REPORT

Role of Renewable Energy Sources in Environment Protection

**Anuj Mathur-18BCE10045**

**INTRODUCTION:**

Renewable resources technologies are cleanest sources of energy and efficient use of these technologies can minimize environmental impacts and leads to less emission of greenhouse gases. By substituting conventional sources of energy, it creates excellent opportunity to have an sustainable development and helps to reduce global warming across the globe.

Renewable energy sources (**RESs**) supply **14%** of total world energy demand. The RESs expected to supply **30%-80%** of total world energy demand by **2100**. As quality of life gets better the consumption of fossil fuels increasing dramatically which leads to diminish fossil fuels reserves. Excess use of fossil fuels demands alarm over the energy crisis has generated a resurgence of interest in promoting renewable alternatives to meet the develop-ing world’s growing energy needs. Emission of **CO2** leads to global warming which have very adverse impact on our environment. The other threats are increase in health risks and threat of global climate change. Now days this issue raised globally and become a political issue especially in developed countries. Society moving toward *sustainable development*, *waste minimization*, reduce *air pollution*, and reduction of *greenhouse gas emission*.

KYOTO Protocol agreement signed by various countries to monitor and reduce the emission of greenhouse gases and to find out scope of renewable energy sources to meet out energy needs.

**Renewable Energy Sources:**

Renewable energy resources will be the next hope for future generations as an energy source. The examples of RESs are solar energy, wind energy, biomass energy, geothermal energy etc. RESs provide energy services with zero or almost zero emissions of both air-pollutants and greenhouse gases and we can use it again and again. Enacting of renewable energy project in rural areas increase job opportunities and reduce mitigation of rural peoples towards urban cities. Use of RESs in efficient manner helps to live sustainable life.

**Climate Change:**

Climate change becomes major concern all around the world in **21st** century**.** The environmental problem relating to energy is global climate change (global warming or the greenhouse effect). The increasing concentration of greenhouse gases such as CO2, CH4, CFCs, N2O, ozone, in the atmosphere traps heat radiated from Earth’s surface and it raises the surface temperature of Earth by **0.4-0.8 ◦C**.

Due to deforestation and the concentration of methane gas which is responsible for ozone layer depletion and increases global mean sea level by **1–2 mm** over the last century.

Industry contributes directly and indirectly about 37% of the global greenhouse gas emissions, of which over 80% is from energy use. Since 1971, emission of CO2 raised by 65%. By 2020, the developing countries could account for half of global CO2 emissions.

**Solar Energy:**

Solar energy is most abundant renewable energy resource. Solar energy is radiant light and heat from the Sun which harnessed by evolving technologies such as solar heating, photo -voltaics, solar thermal energy, solar architectures.

The Sun emits energy at a rate of 3.8 × 1023 kW, of which, approximately 1.8 × 1014 kW is intercepted by the earth. This energy can be utilised for cooking food, water heating, crop drying…etc.

**Solar thermal Applications:**

Solar cooking is the most direct and convenient application of solar energy. Solar energy is a promising option capable of being one of the leading energy sources for cooking. Annually it saves 16.8 million tons of firewood and prevents emission of 38.4 million tons of carbon dioxide per year.

Solar water heating is the conversion of sunlight into heat for water heating using a solar thermal collector and it offers significant protection to the environment and should be employed whenever possible in order to achieve a sustainable future.

**Solar Thermal Power:**

Solar thermal electricity power system is a device which utilize the solar radiation for the generation of electricity. It collected solar energy and converted it to electricity through the use of some sort of heat to electricity conversion device. Electricity production cost through solar energy is quite higher than that of conventional power station. It releases zero carbon emission as it is an major concern all over the globe.

**Solar Photovoltaic System:**

Photovoltaic cells convert solar energy directly into electricity by using photovoltaic (PV) effect. PV effect depends on interaction of photons, with energy equal to, or more than the band-gap of PV materials. Some of the losses due to the band-gap limitations are avoided by cascading semiconductors of different band-gaps. [48]. PV modules generate electricity directly from light without emissions, noise, or vibration. Sunlight is free but power generation cost is exceptionally high. Solar energy has low energy density: PV modules require a large surface area for small amounts of energy generation. The primary component in grid connected PV systems is the inverter, it convert DC power produced by PV array into AC power consistent with the voltage and power quality requirement of the utility gird.

**Wind Energy:**

Wind energy is a form of solar energy. Wind energy (or wind power) describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity. Wind power may prove practical for small power needs in isolated sites, but for maximum flexibility, it should be used in conjunction with other methods of power generation to ensure continuity. Wind energy for electricity production today is a virtually pollution-free technology widely used in many areas of the world.

**Bio-Energy:**

Bio-energy is renewable energy created from natural, biological sources. Many natural sources, such as plants, animals, and their by-products, can be valuable resources. Modern technology even makes landfills or waste zones potential bio-energy resource.

**Bio-Gas:**

Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source. Biogas is a mixture of gases that is composed mainly of CH4(40–70%), CO2 (30–60%), and other gases (1–5%.) The calorific value of biogas is about 16–20 MJ m−3. Biogas has definite advantages, even if compared to other renewable energy alternatives. It can be produced when needed and can easily be stored. It can be distributed through the existing natural gas infrastructure and used in the same applications like the natural gas. The biogas can directly be used for domestic cooking, transportation fuel or distributed on the natural gas grid for end application

**Bio-Diesel:**

Biodiesel is an alternative fuel like conventional or 'fossil' diesel. Biodiesel can be produced from straight vegetable oil, animal oil/fats, tallow and waste cooking oil. The process used to convert these oils to Biodiesel is called transesterification. Biodiesel has the potential to reduce emissions from the transport industry, which is the largest producer of greenhouse gases. The use of biodiesel also reduces the particulate matter released into the atmosphere as a result of burning fuels, providing potential benefits to human health.

**Biomass-Gasifier:**

Gasification is a process that converts organic- or fossil fuel-based carbonaceous materials into carbon monoxide, hydrogen and carbon dioxide. This is achieved by reacting the material at high temperatures (>700 °C), without combustion, with a controlled amount of oxygen and/or steam. Gasification is achieved by partially combusting the biomass in the reactor, and using the heat generated to pyrolyze or thermally break down the rest of the material into volatile gasses. A well-built gasifier will convert wood or other cellulosic biomass into the flammable gases Carbon Monoxide and Hydrogen.

**Hydrogen As Fuel:**

Hydrogen fuel is a zero-emission fuel when burned with oxygen. It can be used in fuel cells or internal combustion engines to power electric vehicles or electric devices. It has begun to be used in commercial fuel cell vehicles such as passenger cars and has been used in fuel cell buses for many years. It is also used as a fuel for spacecraft propulsion.

**1.** The use of biomass reduces CO2 emissions, and thus replacing fossil fuels with sustainable biomass fuel is one option that needs consideration in reducing CO2 emissions.

**2.** The residues conversion increases the value of agricultural output.

**3.** The costs of getting rid of municipal wastes are mounting as land resources are constrained.

It is because hydrogen is a highly combustible and it reacts explosively when it meets air. And hence as a result, storing of the hydrogen gas is difficult and is dangerous at the same time. So, even though hydrogen has the highest calorific value, it is not used as a domestic fuel.

In the future, fuel cells could power our cars, with hydrogen replacing the petroleum fuel that is used in most vehicles today. Unlike a typical battery, which eventually goes dead, a fuel cell continues to produce energy as long as fuel and oxidant are supplied.

**Conclusion:**

The conclusion of the report is that if only depend upon the conventional resources for production of energy soon we will be facing crisis of energy. So it’s the perfect time for us too start thinking about the development of renewable energy so that we can produce energy without causing and harm to the nature and that method can also be everlasting.