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An overview of the types of renewable energy and its importance

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Annotation: This article provides specific information on renewable energies. In addition, this article describes the types of renewable resources and their importance over time. At the end of this article, the importance of renewable energy sources for humanity is given with clear facts.

Key words: Renewable energy, solar energy, wind energy, geothermal energy, hydropower, ocean energy, bioenergy.

Renewable energy is energy obtained from natural sources that are replenished at a rate greater than the rate at which it is consumed. Examples of such constantly replenished sources are sunlight and wind. Renewable sources can provide enormous amounts of energy and are all around us.

Renewable energy is energy collected from renewable sources that replenish naturally over time. It includes sources such as sunlight, wind, water movement and geothermal heat.[1]

While most renewable energy sources are sustainable, some are not. For example, some biomass energy sources are considered unsustainable in their current operation.[2]

Renewable energy often generates energy to generate electricity for the electric grid, air and water heating and cooling, and self-contained energy systems.

Producing energy from renewable sources is associated with much lower emissions than burning fossil fuels. The transition from fossil fuels, which currently account for the lion's share of emissions, to renewable energy sources is keys to tackling the climate crisis. Today, renewable energy is a cheaper alternative in most countries and creates three times more jobs than fossil fuels. Following there are the types of renewable sources.

SOLAR ENERGY: Solar energy is the richest of all energy resources and can be used even in cloudy weather. The rate at which solar energy is captured by the Earth is approximately 10,000 times the rate at which humanity consumes energy.

Solar technologies can provide heat, cooling, natural light, electricity and fuel for a variety of applications. These technologies make it possible to convert sunlight into electrical energy using photovoltaic panels or mirrors that concentrate solar radiation.

Although not all countries are equally endowed with solar energy, each can make a significant contribution to the energy mix from solar energy itself.

In the last decade, the cost of producing solar panels has fallen sharply, making them not only affordable, but often the cheapest way to generate electricity. Solar panels have a lifespan of about 30 years and come in different shades depending on the type of material used in their production. The

[1] Ellabban, Omar; Abu-Rub, Haitham; Blaabjerg, Frede (2014). "Renewable energy resources: Current status, future prospects and their enabling technology". Renewable and Sustainable Energy Reviews. 39-volume. 748–764 [749]-page.
[2] *Harvey.* "Congress Says Biomass Is Carbon Neutral but Scientists Disagree - Using wood as fuel source could actually increase CO2 emissions". Scientific American (March 23, 2018).

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continued decline in the cost of renewable energy equipment, such as wind turbines and solar panels, will lead to an increase in the use of renewable energy sources.[3]

WIND ENERGY;Wind energy harnesses the kinetic energy of moving air using large wind turbines located on land (onshore wind farms) or in sea or fresh water (offshore/coastal wind farms). Wind energy has been used for thousands of years, but over the past few years, onshore and offshore wind technology has evolved to maximize the amount of electricity produced through taller turbines and larger rotating diameters.

Although average wind speed varies greatly by location, the global technical potential for wind energy exceeds global electricity production, and most regions of the world have sufficient capacity to develop a significant number of wind power plants.

Strong winds occur in many regions of the world, but sometimes remote areas are best suited for wind power generation. Offshore wind energy has enormous potential. Modern wind power plants produce energy close to the nominal capacity of 600 kW to 9 MW. The power available from the wind is a function of the cube of the wind speed, so as the wind speed increases, the power output increases up to the maximum power output at a given station.[4]

Areas where the wind is stronger and more constant, such as the sea and high mountains, wind farms are the most suitable places for this type of energy production.

Wind generated electricity met nearly 4 percent of global electricity demand in 2015. Wind power is the leading source of new power in Europe, the United States, and Canada. It ranks second in China. In Denmark, wind power meets more than 40% of electricity demand, while Ireland, Portugal and Spain meet almost 20%.[5]

GEOTHERMAL ENERGY: Geothermal energy uses the available thermal energy from the Earth's interior. Heat is obtained from geothermal reservoirs through drilling or other means.

Reservoirs that are sufficiently hot and permeable in nature are called hydrothermal reservoirs, and reservoirs that are hot enough and enhanced by hydraulic stimulation are called advanced geothermal systems.

Liquids of different temperatures that appear on the surface can be used to generate electricity. The technology for producing electricity from hydrothermal reservoirs is mature and reliable and has been used for more than 100 years. Hydropower is produced in 150 countries. In 2010, the Asia-Pacific region produced 32% of global hydropower. Of the top 50 countries for the share of electricity generated from renewable sources, 46 are primarily hydroelectric.[6] Tidal power, which captures the energy of ocean surface waves, and tidal power, which converts wave motion into energy, are two new forms of hydropower with potential future potential. But they are not yet widely used commercially.[7] The demonstration project, operated and connected to the grid by Ocean Renewable Energy, located off the coast of Maine, harnesses tidal energy from the Bay of Fundy, home to the highest tide in the world.

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[3] "Global Trends in Sustainable Energy Investment 2007: Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency in OECD and Developing Countries". *unep.org*. United Nations Environment Programme (2007).

[4] "Analysis of Wind Energy in the EU-25". European Wind Energy Association.

[5] "Electricity – from other renewable sources - The World Factbook". *www.cia.gov*.

[6] "Renewable Electricity Capacity and Generation Statistics, June 2018"

[7] "Wave power - U.S. Energy Information Administration (EIA)"

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HYDRO POWER: Hydropower uses the energy of water moving from higher altitudes to lower altitudes. Such energy can be obtained using reservoirs and rivers. Hydroelectric power plants on reservoirs use the water reserves located in them, while run-of-the-river hydroelectric power plants use the energy of available river flow.

Hydropower reservoirs often serve multiple purposes, providing drinking and irrigation water, flood and drought control, navigation services, and energy supplies.

Currently, hydropower is the largest source of renewable energy in the electricity sector. It depends on generally stable precipitation patterns and may be negatively affected by climate-induced droughts or changes in ecosystems that affect such patterns.

The infrastructure required to generate hydropower can also have adverse impacts on ecosystems. For this reason, many consider small hydroelectric power plants to be a more environmentally friendly option, especially suitable for people in remote areas.

OCEAN ENERGY: Ocean energy uses technologies that harness the kinetic and thermal energy of seawater—such as waves or currents—to produce electricity or heat.

Ocean energy systems are still in the early stages of development; A number of prototype devices using waves and tidal currents are currently being tested. In theory, ocean energy could easily exceed current human energy needs.

BIOENERGY: Bioenergy is obtained from a variety of organic materials called biomass, such as wood, charcoal, manure and other organic fertilizers used to produce heat and electricity, and crops used to produce liquid biofuels. Most biomass is used in rural areas for cooking, lighting and space heating, and its main consumers tend to be poorer populations in developing countries.

Modern biomass systems include specialty crops or trees, residues from agriculture and forestry, and various organic waste streams.

Producing energy by burning biomass produces greenhouse gas emissions, but to a lesser extent than burning fossil fuels such as coal, oil or gas. However, bioenergy should only be used for limited purposes, given the potential negative environmental impacts associated with the massive expansion of forestry and bioenergy plantations and the resulting deforestation and land use changes.

Renewable resources are of great importance worldwide. From 2011 to 2021, renewable energy has grown from 20% to 28% of the global electricity supply system. Fossil energy decreased from 68% to 62%, and nuclear energy from 12% to 10%. The share of hydropower decreased from 16% to 15%, while solar and wind energy increased from 2% to 10%. Biomass and geothermal energy grew between 2% and 3%. 135 countries have 3,146 gigawatts of installed capacity, while 156 countries have developed laws to regulate the renewable energy sector.[8]

There are more than 10 million jobs globally related to the renewable energy industry. Among them, solar photovoltaic is the largest employing system of renewable energy sources.[9] Renewable energy technology projects are usually large-scale, but they are also suitable for rural, remote areas and developing countries where energy is often critical to human development. Since most renewable energy technologies are powered by electricity, renewable energy is often used interchangeably with

[8] "Renewables 2022 - Global Status Report". № renewable energies. 44-page.
[9] "Renewable Energy and Jobs – Annual Review 2020"

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the term electrification. Renewable energy often replaces four sectors that use conventional fuels: electricity generation, hot water, transportation, and agricultural (off-grid) energy services.[10]

Renewable sources can provide enormous amounts of energy and are all around us. In contrast, fossil fuels—coal, oil and gas—are non-renewable resources that take hundreds of millions of years to form. Renewable energy sources do not pollute the environment, help reduce greenhouse gas emissions into the atmosphere, and reduce the consequences of climate change. They are practically inexhaustible, while fossil fuels will eventually run out. Renewable energy is not the result of deliberate human activity, and this is its distinguishing feature.

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[10] Renewables Global Status Report 2010.