

A Study Of Green Energy As A Renewable Energy Source

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Key words: Biomass, Geothermal, Hydropower, Solar power, Wind energy.

Introduction

Green Energy is energy that is collected from renewable sources, which are naturally replenished on a human scale, such as wind, sunlight, rain, tides, waves and geothermal heat. Green energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation.

At the national level, at least 30 nations around the world already have renewable energy contributing more than 20 percent of energy supply. Some places and at least two countries, Iceland and Norway, are already generating all their electricity from green energy sources and many other countries have set target of achieving 100% green energy in the future

Thanks to robust research, new green energy technologies are everywhere, lessening our dependence on fossil fuels. But what is green energy, and what makes it a better option than fossil fuels?

In the past three decades, research and development in green energy has exploded, yielding hundreds of promising new technologies that can reduce our dependence on coal, oil, and natural gas.

Objectives

- To highlight the importance of Green Energy.
- To discuss about replacing the use of fossil fuels with Green Energy.
- To examine the benefits of Green Energy as a renewal energy source.

Research Methodology

- The project data is based on secondary data sources.
- The contents are taken from various articles.
- Different science magazines and websites were referred for collection of the data.

Analyses of Data

Green Energy Defined

Green energy comes from natural sources such as sunlight, wind, rain, tides, plants, algae and geothermal heat. These energy resources are renewable, meaning they're naturally replenished. In contrast, fossil fuels are a finite resource that take millions of years to develop and will continue to diminish with use.

Renewable energy sources also have a much smaller impact on the environment than fossil fuels, which produce pollutants such as greenhouse gases as a by-product, contributing to climate change. Gaining access to fossil fuels typically requires either mining or drilling deep into the earth, often in ecologically sensitive locations.

Green energy, however, utilizes energy sources that are readily available all over the world, including in rural and remote areas that don't otherwise have access to electricity. Advances in renewable energy technologies have lowered the cost of solar panels, wind turbines and other sources of green energy, placing the ability to produce electricity in the hands of the people rather than those of oil, gas, coal and utility companies.

Green energy can replace fossil fuels in all major areas of use including electricity, water and space heating and fuel for motor vehicles.

Types of Green Energy

Research into renewable, non-polluting energy sources is advancing at such a fast pace, it's hard to keep track of the many types of green energy that are now in development. Here are 6 of the most common types of green energy:

Solar power - The most prevalent type of renewable energy, solar power is typically produced using photovoltaic cells, which capture sunlight and turn it into electricity. Solar energy is also used to heat buildings and water, provide natural lighting and cook food. Solar technologies have become inexpensive enough to power everything from small hand-held gadgets to entire neighbourhood.

Solar Photovoltaic (PV) is a technology that converts sunlight (solar radiation) into direct current electricity by using semiconductors. When the sun hits the semiconductor within the PV cell, electrons are freed and form an electric current. Solar PV technology is generally employed on a panel (hence solar panels).

Wind power - Air flow on the earth's surface can be used to push turbines, with stronger winds producing more energy. High-altitude sites and areas just offshore tend to provide the best conditions for capturing the strongest winds. According to a study published in the Proceedings of the National Academy of Sciences, a network of land-based, 2.5-megawatt wind turbines in rural areas operating at just 20% of their rated capacity could supply 40 times the current worldwide consumption of energy.

Hydropower - Also called hydroelectric power, hydropower is generated by the Earth's water cycle, including evaporation, rainfall, tides and the force of water running through a dam. Hydropower depends on high precipitation levels to produce significant amounts of energy.

Geothermal energy - Just under the earth's crust are massive amounts of thermal energy, which originates from both the original formation of the planet and the radioactive decay of minerals. Geothermal energy in the form of hot springs has been used by humans for millennia for bathing, and now it's being used to generate electricity. In North America alone, there's enough energy stored underground to produce ten (10) times as much electricity as coal currently does.

Biomass - Recently-living natural materials like wood waste, sawdust and combustible agricultural wastes can be converted into energy with far fewer greenhouse gas emissions than petroleum-based fuel sources. That's because these materials, known as biomass, contain stored energy from the sun.

Biofuels - Rather than burning biomass to produce energy, sometimes these renewable organic materials are transformed into fuel. Notable examples include ethanol and biodiesel. Biofuels provided 2.7 percent of the world's fuels for road transport in 2010, and have the potential to meet more than 25 percent of world demand for transportation fuels by 2050.

FINDINGS

From data reviewed it has been summarized that the experts have listed the benefits of Green energy as under:

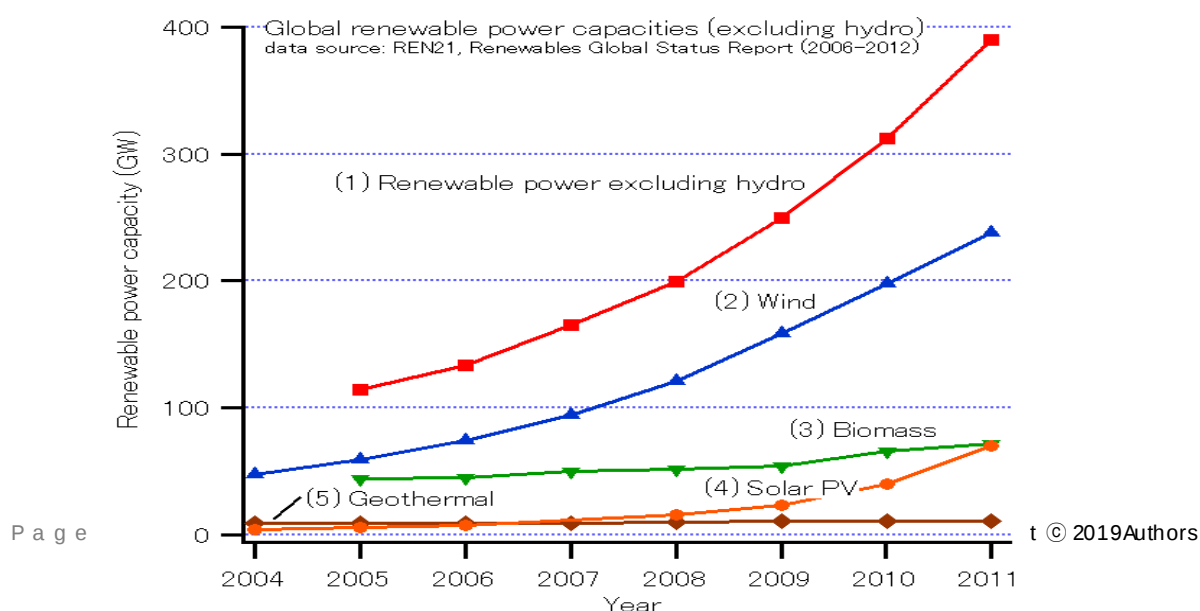
- ✓ It helps in generating energy that produces no greenhouse gas emissions from fossil fuels and reducing air pollution.

- ✓ It helps in diversifying energy supply and reducing dependence on imported fuels.
- ✓ It helps in economic development by creating jobs in manufacturing, installation and more.
- ✓ It provides the foundation for energy independence.
- ✓ Even more importantly, green energy produces little or no waste products such as carbon dioxide or chemical pollutants.
- ✓ Green energy projects can also bring economic benefits to many regions/areas.
- ✓ It is safe, abundant and clean to use when compared to fossil fuels.

GROWTH OF GREEN ENERGY

<i>Selected Renewable Energy Global Indicators</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>
Hydropower capacity	885	915	945	970	990
Wind power capacity	121	159	198	238	283
Solar PV capacity	16	23	40	70	100
Solar hot water capacity	130	160	185	232	255
Renewable capacity	1140	1230	1320	1360	1470

Renewable power capacity is set to expand by 50% between 2019 and 2024, led by Solar Photovoltaic (PV). This increase of 1 200 GW is equivalent to the total installed power capacity of the United States today. Solar PV alone accounts for almost 60% of the expected growth, with onshore wind representing one-quarter.



Agriculture: A Source of Green Energy

Renewable or green energy and agriculture can be a winning combination and could provide significant rural economic development opportunities in many countries. Wind, solar and biomass energy can be harvested forever, providing farmers with a long-term source of income. Green energy can be used on the farm to replace other fuels or sold as “cash crop.”

Wind energy alone could provide 80,000 new jobs and \$1.2 billion in new income for farmers and rural landowners by 2020, according to the U.S. Department of Energy. Green energy can also help reduce pollution, global warming, and dependence on imported fuels.

Policy Trends

The International Renewable Energy Agency (IRENA) is an intergovernmental organization for promoting the adoption of renewable energy worldwide. It aims to provide concrete policy advice and facilitate capacity building and technology transfer. IRENA was formed in 2009, by 75 countries signing the charter of IRENA.

The 2015 Paris agreement on climate change motivated many countries to develop or improve renewable energy policies. In 2017, a total of 121 countries have adapted some form of renewable energy policy. National targets that year existed in at 176 countries. In addition, there is also a wide range of policies at state/provincial and local levels.

Many national, state, and local governments have created green banks. A green bank is a quasi-public financial institution that uses public capital to leverage private investment in clean energy technologies. Green banks use a variety of financial tools to bridge market gaps that hinder the deployment of clean energy. The US military has also focused on the use of renewable fuels for military vehicles. Unlike fossil fuels, renewable fuels can be produced in any country, creating a strategic advantage. The US military has already committed itself to have 50% of its energy consumption come from alternative sources.

Cons of Green Energy

➤ High upfront cost

While you can save money by using renewable energy, the technologies are typically more expensive upfront than traditional energy generators. To combat this, there are often financial incentives, such as tax credits and rebates, available to help alleviate your initial costs of renewable technology.

➤ Intermittency

Though renewable energy resources are available around the world, many of these resources aren't available 24/7, year-round. Some days may be windier than others, the sun doesn't shine at night, and droughts may occur for periods of time.

➤ Storage capacity

Because of the intermittency of some renewable energy sources, there's a high need for energy storage. While there are storage technologies available today. They can be expensive, especially for large-scale renewable energy plants.

Emerging Technologies

Other renewable energy technologies are still under development, and include cellulosic ethanol, hot dry rock, geothermal energy and marine energy. These technologies are not yet widely demonstrated or have limited commercialization. Many are on the horizon and may have potential comparable to other renewable energy technologies, but still depend on attracting sufficient attention and research, development and demonstration (RD&D) funding.

✓ Enhanced Geothermal System

Enhanced geothermal systems (EGS) are a new type of geothermal power technologies that do not require natural convective hydrothermal resources. The vast majority of geothermal energy within drilling reach is in dry and non-porous rock. EGS technologies "enhance" and create geothermal resources in this "hot dry rock (HDR)" through hydraulic stimulation.

✓ Cellulosic Ethanol

Several refineries that can process biomass and turn it into ethanol are built by companies such as LOGEN, POET and ABENGOA, while other company DYADIC INTERNATIONAL, VERENIUM CORPORATION and NOVOZYMES are producing enzymes which could enable future commercialization. The shift from food crop feedstocks to waste residues and native grasses offers significant opportunities for a range of players, from farmers to biotechnology firms, and from project developers to investors.

✓ Marine Energy

Marine energy (also sometimes referred to as ocean energy) refers to the energy carried by ocean waves, tidal, salinity. The movement of water in the world's oceans creates a vast store of Kinetic energy. This energy can be harnessed to generate electricity to power homes, transport and industries.

S NO	STATION	COUNTRY	CAPACITY
1.	SHIWA LAKE TIDAL POWER STATION	SOUTH KOREA	254 MW
2.	RANCE TIDAL POWER STATION	FRANCE	240 MW
3.	ANNAPOLIS ROYAL GENERATING STATION	CANADA	20 MW

Conclusion

According to this research, it is concluded that green energy may play a much bigger role in decentralized or distributed power systems and also help to improve the environment in an effective and efficient manner and also help to increase the economic development or growth of a country.

The issue of waste management has moved to a central stage, both in the public perception and in terms of national regulations. 200 years ago when humans first started to burn their waste as a means of disposal, there was no awareness about gas emissions.

In India the Government has taken steps to look into matters related to renewable or Green energy. The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country.

While there are many large scale green energy projects that have been implemented in cities, renewable technologies are also suitable for rural and remote areas. Green energy needs to be harnessed in developing countries, where energy is crucial for human development.