RENEWABLE AND NON RENEWABLE ENERGY SOURCES: COMPARATIVE STUDY

[1]Dr.M.B.Wasu, [2]D.B.Pohare, [3]N.K.Chaukade
Associate Professor, Department of Chemistry, Jagadambha College of Engineering and Technology, India[1] , Assitant Professor, Department of Electronics & Telecommunication Engineering, Jagadambha College of Engineering and Technology, India[2], Assitant Professor, Department of Mathematics, Jagadambha College of Engineering and Technology, India[3]

ABSTRACT

Enormous growth in population means a growing requirement for energy. Now a day, in advanced technical world enormity of energy cannot be denied. In every walk of life energy is required. Energy sources can be broadly classified as renewable and non renewable. Knowing the dreadful depletion in non renewable sources, the importance of renewable sources is increased. This review paper briefly presents the importance of renewable sources of energy over the limitations of fossil fuel dilemma. Major emphasis is placed on the use of alternative energy technologies. Some applications of renewable sources and future of energy is also discussed.

Keywords: renewable Energy, fossil fuel dilemma, non renewable energy, alternative energy technologies.

1. INTRODUCTION

Renewable energy is the form of energy which is obtained from a limitless source. Proper utilization of energy resources is a hot debate topic these days. It is very essential to decide the criteria to choose effective energy source. Majority of factors such as cleanliness, cost, stability, efficiency and environmental effects must be considered in energy selection1. It is a harsh fact that many industries around the world are still dependent on conventional energy source-fossil fuels for electricity generation. No doubt, these fuels are very effective as far as power production quality is concerned, but its availability becoming limited. Fossil fuels will exhaust one day and the industries must turn to renewable sources completely.

2. CONVENTIONAL ENERGY DILEMMA

Non renewable energy resources are limited natural resources which cannot be re-grown within short time. Conventional energy sources like fossil fuels are hydrocarbon compounds comprising of coal, natural gas and crude oil. The main problem of fossil fuels is not the use of them but the ill side effects their usage creates. Fossil fuels are not sustainable and on combustion, they produce large amounts of harmful gases, the most harmful is carbon dioxide gas, which is responsible for producing global warming. This global warming is continuously playing its negative part in melting of ice glaceries which results in floods and can severely affect agricultural and marine animals activities. Middle East countries have huge reserves of coal, oil and natural gas and many other countries are dependent on them for invariable supply of these fuels. Organization of the Petroleum Exporting Countries (OPEC) is a group of 12 countries which include Algeria, Angola, Ecuador, Libya, Nigeria, Venezuela and Middle East countries like Iran, Iraq, Kuwait, Qatar, Saudi Arabia and UAE. According to the Energy Information Administration (EIA), these are responsible for about 40 percent of the world's total oil production and hold the majority of the world's oil reserves. This monopoly results in drastic worldwide price fluctuations in fossil fuels[2]. Combustion of fossil fuels produce carbon monoxide, nitrogen monoxide, nitrogen dioxide, sulphur dioxide and gases. These produces air pollution which causes smog and harm to human health and plant growth. Acidic rain, majorly caused by sulphur dioxide, leads particularly to the destruction of marble monuments and crops. The companies of coal, oil and natural gas very well know about the harmful effects of using fossil fuel but they are constrained. They cannot do anything until renewable energy sources become more feasible as major providers of energy [2], [3]. Non renewable energy, such as coal, natural

gas and oil, require costly explorations and potentially dangerous mining and drilling, and they will become more expensive as supplies diminish and energy demand increases.[3]

3. IMPORTANCE OF RENEWABLE ENERGY

The most significant feature of renewable energy is its plentiful supply. It is infinite. Renewable energy sources are hygienic sources of energy that have a much lesser negative environmental impact than conventional fossil energy technologies. Most renewable energy investments are spent on materials and personnel to build and maintain the facilities, rather than on costly energy imports. With technological advancements in mass communication, people have now become aware of the demerits of burning 17 fossil fuels. Renewable energy is the need of the hour. Its clean and sustainable nature has compelled the human beings to think seriously about it. Scientists and Engineers, around the world, are continuously working and researching in this domain. They are finding new ways to use these sources of energy effectively. Global warming is a huge hazard which is being caused by burning of coal, oil and natural gas. It is very harmful for the planet and the living beings on it. To put an end to this disaster; we must choice renewable sources. This is because they are cleaner and do not produce poisonous harmful gases. Renewable energy is trustworthy and abundant and will potentially be very cheap, once this technology and its present infrastructure are enhanced. The major sources of renewable energy include solar, wind, biomass, geothermal, hydropower and tidal energy. Renewable energy produces only small levels of carbon emissions. Renewable energy sector is comparatively new in most countries and this sector can attract a lot of companies to invest in it. This can create a pool of new jobs for the unemployed. Therefore, renewable energy can play a very significant role in bringing the unemployment scale down in many countries, especially the developing ones. This, in turn, will make a substantial difference to their economies. Renewable energy can make the electricity prices stable. It is because their cost is dependent only on the initial invested capital Renewable energy can be locally produced and therefore, it is not vulnerable to distant political disturbances. Many of the safety concerns engulfing fossil fuels, such as explosions on oil platforms and collapsing coal mines do not exist with renewable energy. Coal, natural gas and oil reserves are restricted and veiled. An unknown and inadequate amount of each resource is buried deep underground or under the ocean. As more of these reserves are harvested, finding new sources shall become more complicated and more expensive, and utilizing them becomes tougher and sometimes risky as well. Renewable energy is as effortless to find as wind or sunlight. Renewable energy is far cleaner than fossil fuels[4]. Coal mining and petroleum exploration produce solid toxic wastes, such as mercury, lead and other heavy metals. The burning of coal to generate electricity uses large quantities of water which often discharges arsenic and lead compounds into surface waters and releases carbon dioxide, sulphur dioxide, nitrogen oxides and mercury into the air. Gasoline and other products of petroleum cause similar pollution. These pollutants cause respiratory illnesses and death in humans, produce acid rain that devastates buildings and destroys fragile ecosystems, and deplete the ozone layer through global warming[5] .

4. APPLICATIONS OF RENEWABLE ENERGY

Making our energy system sustainable is a technical challenge. The debate about renewable energy so far has often been guided by ideological preferences for one technology over another, without looking at its wider impact. We therefore need major societal, political and economic change to drive the use of novel energy-generating and -storing technologies only with all of these factors working together can we achieve the radical change in our energy systems that we so badly need.

Applications of renewable energy are broadly classified as "on-grid" and "off-grid". A grid is basically an integration of generation, transmission and distribution system which supplies energy to several consumers[6].

On-grid and off-grid are the terms which describe the way electricity is delivered. On grid deals with power stations which are directly connected to grids such as wind farm and solar panels. Off grid applications, in general, serve only one load, such as a small home or a village house. Off-grid applications can take many forms, from photovoltaic (PV) modules for an individual village home to centralized windmills to power a village water pump or a commercial battery charging facility. These off-grid applications are most generally used in remote or rural area. A major on-grid application is to generate electricity in mass amounts. The most important application of wind energy is the wind turbine. The wind turbine can convert the energy in the wind to mechanical power which, in turn, can be fed into a generator to generate large amounts of electricity. This electricity may be used to charge batteries or pump water. Wind energy can also be used in wind-powered vehicles. This can save a lot of fuel and can provide increased performance and efficiency. Similarly, solar energy can be used to power photovoltaic panels which are an excellent way of producing electricity at small scales, especially for rural and remote areas, where transmission lines cannot reach. Due to their little maintenance and high reliability, they are ideal to use in isolated and remote places. Offices can employ glass PV modules for reliable supply of electricity. Solar energy is also widely utilized in solar water heaters, solar calculators and solar lights. They work on the principle of storing energy from the sun during the day and utilizing it at night time. Geothermal energy is most common amongst farmers. They use this energy to heat their greenhouses which enable them to grow various fruits and vegetables all around the year. In some countries, the heat produced from this energy is also utilized to heat pedestrian walkways and bicycle lanes in order to prevent them from freezing in extreme winters. Solid biomass can be burnt in incinerators to produce heat that can be used to produce steam for electricity generation. Biomass can also be converted to biofuels like ethanol for transportation needs. A widely used application of hydropower is in a compressor. Specially designed compressors can be used for adjusting turbine blades and governor valves. They can also be used to blow out the water to eliminate the load during starting.

5. THE FUTURE OF ENERGY SOURCES

Proper use of energy is very vital in catering the need for energy demand. Experts all over the world are of the opinion to utilize renewable energy sources for power generation. The sustainable nature of wind, hydropower, geothermal, solar and biomass highly encourage the energy supply companies to utilize them. Moreover, people can setup small solar panels over their homes to tackle their own load demands. These 18 sources of energy are not hazardous to the environment since they do not require any sort of mining and drilling and produce nearly no pollution. Most importantly, they are much more economical than fossil fuels and do not cause adverse mishaps. Conservation of energy and utilizing renewable sources is the ultimate destination of energy. In possible renewable energy sources Hydrogen could come into its own as back-up storage for the electricity grid[7]. Storing excess energy in next-generation fuels holds the most promise. The natural world has being doing this for a long time - sunlight nurtured the plants and animals that eventually formed our fossil fuels, and the energy stored by present day plants can be used as biofuels. However, the effectiveness of existing biofuels in reducing greenhouse-gas emissions is limited - converting land to biofuel agriculture, as well as producing and transporting biofuels are carbon intensive processes[81].There are other ways of storing energy. The chemical bonds between the atoms in hydrogen gas, for example, liberate a large amount of energy when broken, making this gas very attractive for energy storage[2]. Hydrogen could even be generated by sunlight directly: scientists are developing 'artificial leaves' in which photo catalysts harness the Sun's energy to split water into hydrogAen and oxygen[3]. Even so, artificial leaves are still at the experimental stage, they have low overall efficiency, and their need for exotic materials is a major drawback.

Batteries also have a role to play in the switch to alternative energy systems and the redox-flow battery[9], which stores energy in electrolyte fluid, is of particular promise. The fluid has a low energy density, so it needs to be stored in correspondingly large tanks, thus restricting such batteries to stationary applications. Nevertheless, redox-flow batteries have the large energy capacity that battery systems will need, and they can discharge rapidly.

Lithium-ion batteries have a much higher energy density than redox-flow batteries[10], and they have already proven their suitability for mobile applications such as electric vehicles. However, the driving range of electric vehicles is limited in comparison to those powered by fossil fuels, so a substantial increase in performance is needed. A key problem is that the cathode of a lithium-ion battery must do two important jobs: electrical conduction and ion storage. Separating these two functions, such as by using new carbon materials for electrical conduction and a stable anionic structure for lithium -ion storage, might offer a considerable advantage. Metal-air batteries offer even higher energy densities than lithium-ion batteries[7]. They work by drawing oxygen from air and then using it to oxidize a metal, generating an electrical current in the process. But metal-air batteries are plagued by problems, such as unwanted crystal growth during charge and discharge, and gradual degradation of the electrodes. Scientists will need to master the transport of ions through membranes and electrodes before these batteries see widespread use. Solid-state nuclear magnetic resonance has been useful for revealing how electrode materials behave during operation[8], but more advanced analytical tools could open doors6. THE

SOLUTION

There is no hesitation in saying that people are becoming increasingly conscious of the importance of using renewable sources of energy but still a lot of work needs to be done in this domain. For instance, awareness programs must be started in various regions by local authorities to make people responsive of the importance of alternative energy technologies. They must also discourage them to use fossil fuels due to their adverse harms to the environment and living beings. Courses on renewable sources must be made compulsory to students at school, college and university levels in order to make them realize their significance and to increase their knowledge in this sphere. The governments should revise the power policies to cope with the energy crisis and to make full use of renewable energy sources. Innovative solutions must be brought by experts in the field to solve the energy catastrophe. Technology exchange programs must be initiated by developed countries in order to help the developing countries to establish, build and reinforce the renewable energy sector.

CONCLUSION

While considering a global perspective, the critical demand for o future renewable electricity production is significant. To help combat climate change and protect ourselves off fossil fuels, we need to use energy more efficiently. We will also need to switch to renewable electricity, however. This switch will need to be significant in order for power generation to be both efficient and affordable, but there are further problems to overcome: wind and solar power are inherently intermittent, and at the moment energy generated from fossil fuels is used to fill the gaps. Improving energy storage would enable us to store the electricity generated at peak production times, dramatically increasing the viability of renewable energy.

Renewable energy sources are essential now a days. They have become an integral part of the energy portfolio. The objective in using renewable energy sources is to reduce the pessimistic environmental effects associated with non renewable energy sources such as coal, oil and natural gas. Choosing to use a renewable energy source will not only translate into cost savings over the long-term, but will also help save the environment from the risks of fossil fuel emissions. Energy conservation awareness campaigns must be initiated at government level to make people aware of the importance of conserving energy. Moreover, power companies should gradually

resort to the use of renewable resources as they are profuse and will never deplete. Social media can play a key role in this by educating people about energy sources and their utilization. Colleges and universities should teach a compulsory subject on energy conservation and utilization. Given that these steps are followed accurately, the time is not far when the entire world will be reliant on renewable sources for power production because this is the definitive future of energy.

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