Urgent need for renewable energy

Science, Physics

Introduction

In today’s world the most important thing human’s need is electricity. Without electricity most of the modern equipment would not work. Similarly fuel is needed to power transportation devices. Natural recourses such as coal, oil and natural gas are the basis for producing energy for all kinds of devices. Due to the extensive use of these resources they now face extinction. These resources are classified as non-renewable resources.

In this report we will discuss different types of resources which can be used as a replacement for producing sustainable energy and also the effects on theenvironmentby burning the carbon based resources.

Renewable Energy

Renewable energy is energy which is derived from natural resources such as the sun, wind, tides, streams, rivers, biomass etc. Renewable energy is naturally replenished; it is sustainable energy and does not harm the environment. About 19% of the world’s electricity requirements are met by renewably energy.

The differenttypes of renewable energyare: Solar Energy

Solar energy is obtained from the sun. Sun is a source of light and heat for all living things. It provides energy for photosynthesis, the process of plants creating oxygen. Solar energy can be harnessed and converted to electricity by using solar panels. Sun is also directly or indirectly responsible for most forms of renewable energy requirements, for example – heat causes wind

which intern causes tidal energy. Sunlight causes tree growth some of which contribute for biomass energy.

Hydropower

Hydropower is obtained from the force of water flowing downstream. Water is continuously recycled by the environmental cycle of precipitation and evaporation. This cycle cause water to evaporate and fall back down to earth in the form of rain which makes the rivers flow. This water is also stored in dams which are used all around the world to generate electricity by turbines and generators. Also energy can be obtained from tides and ocean waves which can be harnessed to produce electricity.

Biomass Energy

The most common source of biomass energy is wood. But other sources such asfoodcrops, plants, agriculture and industrial waste, organic municipal components are also used around the world for producing energy. Biomass can also be converted to biofuel which can be used as an alternative to petrol and diesel to run vehicles and heavy machinery. Hydrogen Hydrogen is one of the most common on our planet. However, it is mostly found in combinations with other element in nature. For example - water is two part hydrogen and one part oxygen.

Hydrogen is a very good source of renewable energy however thetechnologyneeded to extract this element is still in its early stages. Currently the most common way of extracting hydrogen is steam hydrocarbons and reforming. Other methods include thermolysis and electrolysis.

Geothermal Energy

The heat from the earth’s core produces steam and hot water which can be used generate electricity, or for other purposes like home heating and generating power in factories. Geothermal energy can be obtained by digging deep underground reservoirs.

Wind Energy

Wind energy is the conversion of the power of wind to electricity. Wind energy has been used for over thousands of years to operate mechanical process such as pumping water, grinding, milling etc. to harness wind energy wind farms are created onshore or offshore, wherever there is abundant of wind energy available by using wind turbines. A wind turbine is a machine which converts the wind’s kinetic energy into rotatory motion to by using generators to produce electricity. Wind energy is harnessed in many countries including India, Germany, Denmark and the United States.

Reasons for Using Renewable Energy Sources: Using renewable energy saves the environment from the harmful effects of greenhouse gases released in the atmosphere due to burning of fossil fuels. There is abundant of resources available that are required for renewables such as the sun, water and wind e available all around the world and thus the cost of setting up the base is significantly reduced which provides a good opportunity for developing nations. Renewable energy resources do not cause military conflicts among nations unlike fossil fuels.

Renewable energy sources are Inexhaustible i. e. unlike fossil fuels they get replenished quickly. Using renewable resources we can save fossil fuels for

future generations for more valuable means. Harnessing renewables also creates job opportunities in new fields ofscience and technology. The Fossil Fuel Dilemma Burning of fossil fuels for meeting our energy requirements causes side effects which are becoming a major concern for environmentalists. These side effects include the creation of carbon dioxide, the top greenhouse gas and contributor toglobal warming.

Also ozone layer depletion and Acid rain are a major concern relating to the environment. Due to the burning of fossil fuels and the greenhouse effect the average temperature has risen by one degree Fahrenheit (1°F). Acid rain The principal cause of acid rain is the release of sulfur dioxide and nitrogen oxide in the atmosphere which then react with water molecules to produce acidic compounds. Major contributor to this is human activities such as power and electricity generation. Coal power plants are a major cause to producing these gasses.

The natural phenomenon causing acid rain is the emission of acidic gases from volcanos. Ozone layer depletion The ozone layer is a layer in the earth’s atmosphere located about 20 to 30 kilometers above sea level. The ozone layer contains a high concentrate of the gas ozone (O3). The ozone layer’s importance is that it absorbs 97 - 99% of the Sun's ultraviolet radiation, which can damage all forms of life on earth. These ultraviolet rays are the main cause of sunburns and excess exposure to this can cause skin cancer. The ozone layer is steadily declining by about 4% per decade from the earth’s stratosphere.

The most significant tear in the earth’s ozone layer is over the Polar Regions namely Antarctica. This phenomenon is called the ‘ Ozone Hole’. The main

compound responsible for the ozone layer depletion is Chlorofluorocarbon (CFC) commonly found in refrigerants used in air conditioners and refrigerators. Due to the Ozone Hole over Antarctica polar ice caps are melting which is causing the rise in sea levels, leading to natural disasters such as floods in many parts of the world. Global Warming Global warming has become in today's world perhaps the most complicated issue faced by the world leader.

Scientific bodies present warnings for the increasing danger from global warming and ongoing buildup of greenhouse gasses produced mainly by burning of fossil fuels and forests. What is Global warming? Global warming is the heating of the earth surface and increase in its average temperature that causes correspondingclimate changeand it may result from greenhouse effect. This idea was first proposed by Nobel Price-Winning chemist Svante Arrhenius in 1896. He speculated that continued burning of fossil fuels would result in the increase in the earth temperature making it warmer (Global Warming & Climate Change, 2012).

What Causes of Global Warming? Scientists have examined all the factors that can affect the Earth's temperature. Three essential factors can be responsible for recent rapid global warming. These are namely The Sun, Earth's reflectivity and Greenhouse gases. Out of these three major factors greenhouse effect causes contributes the most to the process. 1. The Sun: As we all know sun is a huge ball of fire. All the climate changes are powered by the sun. It could have played an important role in heating up the temperature of the earth.

Studies show that since 1985, the sun has changed in ways that if anything, it should have cooled the planet. Therefore sun alone does not cause global warming. 2. Earth’s reflectivity: Earth’s atmosphere traps 70% of the sun’s energy and reflects the remaining back into space. Changes in how much sunlight is absorbed and reflected may change global temperatures. Scientists have calculated how earth’s reflectivity has changed over time. These suggest that a particular type ofpollutionespecially sulfur-containing particles have had a cooling effect masking the effects of greenhouse gases.

Since the industrialization of countries, they began to clean up this pollutant and increase their greenhouse emissions. 3. Greenhouse gases: All scientific evidence point towards one factor only that is greenhouse gases. It is responsible for the rise in global temperature. Greenhouse gases are many chemical compounds found in the earth’s atmosphere. They allow sunlight into the earth’s atmosphere freely. This sunlight when reflected back towards the space by earth in the form of infrared radiation (heat).

The greenhouse gases absorb the infrared radiation and trap the heat in earth’s atmosphere. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Burning of fossil fuels like coal, oil and natural gas as well as wood contribute mainly to the increase in carbon dioxide in the atmosphere (How we know human activity is causing warming, 2012). Climate change Assessments generally suggest that the Earth’s climate has warmed over the past century and that human activity affecting the atmosphere is likely an important driving factor.

A National Research Council study dated May 2001 stated, “ Greenhouse gases are accumulating in Earth’s atmosphere as a result of human activities, causing surface air temperatures and sub-surface ocean temperatures to rise. Temperatures are, in fact, rising. The changes observed over the last several decades are likely mostly due to human activities, but we cannot rule out that some significant part of these changes is also a reflection of natural variability. ” (Greenhouse Gases, Climate Change, and Energy, 2004) International Renewable Energy Agency (IRENA)

The International Renewable Energy Agency (IRENA) was founded in 2009 with the support of World Wind Energy Association and Hermann Scheer the president of EUROSOLAR and chair of the World Council for Renewable Energy. It is a worldwide governmental organization and It’s primary focus is to promote widespread use of renewable energy in all forms with a view of sustainable development. At the Preparatory Commission meeting Abu Dhabi was elected as interim headquarters of the Agency. Its main aim is to promote the use of renewable energy and reduce the emission greenhouse gases in the environment.

IRENA provides advice and support to governments of both industrialized and developing countries on renewable energy policy, capacity building, and technology transfer (irena. org, 2012). Policies for renewable energies in India: Ministry of Non-conventional Energy Sources: India’s search for renewable resources that would lead to sustainable development started in early 70’s. Realising the need for concentrated efforts in this segment, the Indian Government established a Commission for Additional Sources of Energy (CASE) in the Department of Science and Technology in 1981.

The directive of CASE is to promote research and development activities in the field of renewable energy. CASE was formally incorporated in 1982, in the recently created Department of Non-conventional Energy Sources (DNES). In 1992 DNES became the Ministry for Non-conventional Energy Sources, commonly known as MNES. The Prime Minister of India has declared a target of 10% share for Renewable Energy or 10, 000 MW in the power generation capacity to be added during the period up to 2012. The broad objectives predicted in the policy are: Achieving the minimum energy requirements via Renewable energy. •Providing decentralised energy supply in agriculture, industry, commercial and household sectors in rural and urban areas. •Providing grid quality power. Jawaharlal Nehru National Solar Mission: The main goal of this mission is to establish India as the global leader in solar energy. This mission was officially launched Manmohan Singh, the prime minister of India. It is a three phase mission where the 1st phase starts from 2012-2013, 2nd phase from 2013-2017 and 3rd phase from 2017-2022. http://www. nri. org/projects/biomass/conference_papers/policy_material_section_3. pdf) Policies for Renewable resources in US: Renewable Portfolio Standards (RPS): It aims and requires electricity providers to provide a stated amount of customer electricity through renewable resources. Public Benefits Funds for Renewable Energy: These are a pool of resources used by the country to provide and invest renewable energy supply projects. These funds are generated by charging a small amount on consumer’s electricity charges which is called system benefits charge.

Output based environmental regulations: It establishes emission restrictions per unit of any productive energy output, with a aim of controllingair pollutionand encouraging renewable energy. Net Metering: It allows the customers whether residential or commercial who produce their own renewable energy/electricity such as solar energy to get compensation for the energy/electricity they produce. This requires electricity providers to ensure that customer’s electricity meter exactly track how much power or electricity is consumed on location/site or reverted to electricity grid.

When the electricity produced on location isn’t used then it is reverted to the grid; when on location production isn’t enough to meet the customer’s need, then the customer uses electricity from the grid. So, surplus electricity is reverted back to the customer at a later stage/time when they else would have paid for it. Financial Incentives: Such incentives are provided in some states to encourage the development of renewable resources/energy such as tax credits, grants and loans. (http://www. epa. gov/statelocalclimate/state/topics/renewable. html) Polices for Renewable resources in Australia:

Renewable Energy Target: RET is divided in two portions, The large scale renewable energy target and small scale renewable energy target. These targets make a financial incentive for investment in renewable energy sources through the formation and trade of certificates. Australian Renewable Energy Agency (ARENA): ARENA is a Commonwealth authority which supports innovation that advances the renewable resources/energy technologies which would lead to the increasing supply renewable energy in

Australia. (http://australia. gov. au/topics/environment-and-natural-resources/energy)

Policies for Renewable resources in UAE: The Ministry of Foreign Affairs has announced that Abu Dhabi has the target of achieving 7% renewable energy power generation capacity by the year 2020. Abu Dhabi has committed over $15 billion in renewable energy programs. Masdar City Initiative: Established in 2006, Masdar is a wholly owned subsidiary of the Abu Dhabi Government owned Mubadala Development Company. Masdar is a renewable energy company that functions within the growing sector of renewable energy and sustainable technologies, as well across the technology development and commercialization spectrum.

It focuses in 100% renewable energy, developing a carbon neutral city, zero waste, and being the centre of excellence in sustainable technology. REFERENCES Ecology 2011, Fossil Fuels vs. Renewable Energy Resources, Retrieved on July 19, 2012 from http://www. ecology. com/2011/09/06/fossil-fuels-vs-renewable-energy-resources/ Global Warming & Climate Change 2012, Retrieved on July 26, 2012 from http://topics. nytimes. com/top/news/science/topics/globalwarming/index. html Greenhouse Gases, Climate Change, and Energy 2004, Retrieved on July 25, 2012 from http://www. eia. gov/oiaf/1605/ggccebro/chapter1. html

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