ASSIGNMENT
ON

ALTERNATIVE TO ENERGY SOURCES

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SUBMITTED TO THE

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1 ASSIGNMENT ONE

1.1 WITH ADEQUATE MATHEMATICAL RELATIONS, EXPLAIN THE VARIOUS FORMS OF ENERGY

Energy exists in many different forms. Examples of these are: light energy, heat energy, mechanical energy, gravitational energy, electrical energy, sound energy, chemical energy, nuclear or atomic energy and so on. Each form can be converted or changed into the other forms.

Although there are many specific types of energy, the two major forms are Kinetic Energy and Potential Energy.

Kinetic energy is the energy in moving objects or mass. Examples include mechanical energy, electrical energy etc.

Potential energy is any form of energy that has stored potential that can be put to future use. Examples include nuclear energy, chemical energy, etc.

1. **Chemical energy**

Chemical energy is energy stored in the bonds of chemical compounds (atoms and molecules). Chemical energy is released in a chemical reaction, often in the form of heat. For example, we use the chemical energy in fuels like wood, coal by burning them.

2. **Electrical Energy**

Electrical energy is the energy carried by moving electrons in an electric conductor. It is one of the most common and useful forms of energy. Example – Lightening. Other forms of energy are also converted to electrical energy. For example, power plants convert chemical energy stored in fuels like coal into electricity through various changes in its form.

3. **Mechanical Energy**

Mechanical energy is the energy a substance or system has because of its motion. For example, machines use mechanical energy to do work.

4. **Thermal energy**

Thermal energy is the energy a substance or system has related to its temperature, i.e., the energy of moving or vibrating molecules. For example, we use the solar radiation to cook food.

5. **Nuclear energy**

Nuclear energy is the energy that is trapped inside each atom. Nuclear energy can be produced either by the fusion (combining atoms) or fission (splitting of atoms) process. The fission process is the widely used method.

Uranium is the key raw material. Uranium is mined from many places around the world. It is processed (to get enriched uranium, i.e. the radioactive isotope) into tiny pellets. These pellets are loaded into long rods that are put into the power plant's reactor. Inside the reactor of an atomic power plant, uranium atoms are split apart in controlled chain reaction. Other fissile material includes plutonium and thorium.

In a chain reaction, particles released by the splitting of the atom strike other uranium atoms and split them. The particles released by this further split other atoms in a chain process. In nuclear power plants, control rods are used to keep the splitting regulated, so that it does not occur too fast. These are called moderators.

The chain reaction gives off heat energy. This heat energy is used to boil heavy water in the core of the reactor. So, instead of burning a fuel, nuclear power plants use the energy released by the chain reaction to change the energy of atoms into heat energy. The heavy water from around the nuclear core is sent to another section of the power plant. Here it heats another set of pipes filled with water to make steam. The steam in this second set of pipes rotates a turbine to generate electricity.

6. **Gravitational Energy**

Gravitational energy is that energy held by an object in a gravitational field. Examples include water flowing down a waterfall.

1.2 DISTINGUISH BETWEEN THE SUSTAINABLE ENERGY AND RESOURCES AND NON-SUSTAINABLE ENERGY AND RESOURCES

Sustainable energy is a form of energy that meet our today's demand of energy without putting them in danger of getting expired or depleted and can be used over and over again. Sustainable energy should be widely encouraged as it does not cause any harm to the environment and is available widely free of cost. All sustainable energy resources like solar, wind, geothermal, hydropower and ocean energy are sustainable as they are stable and available in plenty

Non-sustainable energy is a natural substance that is not replenished with the speed at which it is consumed. It is a finite resource. Fossil fuels such as oil, natural gas, and coal are examples of nonrenewable resources. Humans constantly draw on the reserves of these substances while the formation of new supplies takes eons.

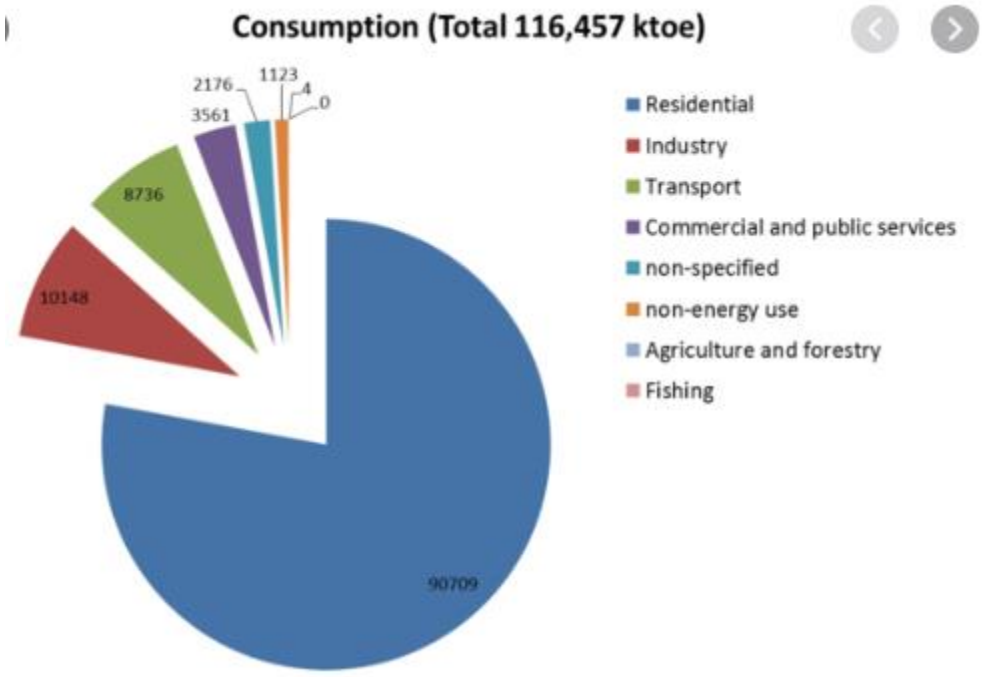
1.3 WITH THE AID OF APPROPRIATE PIE CHART OR BAR CHART BRIEFLY DISCUSS THE TYPICAL ENERGY RESOURCE MIX FOR SUSTAINABLE ENERGY DEVELOPMENT AND PROVIDE YOUR OWN VIEW ON THE CASE FOR THE NIGERIAN ENVIROMENT

Energy consumption patterns in the world today shows that Nigeria and indeed African countries have the lowest rates of consumption. Nevertheless, Nigeria suffers from an inadequate supply of usable energy due to the rapidly increasing demand, which is typical of a developing economy. Paradoxically, the country is potentially endowed with sustainable energy resources. Nigeria is rich in conventional energy resources, which include oil, national gas, lignite, and coal. It is also well endowed with renewable energy sources such as wood, solar, hydropower, and wind.

The patterns of energy usage in Nigeria's economy can be divided into industrial, transport, commercial, agricultural, and household sectors. The household sector

accounts for the largest share of energy usage in the country - about 65%. This is largely due to the low level of development in all the other sectors.

The major energy-consuming activities in Nigeria's households are cooking, lighting, and use of electrical appliances. Cooking accounts for a staggering 91% of household energy consumption, lighting uses up to 6%, and the remaining 3% can be attributed to the use of basic electrical appliances such as televisions and pressing irons.



The predominant energy resources for domestic and commercial uses in Nigeria are fuel wood, charcoal, kerosene, cooking gas and electricity[20]. Other sources, though less common, are sawdust, agricultural crop residues of corn stalk, cassava sticks, and, in extreme cases, cow dung. In Nigeria, among the urban dwellers, kerosene and gas are the major cooking fuels. The majority of the people rely on kerosene stoves for domestic cooking, while only a few use gas and electric cookers.

The rural areas have little access to conventional energy such as electricity and petroleum products due to the absence of good road networks. Petroleum

products such as kerosene and gasoline are purchased in the rural areas at prices very high in excess of their official pump prices. The rural population, whose needs are often basic, therefore depends to a large extent on fuel wood as a major traditional source of fuel. It has been estimated that about 86% of rural households in Nigeria depend on fuel wood as their source of energy. A fuel wood supply/demand imbalance in some parts of the country is now a real threat to the energy security of the rural communities.

The energy consumption per capita in Nigeria is very small - about one-sixth of the energy consumed in developed countries. This is directly linked to the level of poverty in the country. Gross domestic product (GDP) and per capita income are indices that are used to measure the economic well-being of a country and its people. GDP is defined as the total market value of all final goods and services produced within a given country in a given period of time (usually a calendar year). The per capita income refers to how much each individual receives, in monetary terms, of the yearly income that is generated in his/her country through productive activities. That is what each citizen would receive if the yearly income generated by a country from its productive activities were divided equally between everyone.

2 ASSIGNMENT TWO

2.1 MONITOR THE AVERAGE AMBIENT TEMPERATURE BETWEEN ON MONDAY, 17TH AND FRIDAY, 21ST OF FEBRUARY 2020 AND ESTIMATE THE AVERAGE DAILY THERMAL ENERGY FROM THE SUN REACHING LAND

Thermal energy = rate of energy transfer – change in time (21600 seconds)

Date	Average Ambient Temperature (°C)		rate of energy transfer
	Day	Night	
Monday	35	25	18365287.59
Tuesday	36	25	20201816.35
Wednesday	35	25	18365287.59
Thursday	36	25	20201816.35
Friday	37	25	202038345.11

Monday

$$\text{Thermal energy} = 18365287.59 \times 21600$$
$$= 396700 \text{ MJ}$$

Tuesday

$$\text{Thermal energy} = 20201816.35 \times 21600$$
$$= 436300 \text{ MJ}$$

Wednesday

$$\text{Thermal energy} = 18365287.59 \times 21600$$
$$= 396700 \text{ MJ}$$

Thursday

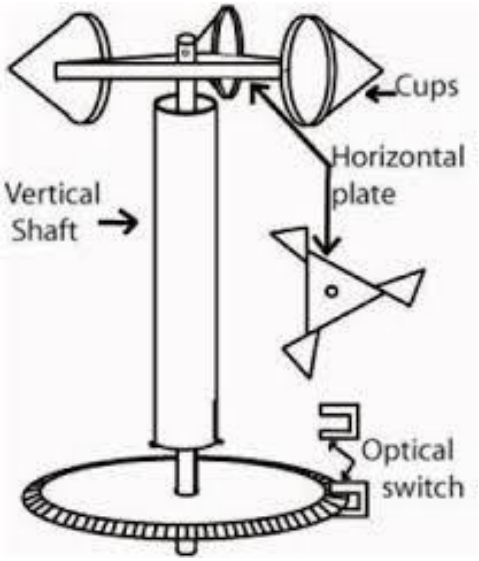
$$\text{Thermal energy} = 20201816.35 \times 21600$$

$$= 436300 \text{ MJ}$$

Friday

$$\text{Thermal energy } = 202038345.11 \times 21600$$
$$= 476000 \text{ MJ}$$

2.2 WITH THE AID OF A BEAUTIFUL DIAGRAM ONLY, DESCRIBE ANEMOMETER



3 ASSIGNMENT THREE

3.1 HOW MUCH ENERGY IS BEING PRODUCED FROM THE DAMS IN NIGERIA? COMPARE WITH THE ENERGY PRODUCED FROM CRUDE

There are three major dams in Niger State, Nigeria. The Kainji Dam built in 1968, Jebba Dam built in 1985 and Shiroro Dam built in 1990. These are all hydroelectric dams and generate a potential combined power output of 1,900 megawatts.

As at 2017, all the dams produce about 20,100,000,000,000 Joules of energy and about 1,069,350,000,000,000 Joules of energy from crude.