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Review of Sustainable Energy and Electricity Generation from Non - Rewneable Energy Sources

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Abstract
Demand for Electricity in the world would continue to increase as the world population and socio-economic also grow. Our industries, commerce, small businesses and domestic activities depend on its availability. However, the present sources of generating electricity (fossil fuel) has become a threat to human existence through the emission of Carbon dioxide called global warming and the prediction that in the next 50years these sources will vanish moreso that electricity generated from these sources have been estimated to 80% of the total world Electricity generation .This paper reviews methods and means of generating Electricity such as the non-renewable and renewable energy sources .It recommends that if more research grants are voted into the technologies required to raise the operational value of the renewable energy sources(vis-a vis its advantages in terms of environmental friendliness), they will provide the worlds the needed energy for the manufacturing of sustainable Electricity most especially in Nigeria where the effect of global warming is not yet significant.
Key word:*Sustainable Energy, Electricity Generation and Non- Renewable Energy*

Introduction

Energy can be defined as the capacity of a physical system to perform work (Andrew, 2011). Energy exists in several forms such as, heat, kinetic, mechanical, electrical, and potential and other forms. Energy has been very important for development and it is always very vital and this is a necessary input to the economic need of the present civilization. Since energy has been realised to be important, Scientists left no stone unturned in ensuring that the energy supplied meets the consumers need .The early sources of energy were from sun, Wind, Wood, Water otherwise called renewable energy and later from the Fossil fuel and nuclear sources called non-renewable (Godfrey, Bob & Janet, 2003). These sources were processed to generate, oil, natural gas and gasoline used to produce steams which are used to rotate the Turbines for the manufacture of electricity which forms the basis for the development of the world socio- economic growth.

According to Godfrey, Bob & Janet, 2003, the energy from the non- renewable sources has taken over the major supply of the world energy consumption, Energy from the fossil fuel had been estimated to be 80% of the total energy supply worldwide while unclear energy produces 17%, with the remaining percentage coming from other sources. Even in Nigeria, according to IEA (2010) energy generated from non-renewable source (Natural Gas) was quoted to be 64.39% while the remaining percentage was from the renewable sources (hydroelectric). The continuous generation of electricity from non- renewable has posted great concerns to humanity who believes that, in a short- term, these sources may go into extinction apart from the environmental threats that are coming from them. Hence the authors of this paper believe that if focus should be shifted to renewable sources most especially in Nigeria where the global warming effect is not yet severe and reduce concentration from the fossil fuel that produces 80% of the Energy for the world consumption coupled with fact that they would soon go into extinction, lives and properties can be protected while the supply of electricity would still be enough to meet the demand of its consumers and remain sustainable.

Sustainable energy with respect to electricity has been described by EnergyLinx (2011), as using energy wisely and using energy generated from clean sources and clean technology. John and Gilbert (2008): also said that sustainable energy is a pattern of energy production and its uses that can support society's present and future needs with least of life – cycle economic, environmental and society cost. Wise energy use is the first step to ensure we have sustainable energy. Electricity is a very important energy that must be sustained as it has invaded our lives and has become vital in almost all aspect of society today. The use of electricity can be found in many sectors, talk of transportation, domestication, such as heating and light of the home and the house electrical appliances, communication, industries and entertainment. It could be described as the pillar of all nations' economic growth as developed, developing and undeveloped countries need electricity for their survival. According to Godfrey, Bob & Janet, (2003), taking reference from Emile (1901) said that,

"*he was of the opinion that, the day will come when electricity will be for everyone, as waters of rivers and winds of heaven, that electricity should be lavished and not merely supply and that then men may use it at their will, as the air they breathe, in town it will flow as the very blood of the society".*

As at present this opinion has not been fully filled and the major sources of the present energy supply are threatened, thus, there is a need to think of alternative sources of clean energy , using clean technology that is environmentally friendly for the manufacturing of electricity .

This paper reviews the current sources of energy used for the generation of electricity especially from Nigeria visi- a- vis the global warming which currently has constituted a lot of threat to the lives and properties of human being, ecological system of the world and proposed alternative clean technology that would be environmentally friendliness and at the same time fulfilling the sustainability of the electricity supply.

Electricity.

Electricity is a manufactured product. Electric power is manufactured from a rotating machine called electric generator which is later delivered through copper wire to its point of needs such as industries, houses, e.t.c.

Electricity means everything to human economics. To a layman the lightening of bulb or heating of houses is the electricity. The first appearance of electricity was when Thomas Edison generated light from electric generator he invented in 1879, and until 1882 when he developed it and provided not only electricity but also the light bulb (John, Bod and Janet, 2008). Scientifically electricity is described as the flow of electrons, when electrons are lost from atom, the free movement of these electrons constitutes an electric current (Mary Bellis, 2011).

Electricity is a basic part of nature and one of the most widely used form of energy. It is produced from the conversion of other sources of energy like coal, natural gas, oil, nuclear power, and the renewable energy sources. Before the advent of electricity, houses were lit with kerosene lamps, food were cooled in iceboxes, and rooms were warmed by wood- burning or coal-burning stoves e.t.c.

Today almost every facets of human endeavour relies on the availability of electricity and without it nothing works well. Hence, if the danger from the present means of generating it is not averted as it had been predicted that in the next 50 years the sources may be no more available to meet the present demand hence, the sustainability of future demand.

Demands for Electricity:

Electricity demand all over the world depends on four major development areas; Industries, Commerce, Small scale business and Domestic. The demand for electricity is also characterized with the economic growth of nation, the weather which occasionally is seasonal and during the days. As the world population will continue to grow for several decades so also the demand for electricity will continue to increase and the proportion of supply will also continue to increase.

According to the *CIA world face book*, the total worldwide electrical energy consumption for the year 2004 from all sources, including renewable was 15,406 Tera Watt hour (TWH) .

The figure 1.1. **below explain the economic power of some nations of the world .The total electrical energy consumed by the world's top ten consumers with scales in TWh and Mtoe (Million Tons of Oil Equiv alents)measure annually.**

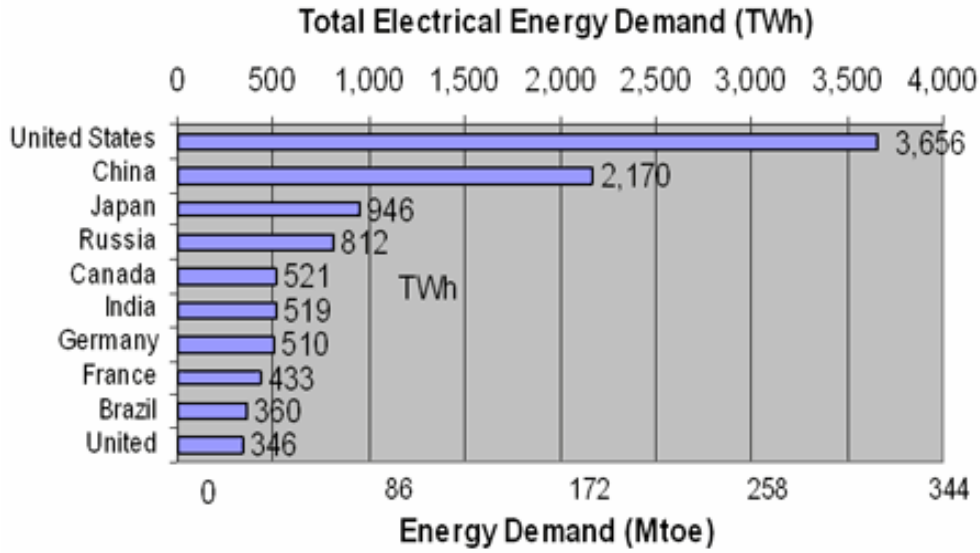
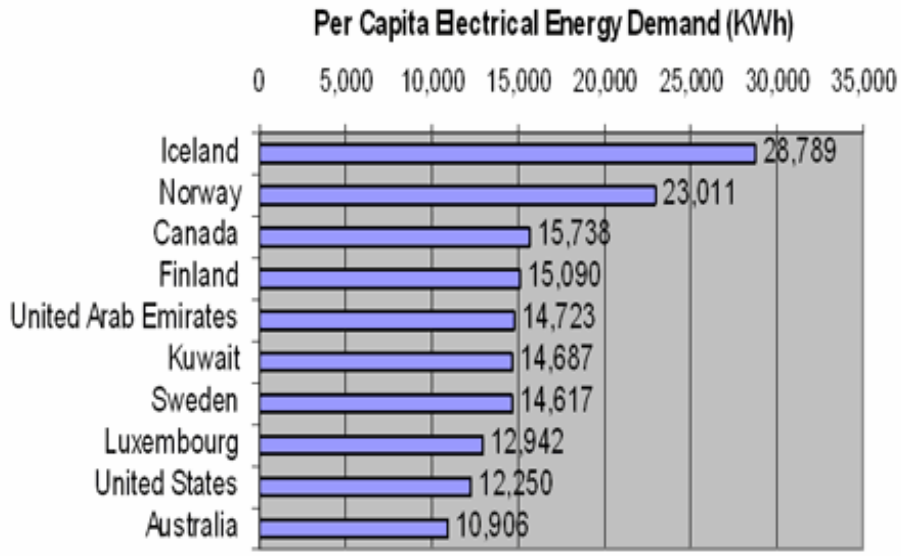


Fig 1.1: Source: *CIA world face book* (2006) .

Fig1.2**. Total national electrical energy consumption per capita for all applications (Not just domestic consumption),**

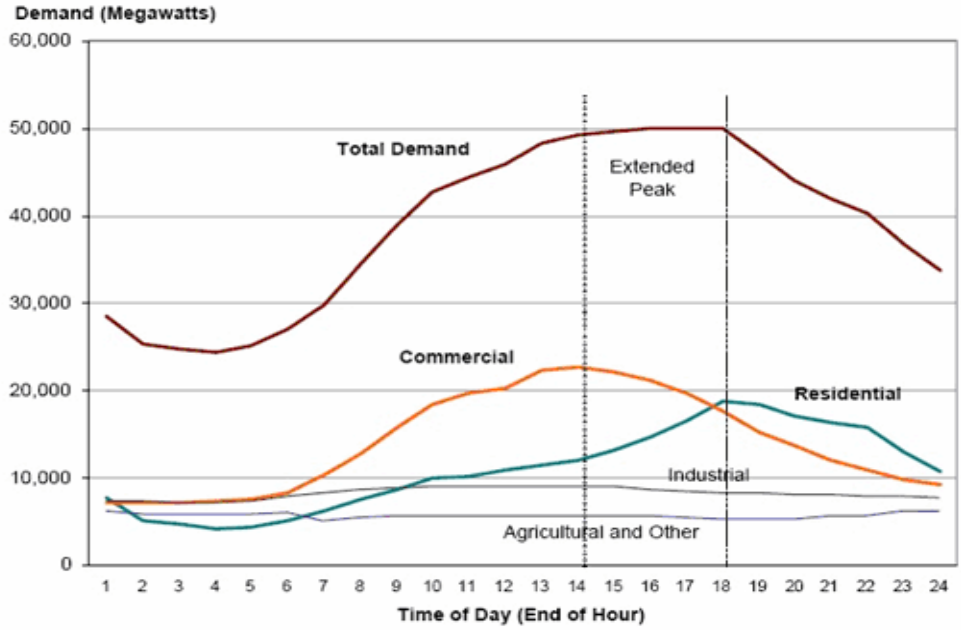


Source: *CIA World Fact book* (2006).

In practice, demand for electricity varies from hour to hour and from season to season. During the winter more electricity is needed compared to summer period and between the hours of 6am daily to 5pm more energy is used for daily activities with less energy consumption in the night when human beings are either sleeping or at home doing nothing.

Fig 1.3 **explains the total California load profile for a hot day in 1999**

` **Aggregate (Community) Electricity Consumption**



Source: Lawrence Berkeley National Laboratory

Electricity demand would continue as long as people moved from old houses to new , industries and small business are established , hence ,the need to have electricity in abundance.

SOURCES OF ELECTRICITY GENERATION (SEG).

Electricity generation is generating or creating electricity from other forms of energy, including water, wind and photovoltaic panels. However, these are indirect forms of generating electricity. There are few

fundamental and direct sources of transforming other sources of energy into electricity or electrical energy.

The direct sources of transforming energy into electrical energy are static electricity, electromagnetic induction and transforming chemical energy into electricity. It also includes photoelectric process (transforming light into electrical energy), direct conversion of temperature differences to electricity, by means of nuclear energy. A major chunk of electricity generation is driven by heat engines. The heat to these engines is mostly supplied by combustion of fossil fuels, nuclear fission and other renewable energy sources. Steams are generated at the electricity plant by burning of fossil fuel or at a nuclear or hydroelectric plant; the steams powered a turbine which spins a huge magnet inside a copper wire. Hence, the heat energy is converted to mechanical energy which then converts it to electrical energy in a generator.

The electrical energy in the plant generator otherwise called electricity flows from the power plant through wires to a step up transformer. This transformer raises the pressure so that it travels long distances (up to 756,000 volts). The electric current runs through power lines to the substation transformer where the pressure is lowered to between 2000 and 1300 volts from where it can then go through a pole transformer or a transformer box in underground where the pressure is further lowered to 120 and 240 volts. Here, the electricity can be distributed to point of needs. Other means of generating electricity are; tidal power and wave power, solar energy, photovoltaic, and geothermal sources of Energy used for electricity generation having their advantages and disadvantages.

Sources of energy are majorly divided into two that is, the renewable and the non-renewable energy sources. Energy sources are considered non- renewable, if they cannot be replenished in a short period of time while renewable energy sources are energy that can be replenished naturally. The non –renewable energy sources are derived basically from oil and petroleum, natural gas, coal and Uranium. The first three are energy obtained as a result of burning fossil fuel while the Uranium is derived from the nuclear energy and is also non-renewable. This paper is mostly concerned about these mentioned energy sources for the continuous generation of sustainable electricity at the expense of the various risk posted to human lives and properties. The renewable energy sources are from the following sources: Biomass (Wood and wood waste, municipal solid waste, landfill gas and biogas, ethanol, and biodiesel), water (hydropower), geothermal, wind and solar.

Non-Renewable Energy (NRE)

Nuclear Power: Nuclear power is a form of energy which arises from a reaction between atomic nuclei. They came out of nuclear fusions. The atomic nuclei exist out of neutron and protons, they're held together in the centre of atomic nucleus through a special energy called binding energy. In a process in which the atomic nuclei collide with one other, they fall apart and the loose part comes out of the atomic nucleus. The energy generated as a result of the fall out is used for the heating of water which becomes steam. The steam is used to spins the turbine which generates the electricity. Presently, electricity supplied to the world from this source is just within 16 to 17%.

The use of nuclear energy for the generation of a lot of electricity requires just little raw materials which can be used for a long period but the raw material of nuclear which is the Uranium is very radio- active, also the used rod and other used materials stay radioactive for ages an example of the disadvantage of what can happen if nuclear energy is relied upon for the generation of electricity such as what happened in Japan after the 2011 Tohoku earth quake and Tsunami (WHO, 2012). Hence, the reason why environmental groups are against the continuous usage of non- renewable sources for electricity generation.

Fossil Fuel

Fossil energy is generated through the burning of anaerobic decomposition of buried dead organisms. At this burning, the fossil fuel is used as a source of heat to make steam out of water. The steam is used for the working of a turbine. With the help of a generator, the turbine can make electricity. Examples of fossil fuels are oil, natural gas and coal. These fossil fuels are remains of dead materials of plants and animals. These are plants and animals that died over a million years ago and under the pressure of the earth's surface and through the decay of these materials there came a process of compression. Carbon is the main part of these fossils fuels, the more carbon, the heavier the fuel.

The fossil fuel advantage is that, to generate energy from the raw materials is very cheap and easy but the disadvantages arising from its uses, is that it requires attention. First its supply is not endless and the current prediction for its extinction is about 50 years and during the process of combustion ,a lot of toxic materials come into the air which causes extra pollution of the atmosphere which currently increases the effect of the much debated global warming. Thus electricity from these sources had been rated to 80% of the total energy generated.

Renewable Energy (RE)

This is a kind of energies derived from the sun, wind, water etc, for example the hydro-electric station makes use

of fallen between a lake and a river to spin the turbine for the generation of electricity. It is energy without waste-matters. Their sources are endless. The major advantages are that most of these sources are environmental friendly, no pollution but the costs of transforming them are high. This paper, then looks, at the costs and the benefits that can be derived from its usage, if maximized to provide sustainable electricity and base its conclusion on change of focus.

Discussion

Electricity plays a very important role in the socio–economic and technological development of every nation. The economic growth for both developed, developing and the underdeveloped countries rely heavily on the availability and sustainability of it. Also, if we take into cognizance the sources of generating electricity which majority is from the fossil fuel which according to predictions will vanish in the next 50 years, considering the various health hazards that are coming from them and the costs of the possibility of managing the threat before it goes out of hands, then, we can therefore from this discussions agree that there is a need to look for alternative sources of energy to replace the present energy sources so as to continue with the supply of electricity without stoppage.

Conclusion and Recommendations

In order to avert the potential hazard associated with non renewable sources of energy for electricity productions and supplies and the need to continue with its sustainability to meet the demands of the consumers, the following recommendations should be considered.

- More researches should be carried out on the other sources of renewable energies such as Wind power energy, Solar energy (photovoltaic), Biomass and Wave energy.
- Technologies on renewable energy should be improved so that they can generate sustainable electricity that would meet the demand of the world.
- To avert the various health threats coming from the use of Non- renewable energy, the world producer of electricity should gradually disengage from generating electricity from them.
- Finally, if from every indication, it is not possible to do without the non-renewable energy sources, then, more researches should be intensified to reduce its threat to the world and less quantity should be supplied from this source.

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