energy, Energy, Potentials

COVID-19 PANDEMIC: THE PENDULUM FOR RECONSTRUCTION OF INSTRUCTIONAL SYSTEM IN NIGERIA

Introduction

Electricity supply that is steady and satisfactory when used, promotes high standard of human living and improved economy growth. A nation whose energy needs fall below reliability, stands a chance of not developing or experiencing slow in development. With the fast development of Technologies, electricity still remains one of the major sources of any nation development. Electricity is an engine that energizes the economic development process of every country. Any nation looking forward for development will not ignore the power sector with a more focus on renewable energy (Obanor, 2015). As practically shown in the existing world today, the application of electricity in various ways as a preferred form of energy is widely recorded. For residence, electricity is applicable for domestic lighting, heating, cooling, and refrigeration and for operating appliances, computers, electronics purposes, in the industries; it determines the functionality of several machines, equipment and processes. While for the commercial consumers, it delivers services, operating power for various devices and public transportation systems. One general visible development is that the more any country's population the more the demand in electricity (Oyedepo, 2012).

In Nigeria, the efficiency in the production and competitiveness is badly affected as a result of unreliable, poor and high costs of electricity supply. Nigeria has six Geo-Political Zones with a total of 923,768 sq. km of which 98.6% of total area is land (Sambo et al., 2010). Nigeria is blessed with the capacity of producing per day of about 2.5 million barrels crude oil and widest imaginable range of energy resources (coal, natural gas, petroleum, solar, hydro, geothermal, nuclear) standing as sources of generation of electricity. Yet, with all the endowments, many of its citizens still lack electricity as a result of energy resources lack of exploit or mismanagement. Nigeria is known to be one of the most populated countries among others in Africa and just about 40% of the people are linked to the national energy grid. The few people who are actually connected, experience difficulties with poor electricity supply (Aliyu et al., 2015). As a result, most Nigerians now power their homes, hospitals and businesses using generators which is not environmentally friendly as energy demand in the country is on the rise and also putting many Nigerians technically in poverty in this period of COVID-19. The coronavirus disease 2019 (COVID-19) pandemic present in Nigeria is part of the worldwide pandemic with medical science attributing it to be caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The first confirmed case in Nigeria was announced on 27 February 2020, when an Italian citizen that came into Lagos tested positive for the virus (Maclean & Dahir, Abdi, 2020). According to the latest figures published Tuesday 7 July, 2020 by John Hopkins University, 11,579,837 cases have been recorded worldwide, showing 536,814 deaths and 6,269,860 people recovered. Nigeria records 28,711 cases and 645 deaths cases as a result of existing chronic medical conditions, old age, and failure to report at the hospital for medical attention. The figure 1 below shows the death, recoveries and active cases of COVID-19 in Nigeria as indicated.



Date	# of cases	# of deaths
2020-06-21	20,244 (+2.2%)	518 (+2.4%)
2020-06-22	20,919 (+3.3%)	525 (+1.4%)
2020-06-23	21,371 (+2.2%)	533 (+1.5%)
2020-06-24	22,020 (+3%)	542 (+1.7%)
2020-06-25	22,614 (+2.7%)	549 (+1.3%)
2020-06-26	23,298 (+3%)	554 (+0.91%)
2020-06-27	24,077 (+3.3%)	558 (+0.72%)
2020-06-28	24,567 (+2%)	565 (+1.3%)
2020-06-29	25,133 (+2.3%)	573 (+1.4%)
2020-06-30	25,694 (+2.2%)	590 (+3%)
2020-07-01	26,484 (+3.1%)	603 (+2.2%)
2020-07-02	27,110 (+2.4%)	616 (+2.2%)
2020-07-03	27,564 (+1.7%)	628 (+1.9%)
2020-07-04	28,167 (+2.2%)	634 (+0.96%)
2020-07-05	28,711 (+1.9%)	645 (+1.7%)

Figure 1. Death, Recoveries and Active cases in Nigeria (Oyero,2020)

The treatment of the virus in all the hospitals approved by the Nigeria Centre for Disease Control (NCDC) requires constant electricity but most rural dwellers in Nigeria are still complaining of poor electricity. A technical approach to tackle the issue of poor electricity challenges in Nigeria requires overview of the power sector by revisiting other energy resources that are carbon emission free. This gap can only be filled with a total implementation of renewable and clean energy. Renewable energy resources like the solar will be an alternative energy source in Nigeria as the country is blessed with fairly sunny weather, especially the northern area of the country that can promote solar energy generation to complement the utilisation of the available fossil fuels. Solar energy in Nigeria is the most promising renewable energy resources as it remains apparently cheap

and abundance. IRENA, (2018) pointed out clearly that, by 2020 onshore wind and solar photo voltaic (PV) cell will be less expensive sources of new electricity than the cheapest fossil fuel alternative as shown in fig. 2 below.

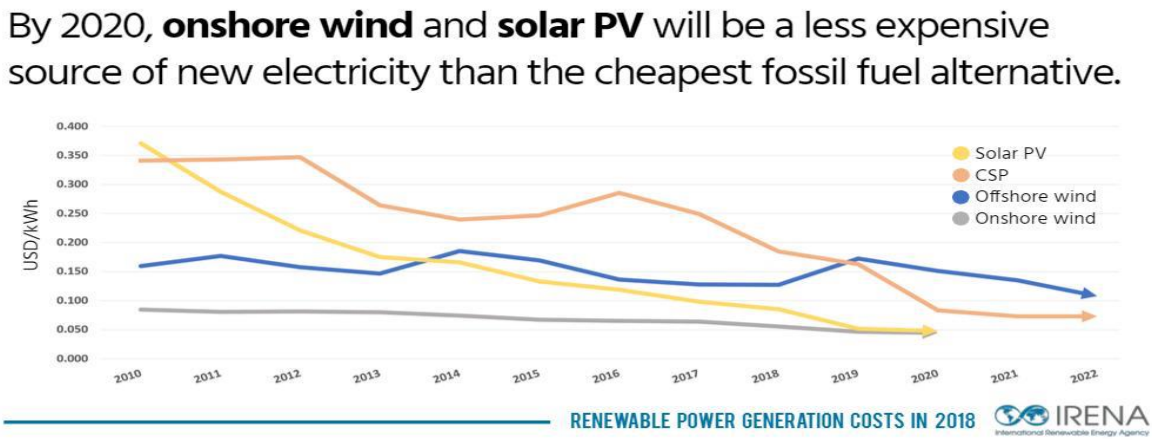


Fig. 2 Renewable Power Generation cost in 2018

Solar has become a very important field or area of study for the past notable years because of the declining fossil fuel reserves and concerns about global warming. The solar energy is generated from the sun through the help of the photovoltaic (PV) cells. Solar energy is by far the most abundant form of renewable energy and has the potential to partially replace fossil fuels. The amount of solar radiation striking our earth's surface is about ten thousand times higher than the current global electrical energy consumption (Shaaban and Petinrin, 2014). The use of photovoltaic (PV) cell is one of the ways to harness solar energy. PV cells convert sunlight directly to electricity which could meet the nation's energy demand. Electrical power produced from photovoltaic solar energy installations used in residential applications that has exhibited momentous development around the world, though, could hardly provide quick response to consumer's demand as a result of the fluctuating nature of the technology but can be more efficient and reliable to meet the needs of consumers if supported by Battery Storage Technology. Every Nigerian can generate their electricity through Photovoltaic cells at day time and stored using the battery storage technologies for efficient use at night.

Battery Energy Technology for storage purposes and as well as their incorporation into the electricity power network have turned out to be progressively vital, particularly within the photovoltaic solar energy installations (Kawakami et al., 2010). Figure 3 shows the images of photovoltaic solar energy installations connected alongside with the batteries and inverter for residential applications.

Figure 3 Photovoltaic solar energy installations connected alongside with the batteries and inverter for residential applications (Ohwofasa, 2018)

Methodology

This is a literature based conceptual paper. The authors reviewed literature on solar energy potential, generation and factors affecting power generation in Nigeria. They however proceeded by stating how the energy generated from solar can be more sustainable with the use of battery storage technology in solving Nigeria electricity challenges. Numerous solar energy policies, objectives and strategies to encourage the exploitation of the solar energy potential are also provided. Figure 4 shows the graphic demonstration of the study workflow. The workflow encompasses: factors affecting the generation of power in Nigeria, solar radiation, battery energy storage, batteries and solar power configuration, energy policy, conclusion and recommendations.

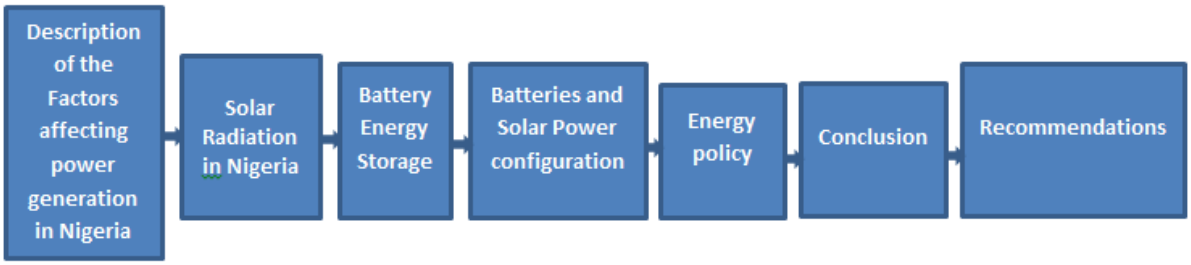


Figure 4 Graphic demonstration of the study workflow

Description of the factors affecting power generation in Nigeria

The problem of lack of adequate electricity supply by the Nigeria public utilities as stated in Table 1 has caused majority of the residential, commercial, institutional and industrial consumers in the nation with an experience of darkness which has brought economy underdevelopment.

Table 1. Challenges of power generation in Nigeria

S/N	Factors	Descriptions
1	Poor plant maintenance	The generation plants in Nigeria has suffered from years of poor maintenance resulting to low power generation output due to bad maintenance culture.
2	Inadequate funding	The power sector in Nigeria has been experiencing inadequate funding due to weak economy.
3	Inexperienced manpower	The generation plants in Nigeria lack some skilled manpower to carryout maintenance and regular upgrading of the power generation systems
4	Lack of energy mix	Over dependent on only oil, gas and hydro as power generation sources cannot meet the electricity demand of consumers in Nigeria. The renewable sources can complement current sources for an improved power output.
5	Lack of policy continuity	New Government- New policy has really affected the power sector in Nigeria.
6	Aged or Outdated equipment	Most of the infrastructures in the power sector in Nigeria have been built for some decades causing an

		often breakdown of the plant as a result of the wear and tear.
7	Low staff morale	Poor remuneration has an effect on staff effectiveness /productivity
8	Inadequate staff training	''You can't give what you don't have''. Most of the staff are still lacking the new Technological training as a result of the sector poor funding.
9	High cost of operation	Maintenance of power generation stations and hiring of foreign expatriates requires high cost.
10	Corruption	Corruption has eaten deep into the power sector whereby the little amount allocated for maintenance or upgrading is either mismanaged or embezzled.

Solar Radiation in Nigeria

Solar energy can supply a low-cost and abundant energy for communities connected to the national grid and also to those in remote areas. Solar energy in Nigeria is an alternative source of green energy in rural and remote locations. Nigeria as a country receives abundant sunshine and solar radiation (Ojosu, 2009). Solar energy in Nigeria is the most promising renewable energy resources as it remains apparently cheap and abundant (Ilenikhena & Ezemonye, 2010). The radiated energy from the sun is approximately 3.8×10^{23} kW, an equivalent of 1.082 million ton of oil (mtoe) per day (Sambo, 2005). This is approximately 4000 times the Nigerian present daily crude oil production and at the same time the natural gas daily production of approximately 13,000 times based on standard energy units (Idigbe & Onohaebi, 2009). Nigeria Electricity Regulatory Commission (NERC) also gives an estimate of 7KW/m^2/day high in the northern border areas and 3.5KW/m^2/day low in the coastal areas of south as an annual average of daily solar radiation and an annual average daily sunshine hours was also estimated to vary from as high as more than 8hrs/day in the northern border areas and 6hrs/day low in the coastal areas of south (NERC, 2008). The total electricity demand of both the rural and urban people in Nigeria when resolving the electricity challenges could be met if just 0.1% of the total solar energy radiant on the nation's land mass is converted at an efficiency of 1% (Bugaje, 2009). Nigeria with land area of 924×10^3 km^2 annually has an average of 1.804×10^{15} kWh of solar energy incident and an average of 5.535 kWh/ m^2/day. Nigeria has an average of 6.5 h/day of sun shines. The annual solar energy value is approximately 27 times the country's total fossil energy resources in energy units and is over 115,000

times the electrical power produced (Augustine & Nnabuchi, 2009). Therefore, it means that about 3.7% of Nigeria's landed area is required to collect an amount of solar energy that is equal to the nation's conventional energy reserves. In Africa, Nigeria is located in the western region with latitude falling between 4˚N and 13˚N and longitude also falling between 3˚E and 15˚W (Osueke et al., 2013). Shows Table 2 the monthly average global solar radiation in Nigeria over a period of 25 years with northern region having the highest radiation. Nigeria is blessed with better radiation sites which can increase the development of solar energy, yet Nigerians and the government has not shown much attention towards exploiting the huge natural renewable energy resources.

Table 2: Maximum, minimum and monthly average global solar radiation ($kWh/m^2/day$)

Stations	Location Lat. ºN	Location Long ºE	Altitude (m)	Max[a]	Min[b]	Monthly Average
Abeokuta	7.25	3.42	150	4.819	3.474	4.258
Abuja	9.27	7.03	305	5.899	4.359	5.337
Akure	7.25	5.08	295	5.172	3.811	4.485
Azare	11.8	10.3	380	6.028	5.022	5.571
Bauchi	10.37	9.8	666.5	6.134	4.886	5.714
Benin City	6.32	5.6	77.52	4.615	3.616	4.202
Calabar	4.97	8.35	6.314	4.545	3.324	3.925
Enugu	6.47	7.55	141.5	5.085	3.974	4.539
Ibadan	7.43	3.9	227.23	5.185	3.622	4.616
Ilorin	8.48	4.58	307.3	5.544	4.096	4.979
Jos	9.87	4.97	1285.58	6.536	4.539	5.653
Kaduna	10.6	7.45	645.38	6.107	4.446	5.672
Kano	12.05	8.53	472.14	6.391	5.563	6.003
Katsina	13.02	7.68	517.2	5.855	3.656	4.766
Lagos	6.58	3.33	39.35	5.013	3.771	4.256
Lokoja	7.78	6.74	151.4	5.639	4.68	5.035
Maiduguri	11.85	13.08	383.8	6.754	5.426	6.176
Makurdi	7.73	8.53	112.85	5.656	4.41	5.077
Minna	9.62	6.53	258.64	5.897	4.41	5.427

New Bussa	9.7	4.48	152	5.533	4.15	4.952
Nguru	12.9	10.47	342	8.004	6.326	6.966
Obudu	6.63	9.08	305	5.151	3.375	4.224
Owerri	5.48	7.03	120	4.649	3.684	4.146
Port Harcourt	4.85	7.02	19.55	4.576	3.543	4.023
Serti	7.5	11.3	610	4.727	3.972	4.488
Sokoto	13.02	5.25	350.75	6.29	5.221	5.92
Warri	5.52	5.73	6.1	4.237	3.261	3.748
Yola	9.23	12.47	186.05	6.371	4.974	5.774

Source: Okoro et al., 2007

Max[a] = Average for the months of March, April and May.

Max[b] = Average for the months of July and August.

Battery Energy Storage (BES)

Batteries for the purpose of storage are key component of any self-reliant renewable energy system like the solar that generates its energy from the sun without being connected to a national grid. The energy in form of electrochemical wave generated by photovoltaic solar system is stored using the battery. Battery banks serve as a back-up source of energy at night when photovoltaic solar system may not be able to generate as expected to meet the needs of the consumer. Batteries are utilised in networks of electricity for diverse reasons comprising charging of electric cars (Yuksel et al., 2017), voltage profile improvement (Kabir et al., 2014), and micro grid management (Tabar et al., 2017). Locally, it can improve efficiency, distribution networks that require management and reduction in costs, for peak load shaving (Lu et al., 2014), power quality enhancement (Mahela, and Shaik 2016). The battery is used for frequency control (Mercier et al., 2009), mitigating uncertainty related to renewable energies (Parra et al., 2015), and for relief of transmission congestion (Rosso & Eckroad 2014).

For-profit maximisation for stockholders in electricity market (Hemmati et al., 2016), network expansion postponing (Hemmati et al., 2016), and reliability improvement (Saboori et al.,2015) in a battery energy Technology for storage purpose. Battery Energy Technology for storage purpose and as well as their incorporation into the electricity power network have turned out to be progressively vital, particularly within the photovoltaic solar energy installations (Kawakami et al., 2010). Table 3 below shows the comparison of some battery technologies using some characteristic parameters. The

battery technologies considered include: lead-acid, lithiumion, sodium-sulphur and vanadium Redox.

Common types of Battery Technologies for the Purpose of Solar Energy Storage

1. Lead-acid Batteries: A lead-acid battery is an electrical storage device that uses a reversible chemical reaction to store energy. The penetration of lead-acid (LA) into the storage system, has made its chemistry a kind of most popular (Haas and Cairns, 1999; Linden, 2010) as a result of its affordability and high reliability (Ohwofasa 2018).
2. Lithium ion battery technology has progressed from developmental and special-purpose status to a global mass-market product in less than 20 years (Sharma et al., 2010). It is dependent upon electrochemical charge/discharge reactions occurrence between a negative electrode (anode) which comprises of carbon materials or intercalation compounds and a positive electrode (cathode) which comprises of certain lithiated metal oxides (Ohwofasa 2018).
3. Sodium-Sulphur batteries (NaS): NaS battery technology involves high operating temperatures, i.e. 300°C. The cell construction uses liquid sulphur as the negative electrode and liquid sodium as the positive electrode, separated by a solid electrolyte of beta- alumina. The battery delivers 100% coulombic efficiency, meaning that all the electricity put into it can be recovered (Baker, 2008).
4. Vanadium Redox Battery (VRB): In the VRB energy is stored chemically in different ionic forms of vanadium in a dilute sulfuric acid electrolyte. This creates a current that is collected by electrodes and made available to an external circuit. The reaction is reversible allowing the battery to be charged, discharged and recharged (Sharma et al., 2010).

Table 3. Comparison of battery technologies

Technology	Maturity	Efficiency (%)	Power Rating (MW)	Discharge Time	Lifetime (Years)	Self-Discharge per day (%)	Energy Density (Wh/I)	Power Density (W/I)
Lead-acid Battery	Demo to Mature	80-90	0.001-100	1min-8h	5-10	0.1-0.3	50-80	90-700
Lithium ion Battery	Demo to Mature	85-95	0.05-100	1min-8h	5-20	0.1-0.3	200-400	1300-10000
Sodium-Sulphur Battery	Demo to Deploy	70-90	10-100	1min-8h	5-20	0.05-20	150-300	120-160
Redox Flow Battery	Develop to Demon	60-85	0.1-100	hours	5-20	0-0.20	20-70	0.5-2

Source: Ohwofasa 2018

Batteries and Solar Power configuration for residential applications and small profitable consumers

The solar panels generate the energy from the sun and send it to the battery through the charge controller to be converted from DC to AC using the inverter for customer use. The Fig. 5 shows the main working components of the PV generation system consisting of the battery for the energy storage purpose, total electricity loads of the customer, grid, power electronic inverter, power electronic charge controller and the Solar PC panels (Maslow brochure and datasheet 2014).

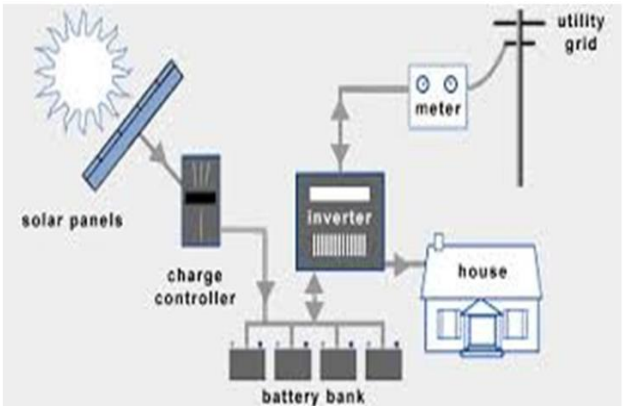


Fig. 5 Residential PV-battery storage configuration (Maslow brochure and datasheet (2014)

i. **Batteries** are purposely designed in order to capture excess Solar PV system electricity generated at day time to meet the consumer needs at night without or before exported to the indigenous electricity grid. Potentially batteries allow the use of more of the PV system energy generated with an advantage of reduction in electricity bill (BRE and RECC, 2016). They discharge when used and then recharge after use hundreds or thousands of times and are rated in amp hours between 20 hours and 100 hours. The solar panels and batteries are either connected in series and/or parallel for voltage and amp hours increase (Oji et al., 2012).

ii. **Inverters** in the configuration converts the Direct Current (DC) generated by the PV module from the sun and stored in batteries into Alternating Current (AC) power for consumer use. Most of all the lighting appliances and motors are designed to be powered by AC power, so it takes an inverter to convert DC to required standard power (120VAC, 60Hz).

iii. **Charge Controller** is purposely designed to monitor the battery's state-of-charge. It makes sure that the battery is charged and not overcharged when necessary.

iv. **Solar Panel Placement and Positioning** Solar panels are expected to be inclined at an angle closer to the area's latitude as possible for the purpose of

absorbing the maximum amount of power from the sun. Figure 6 below shows the mounting angles required for fixing solar collectors.

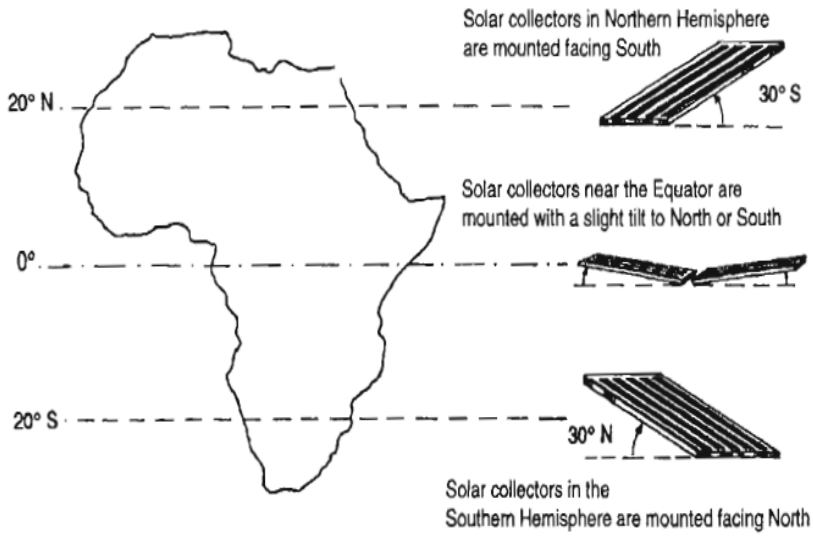


Figure 6. Fixed solar collectors mounting angles

Source: Hankins, 1995

A different positioning and/or inclination are required to maximize the production of energy either in the morning or hot afternoon, and/or the period of summer or that of winter. At any period of the year the modules are expected to be exposed to rays of light or the sun. Power generation can be significantly improved if the PV module is exposed to the sun. Optimally, as asserted by (Oji et al., 2012) the angle of the solar panels are exposed it to direct sunlight.

Energy policy

A well-prepared energy policy is necessary as a guide for a country to achieve an efficient use of its energy resources. Though, the existence of any country energy policy is important, but the implementation must also be put into consideration (Shaaban and Petinrin, 2014).

i. National energy policy

Before now Nigeria has been facing a no comprehensive energy policy before the 2003 approval of the energy policy in Nigeria by the Government of Nigeria. The National Energy Policy (NEP) as it was called has a general objective of proper use of the nation's energy resources; both fossil and renewable energy, with both the active participation of the private sectors for sustainable development [Iloeje, 2002]

The NEP pointed out, amongst other things, that :

1. with the vision to increase the nation reserve base to the peak, a widespread crude oil and natural gas exploration and development pursuit shall be required.
2. the nation shall continue to engage extensively in a way to develop the electric power with the view to making electricity more reliable and available to about 75% of the population or more by 2020; taking both conventional and more on renewable energy resources into consideration as options for electricity generation.

ii. The Energy Commission of Nigeria (ECN)

It is an agency with the function of developing and promoting the Renewable Energy (RE) technologies in Nigeria. Also involved in strategic energy planning, coordinating the RE policy and to monitor the entire energy sector. Furthermore, provide strategies for the application of energy types for required purposes and making recommendations on the exploitation of new renewable energy sources of energy. Therefore, RE is a key component of the ECN mandate [Iloeje, 2002]. The key elements on the stand of national policy towards achieving the development and application of RE resources and its technologies are as follows:

1. it involves developing, promoting and harnessing the RE resources in Nigeria and incorporating all sustainable ones in the national energy mix;
2. it involves promoting decentralized energy supply, mostly in the rural areas, based on RE resources;
3. it involves deemphasizing and discouraging the use of wood in the place of fuel;
4. the use of biomass energy resources, it involves promoting efficient methods;
5. it involves keeping up-to-date of the international development in RE technologies and applications (Ikuponisi, 2004).

iii. Solar Energy Policies, Objectives and Strategies.

On the earth's surface, solar radiation incident varies in intensity with every location, every season, every day in any month, every time of day, sudden cloud cover and also other environmental factors. However, the incorporation of battery storage technology into solar

energy conversion systems will provide solution to the irregular nature of the availability of solar radiation.

Nigeria solar radiation is distributed fairly well. Annually, the total average solar radiation falls between 12.6MJ/m^2 per day in the coastal latitudes to approximately 25.2 MJ/m^2 per day in the Northern area (Rilwanu, 2003). But with the great solar energy potentials, solar energy technologies and its use is still fall below expectation in Nigeria. Much work is still needed to be done in the area of development and exploitation of the the solar energy potentials.

1. Policies

i. In order to achieve the integration of solar energy into the Nigeria energy mix, there shall be an aggressive pursuit of solar energy potentials in the country.

ii. The nation shall keep an up-to-date standard of the international developments in solar energy technology.

2. Objectives

i. It involves the development of the country's competency in the exploitation of solar energy.

ii. It involves utilization of solar energy to complement the nation’s energy resource for both the rural and urban areas.

iii. It involves development of the nation’s solar energy technologies market.

iv. It involves locally, the development of the nation’s solar energy conversion technologies.

3. Strategies

i. To intensify more research and developmental strategies to promote solar energy technology.

ii. Encourage re-training, re-raining and manpower development.

iii. Provides adequate encouragements to local manufacturers towards the production of solar energy systems.

iv. Provision of adequate motivations to suppliers of local solar energy products and services.

v. Introduction of measures to provide financial or other supports required by the local solar energy industry to grow.

vi. Setting up more programmes in a way of introducing the solar technology into the nation energy mix.

vii. Subsidizing the installation of all solar energy systems.

viii. Creating an awareness programmes on the available solar energy resources, potentials and technologies.

Conclusion

Having established that solar energy and its potentials in Nigeria stand a chance of becoming an alternative to solving the nation's electricity challenges if supported with the battery storage technology, there is still need for an encouragement towards exploitation of the nation's solar energy potentials. Reports from researchers and scientists on solar power systems show that the geographical location of any site has an important role in the design of a solar power system. Though, Nigeria is blessed with abundant sunshine but location still has to be put into consideration when designing a solar power system.

This work has helped to show the solar radiation in major cities and rural geographical locations in Nigeria as the nation is blessed with enormous solar energy potentials.

Suggestions

In order to achieve effective and proper exploitation of solar energy in Nigeria, the following suggestions are made:

a) More research is required in the area of cost implications and efficiencies of solar plants.
b) Government should make provisions for regular funding of researches on solar technology and development initiatives in Nigerian tertiary institutions, research bodies and Research Institutes.
c) Government should make provision for subsidy to reduce the high cost of Renewable Energy Technologies (RET) importation most especially in the area of solar PV cells manufacture in Nigeria.
d) All appropriate authorities should provide encouragement to the private individuals and organizations in a way to invest in the nation solar technologies.
e) Government should publicly create more awareness using every media on the advantages of using Renewable Energy Technologies (RET) most especially solar technologies since it is environmentally friendly.
f) Government should discourage the current importation of diesel and petrol engine and generators into the country by promoting the green energy (Renewable Energy). Solar power generation.

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