B.com part-1

Energy is the foundation of industrialized world; without energy, life as we know it would cease to exist. The yearly energy and fuel consumption rates have risen dramatically within the last years. This phenomenon is a direct result of globalization pressures, the international information network we call the Internet, and a population that seems to be hitting the dangerous upswing of the Malthusian curve. Although there is not yet a current shortage of conventional fuels, such as reserves of coal, oil and other fossil fuels are limited and non-renewable. In addition, the common practice of burning oil, coal, and other assorted hydrocarbons has resulted in hazardous environmental conditions such as global warming, acid rain and dangerously high air pollution levels. This and other environmental disasters have brought about a demand for alternative fuel and energy sources that are convenient, environmentally friendly, and economically viable. The U. S. Department of Energy defines alternative fuel as fuel that is essentially non-petroleum and yields energy security and environmental benefits. Following are some of the fuels the Department of Energy currently recognizes as alternative fuels methanol, hydrogen, liquid and compressed natural gas, and electric fuel. Alternative sources of energy are classified as energy provided from sources other than fossil fuels. This includes but is not limited to nuclear power, solar power, hydropower and biomass. Currently, many of these alternate sources are in use, but unfortunately they are underused or underdeveloped because of perceived shortcomings or drawbacks. While some of these fuel and energy sources may indeed lack the efficiency or cost effectiveness of the conventional fuel and energy, having a clean living planet far outweighs the cost of clean energy. Traditional Energy Sources Fossil fuels are considered conventional sources of energy. Fuels that are

primarily petroleum based are considered conventional fuels. The three most predominant fossil fuels are coal, oil and natural gas, all of which is nonrenewable. Although, natural gas is a fossil fuel, the Department of energy considers it an alternative fuel because of its low petroleum concentrations and environmental benefits. Coal is said to be the most abundant of the three but it is also the most polluting. The first problem begins with extract coal from the ground, this is done through mining. Mining not only disturbs massive amount of earth but the resulting rock waste disturbs the environment. This rock waste produced from mining weathers rapidly to produce acid drainage, which contains sulfur that combines with oxygen and water to make sulfuric acid. Sulfuric acid not only contaminants water but it is also the major cause of acid rain. Further, more burning coal releases dangerous chemical compounds into the environment. These compounds not only pollute the air but also contribute to global warming. Petroleum or crude oil is composed of various organic compounds and is found below the surface of the earth. Petroleum provides approximately 40% of the world’s energy. However, many experts forecast that petroleum will no longer be a common commercial material by the mid-21st century, because of declining availability. Crude oil has a heating value of 19, 000Btu/lb and gasoline, a product of crude oil has a heating value of 20, 750Btu/lb. Not only is crude oil’s availability declining, it also release dangerous gases into the atmosphere. Because of growing energy demands in developing and industrialized nations along with the decline of the conventional sources of energy, it has become necessary to turn to alternative sources of energy. Biomass Fuel A biomass fuel is an energy source derived from living organisms. Most commonly, it is plant residue,

harvested dried and burned, or further processed into solid, liquid or gaseous fuels. Biomass is a known renewable source of energy since green plants are essentially solar collectors that capture and store sunlight in the form of chemical energy. The most familiar and widely used is wood, but cereal straw, seed hulls, corn stalks, and even animal waste and garbage are used. Dry wood has a heating value of 8500 Btu per Lb. Wood accounted for 25 percent of all energy used at the beginning of this century, but with increased use of fossil fuels, it's significance rapidly declined. 1976 supplied only 1 to 2 percent of the United States energy supplied by wood. Although the same trend has been evident in industrialized countries, the decline has not been as dramatic everywhere; biomass is still a primary source of energy for developing societies. In a few instances it is also a major source of power, as in Brazil, where sugarcane is converted to ethanol fuel, in China, where fuel gas is obtained from dung and in Western Europe there are over 200 power plants that burn rubbish to produce electricity. A drawback of using biomass because it is a solid fuel and solid fuels are not as convenient or versatile as liquids or gases. However, techniques can convert the biomass into a liquid or gaseous form. These techniques include partial combustion, anaerobic digestion, or fermentation. Growing plants remove carbon dioxide from the atmosphere that is released back to the atmosphere when Biomass fuels are used. Thus the overall concentration of atmospheric carbon dioxide should not change and global warming should not result. In addition, biomass contains much less sulfur than most fossil fuels. Therefore, biomass fuels should reduce the impact of acid rain. A number of studies have attempted to estimate the global potential of biomass energy. A total net production of biomass energy has been estimated at 100 million megawatts

per year. Forests and woodlands account for about 40 percent of the total, and oceans about 35 percent. Considering all the constraints on biomass harvesting is estimated that about 6 million MW/yr. of Biomass is available for energy use. Natural Gas Natural gas is one of the most common alternative fuels available today and currently is being utilized in homes, industrial factories, and automobiles. Natural gas occurs deep below the surface of the earth and can be found alone or combined with crude oil. Natural gas mainly consists of methane (NH4) and ethane but also can contain propane, heptane, pentane, butane and hexane. Because natural gases components are not always consistent, the heating value can greatly vary. Natural gas is available in two forms compressed natural gas (CNG) and liquid natural gas (LNG). CNG is odorless and odorants are added to detect leaks and spills. CNG has a heating value that ranges from 21, 300Btu/lb to 23, 600Btu/lb. LNG must be used in conjunction with gas detectors because odorants cannot be added. Natural gas supplied approximately one fourth of the power needs of the United States in 1999 and supplied more than 22% of the world's fuel needs. Natural gas is cleaner burning, more efficient then oil and coal, and is comparable in price to these more conventional fuels. Today, there are approximately one million natural gas vehicles in service, most being used by natural gas companies and metropolitan bus services. Although natural gas is currently abundant, it is not a renewable resource and therefore should not be thought of as an answer for all fuel needs. Nonetheless, natural gas is less polluting and competitively priced in comparison with oil and coal. It is also over three times as efficient as electricity from point of origin to point of use. Another point in its favor is that Natural gas can be converted directly into electricity

with the use of fuel cells. Fuel Cells Fuel cell technology may sound like the magical fuel of the future, but in fact has been used by NASA to power the space shuttle ever since the 1960's. On a smaller scale they are used to power vehicles and provided electricity to various buildings. The use of chemical energy, rather than combustion via chemical reactions makes fuel cells ideal for converting fuels and even hydrogen into electricity. Fuel cells chemically merge a fuel and an oxidizer without burning, dispensing the inefficiencies and pollution of traditional combustion. There are several different types of fuel cells phosphoric acid, molten carbonate, solid oxide, alkaline and direct methanol fuel cells just to name a few. The type of fuel cell depends on the fuel that is provided. All fuel cells are composed of an anode, that is supplied with a fuel, a cathode, to which an oxidant, commonly air or oxygen, is supplied and an electrolyte. The process works by passing hydrogen through the anode and passing oxygen through the cathode and with assistance of catalyst splits the hydrogen molecule into a proton and electron. While the proton passes through the electrolyte, the electrons create a separate current that can be utilized before they return to the cathode and form into water molecule. In addition, fuel cells that use hydrocarbons as fuel contain a fuel reformer. Fuel cells, by creating electrical current directly from the fuel, in some cases double the energy efficiency of the older generating plants. One of the main benefits in its favor is that is has no emissions other than water, and in some cases negligible amounts of carbon dioxide. Experts say that if as few as ten thousand fuel cell vehicles ran on alternative fuel it could reduce oil consumption by 6. 98 million gallons per year. This exhibits the remarkable impact fuel cells could have in reducing air pollutants and green house gases. This promising technology

does have its drawbacks, both image wise and economic. The main factor holding the fuel cell back right now is the price involved to build these generators. Additionally, most fuel cells that use hydrocarbons must first reform fuel reducing the fuel cells efficiency. Until the price of manufacturing fuel cells becomes more affordable or conventional energy becomes too expensive, fuels cells remain a fuel of the future. Nuclear Energy Unlike the fuel cell, nuclear energy is a low cost, low pollution and reliable alternative to conventional fossil fuels. The process of generating nuclear power is relatively straightforward. Like conventional coal and oil generating plants, thermal energy is used to boil water into steam, which moves turbines that create electricity. However, the nuclear plants substitute the heat of nuclear fission, from uranium, for the burning of polluting fossil fuels. Uranium is a naturally occurring element that is found in the crust of the earth. Uranium is a mixture of isotopes: uranium-238 (U-238), accounting for 99. 3% and U-235 about 0. 7%. Only the U-235 is readily split. The heat is generated in the core of a reactor by uranium-235 atoms splitting to form neutrons, which in turn split other uranium atoms into neutrons. Because this occurs repeatedly, a large amount of heat can be produced by a relatively small amount of uranium. When the atoms split they release heat that makes the water boil. This produces the steam to move the turbines and produce electricity. The process is controlled by the use of graphite rods in the core, which absorb neutrons and slow down reactions. The main reason it is not used is because of the public's belief that it is far more dangerous than it actually is. This belief is primarily comes from nuclear technology's first use as a weapon and has been reinforced by tragedies from poorly maintained facilities such as Three Mile Island (1979) and Cyrnobyl (1986). However,

with competent management, strict safety and environmental regulations, there is no reason we cannot use this cheap reliable source of power. The misunderstanding of the U. S. public has caused us to fall behind Europe in taking advantage of nuclear power. France, for example, states that in 2000 nuclear power accounted for 75% of all the energy produced in their country and they plan to switch over completely in the next 25 years. Hydropower Not all countries have access to technologically advanced forms of power available to the first world. There are energy sources, which rely on what nature provides. Waterpower or hydropower is produced from running water, which possess kinetic energy that is turned into mechanical and then into electric energy by means of a hydropower plant. In most cases hydropower plants consist of dams, penstocks, turbines and a generator. Dams are constructed to create reservoirs of water. Then water is carried from the reservoir to the turbines through a penstock. The water pressure then turns the blades of the turbine activating the generator. The generator converts the mechanical energy into electric energy. Even though hydropower may seem complex it is not a new concept it was used as far back as Ancient Roman and Greek times to mill corn. Of course, they did not have all of today’s current technologies the concept is the same, converting kinetic energy into mechanical energy. Unfortunately, it was not realized until recent years how important using this renewable resource is. While, hydropower is currently the largest source of renewable power, generating 80 percent of total renewable energy used in the world, it is only 19 percent of total world energy consumed. In the United States during the 1920’s hydropower accounted for 40 percent of energy consumed and today it only accounts for a little more than 9 percent. This change of sources is largely

due to the invention of fuel consuming stem power plants, which are cheaper to construct, but also more polluting. Although not all countries have taken the same destructive path as the U. S. in Brazil and the Democratic Republic of the Congo hydro power accounts for over 90 percent of total consumed power. The principle advantage of using hydropower is the fact that it is renewable. It also does not produce polluting emissions during operation, it can respond quickly to power demands and once hydropower plant is constructed has a relatively low operating cost. On the other the hand the initial cost of constructing a hydropower plant is very high, sites for constructing plants are limited and there can be some environmental damage such as fish mortality and degradation of passing water. Wind Power Like Hydropower, wind power is a renewable naturally occurring energy source. Wind power is the process of converting wind into mechanical energy or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity to power homes, businesses, schools etc. Wind power has been used as far back as 5000 B. C. to propel boats along river and oceans. Although, it was not until the late 1890’s that wind power was used to generate electricity. Modern wind turbines come in two forms vertical axis design and horizontal axis design. All electric generating wind turbines are comprised of a few basic components. These are the rotor, the part that rotates the wind; the electric generator, the speed control system; tower and some machines have a fail-safe shutdown system. The motions of the blades power an electric generator, which in turn produces electricity. The amount of electricity produced by the turbines depends on the size of

the turbine and the speed of wind. The wind speed is of utmost importance for the amount of energy a wind turbine can convert to electricity. The energy content of the wind varies with the cube of the average wind speed. The more kinetic energy a wind turbine pulls out of the wind, the more the wind will be slowed down as it leaves the turbine. If we tried to extract all of the energy from the wind, the air would move away with the speed zero i. e. the air would not leave the turbine. In that case, no energy could be extracted, as all of the air would be prevented from entering the turbine. Betz' Law states that one can only convert less than 16/27 or 59% of the kinetic energy in the wind to mechanical energy, using a wind turbine. The most productive turbines for large-scale power generation are medium sized turbines of 50 to 100 ft with power ratings of 100 to 400 kW and average wind speed of 21 km/h. These wind turbines are usually placed in-groups and are called wind farms. The largest wind farms are found in California and are able to produce up to 1120 MW of power. Although wind power is not yet one of the main sources of power in the world it is quickly growing in popularity. In recent years Germany, the U. S., Spain, and Denmark have significantly increased their usage of wind farms. Wind energy is a free renewable source, so no matter how much is used today, there will still be the same supply in the future. Wind energy is also a source of clean, non-polluting electricity. Unlike conventional power plants, wind plants emit no air pollutants or greenhouse gases. In 1990, California's wind power plants offset the emission of more than 2. 5 billion pounds of carbon dioxide, and 15 million pounds of other pollutants that would have otherwise been produced. The only environmental problems facing wind power are the noise produced by the rotor blades, the visual impact on a landscape and the fact that the rotor

blades can effect wildlife. According to the experts, wind power has an expansive future. In the 1990’s, it had been the fastest growing source of electricity generation in the world. The majority of this growth has been in Europe, where government policies and high conventional energy costs favor the use of wind energy. To develop innovative, low-cost wind technologies to compete in global energy markets. Closing Comments Our world runs on energy, it drives our economies and connects us to each other across an ever-smaller planet. Oil is a poison that we are consuming at an alarming rate, over 70 million barrels a day and growing. The burning of coal and oil has released massive amounts of carbon dioxide, sulfur dioxide and nitrogen oxides causing acid rain, air pollution and intense global warming. During the 1990’s, we saw noticeable negative global climate change. We can lie to ourselves and we can believe the local weatherman when he claims we are just in the fifth straight year of " El Nino" or we can change our destructive ways. There is a constant conflict between the need for energy and protection of our environment. Only with conservation, new technology advancements and the implementations of alternative fuels and energy can we save our dying planet.