
RESCUING OUR ENVIRONMENT THROUGH RENEWABLE ENERGY

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ABSTRACT: *Our environment has really suffered from its depletion by the emission that it got through the fossil fuel engines and from household equipment. Apart from these, all these energy sources are foreseen to be running out and may soon no longer be available for our use, thus the need to have a source that is sustainable and efficient. It has also been found that most of the renewable energy sources are seasonal thus limiting their availability to the season in which they are available. This paper thus take a look at the various renewable energy sources, their season of availability and unavailability, it also look into how they can be harnessed during their period of availability so as to make the best use of them, also how they can be alternated so that in the period when they are not available alternative can be used. The paper concludes with the advantages of renewable energy switching.*

Keywords: Renewable Energy, Non Renewable Energy, Environment, Hazards.

Received for Publication on 15 August 2013 and Accepted in Final Form 22 September 2013

INTRODUCTION

The world currently faces an unprecedented surge in energy demand and consumption of energy around the world has more than quadrupled since 1950s. ^[1] The demand for energy over the years has greatly increased and the means to meet this demand has been questioned ever since.

Presently, the Nigeria state is facing many challenges on the climate, which includes the frequency and intensity of extreme events like droughts and floods in some part of the country. Climate change and its attendant effects are issues of global significance. Issues such as global warming, temperature rise and green house effect seem to be of major concern. Combustion of fossil fuels produces greenhouse gases which absorb and trap the heat from the sun within the atmosphere. Levels of greenhouse gases have increased in the past few years due to industrial growth.

The Intergovernmental Panel on Climate Change (IPCC) Group 1 issued her third report on the scientific basis of climate change in 2001, the report which is summarized for policymakers and approved by IPCC member government in Shanghai raised some thought provoking concerns which are:

- i. The global average surface temperature has increased over the 20th century by about 0.6^oC. Most of the warming occurring in the 20th century, during two periods, 1910 to 1945 and 1976 to 2000.
- ii. Satellite data showed that there are very likely to have decrease of about 10% in the extent of snow cover since the late 1960s, and ground – based observations showed that there is very likely to have a reduction of about two weeks in the annual duration of lake and river ice cover in the mid

and high latitudes of the Northern Hemisphere.

- iii. There has been a wide spread retreat of mountain glaciers in non-polar regions during the 20th century.
- iv. Global average sea level has risen and ocean heat content has increased, -Tide gauge data showed that global average sea level rose between 0.1 and 0.2 metres during the 20th century. –Global ocean heat content has increased since the late 1950s.
- v. Northern Hemisphere spring and summer sea-ice extent has decreased by about 10 to 15% since the 1950s.^[2]

Nigeria is an energy resource rich country blessed with both fossil fuels such as crude oil, natural gas, coal and renewable energy resources like solar, wind and biomass. Presently, in Nigeria the focus is on the use of the non-renewable energy which has been found to have a great adverse effect on the environment and thus the need to shift focus from this source of energy to the renewables.

RENEWABLE ENERGY SOURCE AND NIGERIA

Renewable energy is energy generated from natural resources such as sunlight, wind, tides, geothermal energy, which are naturally replenished. Each of these renewable sources has unique characteristics which influence how and where they are used. Globally in 2006, about 18% of global final energy consumption came from renewable, with 13% coming from traditional biomass

which is mainly used for heating, and 3% from hydroelectricity. New renewables (small hydro, modern biomass, wind, solar, geothermal and biofuels) accounted for another 2.4% and are growing very rapidly. The share of renewable in electricity is around 18%, with 15% of global electricity coming from hydroelectricity and 3.4% from new renewable.^[3]

Biomass Energy and Nigeria

Biomass refers to energy derivable from sources of plant origin such as trees, grasses, agricultural crops and their derivatives, as well as animal wastes. As an energy resource, biomass may be used as solid fuel, or converted via a variety of technologies to liquid or gaseous forms for the generation of electric power, heat or fuel for motive power. Biomass resources are considered renewable as they are naturally occurring and when properly managed, may be harvested without significant depletion. Biomass resources available in the country include: fuelwood, agricultural waste and crop residue, sawdust and wood shavings, animal dung/poultry droppings, industrial effluents/municipal solid waste.

The availability of biomass resources follows the same pattern as the nation's vegetation. The rain forest in the south generates the highest quantity of woody biomass while the Guinea savannah vegetation of the north central region generates more crop residues than the Sudan and Sahel savannah zones. Industrial effluent such as sugar cane molasses is located with the processes with which they are associated. Municipal wastes are generated in the high-density urban areas.^[4] Table 1 shows the estimated biomass resources in Nigeria.

Table 1: Estimated Biomass Resources in Nigeria

Resource	Quantity (Million Tonnes)	Energy Value ('000 MJ)
Fuel wood	39.1	531.0
Agro – waste	11.244	147.7
Saw Dust	1.8	31.433
Municipal Solid Waste	4.075	

Source: ^[4]

Small Hydropower (SHP) and Nigeria

Small hydropower can be defined as the development of hydroelectric power on a scale serving a small community or industrial plant. Generally, 10 MW generation capacities are accepted as the upper limit of a small hydropower. ^[5] The

classification of the hydropower station is shown in table 2. Table 3 gives the small hydro potential in surveyed states of Nigeria. However, small hydropower potential sites exist in virtually all parts of Nigeria with an estimated capacity of 3,500 MW. ^[4]

Table 2: Classifications of Various Hydro Schemes

Scale of Hydro Scheme	Capacity Range (MW)
Large	100
Medium	>50 – 100
Intermediate	10-50
Small	1-10
Mini	0.5-1.0
Micro	< 0.5

Source: ^[6]

Table 3: Small Hydro Potential in Surveyed States of Nigeria

State (Pre. 1980)	River Basin	Total Sites	Total Capacity (MW)
Sokoto	Sokoto Rima	22	30.6
Katsina	Sokoto Rima	11	8.0
Niger	Niger	30	117.6
Kaduna	Niger	19	59.2
Kwara	Niger	12	38.8
Kano	Hadejia-Jama'are	28	46.2
Borno	Chad	28	20.8
Bauchi	Upper Benue	20	42.6
Gongola	Upper Benue	38	162.7
Plateau	Lower Benue	32	110.4
Benue	Lower Benue	19	69.2
River	Cross River	18	258.1
Total		277	734.2

Source: ^[7]

Wind Energy and Nigeria

Wind, which is an effect from the uneven heating of the earth's surface by

the sun and its resultant pressure inequalities, is available at annual average speeds of about 2.0m/s at the coastal

region and 4.0m/s at the far northern region of the country. If air density of 1.1kg/m^3 is assume, wind energy intensity, perpendicular to the wind direction, ranges between 4.4W/m^2 at the coastal areas and 35W/m^2 at the far northern region. Wind energy conversion systems (wind turbines, wind generators, wind plants, wind machines, and wind dynamos) are devices that are used to convert the kinetic energy of the moving air to rotary motion of a shaft, that is, mechanical energy.^[4]

Solar Energy and Nigeria

Nigeria lies within a high sunshine belt and thus has enormous solar energy potentials. The mean annual average of total solar radiation varies from about $3.5\text{kWhm}^{-2}\text{day}^{-1}$ in the coastal latitudes to about $7\text{kWhm}^{-2}\text{day}^{-1}$ along the semi arid areas in the far North. On the average,

the country receives solar radiation at the level of about $19.8\text{MJm}^{-2}\text{day}^{-1}$. Average sunshine hours are estimated at 6 hours per day. Solar radiation is fairly well distributed. The minimum average is about $3.55\text{kWhm}^{-2}\text{day}^{-1}$ in Katsina in January and $3.4\text{kWhm}^{-2}\text{day}^{-1}$ for Calabar in August and the maximum average is $8.0\text{kWhm}^{-2}\text{day}^{-1}$ for Nguru in May.

Given an average solar radiation level of about $5.5\text{kWhm}^{-2}\text{day}^{-1}$, and the prevailing efficiencies of commercial solar – electric generators, then if solar collectors or modules were used to cover 1% of Nigeria’s land area of $923,773\text{ km}^2$, it is possible to generate $1850 \times 10^3\text{GWh}$ of solar electricity per year which is over one hundred times the current grid electricity consumption level in the country.^[4]

Table 4: Comparison of Environmental Effects of Power Generating Plants

Type of plant	Multipurpose	Emission	Radioactive Radiation	Social Impact	Earthquake Prone
Hydro	Yes	No	No	Yes	Yes
Small Hydro	Yes	No	No	Yes	No
Fossil Fuel	Yes	Yes	No	Less	μ
Nuclear	Yes	Yes	Yes	No	No
Solar	Yes	Yes	No	Yes	No

Source:^[8]

CONCLUSION

It has become imperative that to save our environment from all the hazards that it is been exposed to daily through the use of non renewable energy sources then we cannot but switch over to the renewable energy sources which are more environment friendly, which is shown in table 4. Although the output that can be gotten at a particular time from the various sources may appear very small but then the little can be used by the rural communities which are not having the advantage of being connected to the national grid thus making them have access to what is obtainable at the urban centre, also with the use of the renewable the effect of gas

flaring, oil spillage, ozone depletion and flooding to mention but a few of the effect that our environment is being exposed to will be minimized.

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Reference to this paper should be made as follows: Adebayo, A.A. (2013), Rescuing Our Environment through Renewable Energy. *J. of Engineering and Applied Science*, Vol. 5, No. 2, Pp. 22 – 26.
