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The importance of renewable energy

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Abstract

In current times, there are still a lot of people who don't understand the importance of renewable energy. The world population is expected to exceed 10 billion by 2050, as is the demand for energy in both developed and developing countries. How can a planet of 10 billion people be adequately supplied with clean, safe, and substantial energy? Renewable energy sources are increasingly seen as an essential component of the solution. Concern over the pollution, resource depletion, and potential climate change effects of our continued use of traditional fossil and nuclear fuels has contributed to the increased interest in renewable energy sources. Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Sunlight and wind, for example, are such sources that are constantly being replenished. Renewable energy sources are plentiful and all around us. Fossil fuels - coal, oil and gas - on the other hand, are non-renewable resources that take hundreds of millions of years to form. Fossil fuels, when burned to produce energy, cause harmful greenhouse gas emissions, such as carbon dioxide. Generating renewable energy creates far lower emissions than burning fossil fuels. Transitioning from fossil fuels, which currently account for the lion's share of emissions, to renewable energy is key to addressing the climate crisis. Renewables are now cheaper in most countries, and generate three times more jobs than fossil fuels.

Keywords: Renewable energy, fossil fuels, solar energy

Introduction

Common sources of renewable energy

Solar energy

Solar energy is the most abundant of all energy resources and can even be harnessed in cloudy weather. The rate at which solar energy is intercepted by the Earth is about 10,000 times greater than the rate at which humankind consumes energy. Solar technologies can deliver heat, cooling, natural lighting, electricity, and fuels for a host of applications. Solar technologies convert sunlight into electrical energy either through photovoltaic panels or through mirrors that concentrate solar radiation. Although not all countries are equally endowed with solar energy, a significant contribution to the energy mix from direct solar energy is possible for every country. The cost of manufacturing solar panels has plummeted dramatically in the last decade, making them not only affordable but often the cheapest form of electricity. Solar panels have a lifespan of roughly 30 years, and come in variety of shades depending on the type of material used in manufacturing.

Wind energy

Wind energy harnesses the kinetic energy of moving air by using large wind turbines located on land (onshore) or in sea- or freshwater (offshore). Wind energy has been used for millennia, but onshore and offshore wind energy technologies have evolved over the last few years to maximize the electricity produced - with taller turbines and larger rotor diameters. Though average wind speeds vary considerably by location, the world's technical potential for wind energy exceeds global electricity production, and ample potential exists in most regions of the world to enable significant wind energy deployment. Many parts of the world have strong wind speeds, but the best locations for generating wind power are sometimes remote ones. Offshore wind power offers tremendous potential.

Geothermal energy

Geothermal energy utilizes the accessible thermal energy from the Earth's interior.

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Heat is extracted from geothermal reservoirs using wells or other means. Reservoirs that are naturally sufficiently hot and permeable are called hydrothermal reservoirs, whereas reservoirs that are sufficiently hot but that are improved with hydraulic stimulation are called enhanced geothermal systems. Once at the surface, fluids of various temperatures can be used to generate electricity. The technology for electricity generation from hydrothermal reservoirs is mature and reliable, and has been operating for more than 100 years

Hydropower

Hydropower harnesses the energy of water moving from higher to lower elevations. It can be generated from reservoirs and rivers. Reservoir hydropower plants rely on stored water in a reservoir, while run-of-river hydropower plants harness energy from the available flow of the river. Hydropower reservoirs often have multiple uses - providing drinking water, water for irrigation, flood and drought control, navigation services, as well as energy supply. Hydropower currently is the largest source of renewable energy in the electricity sector. It relies on generally stable rainfall patterns, and can be negatively impacted by climate-induced droughts or changes to ecosystems which impact rainfall patterns. The infrastructure needed to create hydropower can also impact on ecosystems in adverse ways. For this reason, many consider small-scale hydro a more environmentally-friendly option, and especially suitable for communities in remote locations.

Ocean energy

Ocean energy derives from technologies that use the kinetic and thermal energy of seawater - waves or currents for instance - to produce electricity or heat. Ocean energy systems are still at an early stage of development, with a number of prototype wave and tidal current devices being explored. The theoretical potential for ocean energy easily exceeds present human energy requirements.

Bioenergy

Bioenergy is produced from a variety of organic materials, called biomass, such as wood, charcoal, dung and other manures for heat and power production, and agricultural crops for liquid biofuels. Most biomass is used in rural areas for cooking, lighting and space heating, generally by poorer populations in developing countries. Modern biomass systems include dedicated crops or trees, residues from agriculture and forestry, and various organic waste streams. Energy created by burning biomass creates greenhouse gas emissions, but at lower levels than burning fossil fuels like coal, oil or gas. However, bioenergy should only be used in limited applications, given potential negative environmental impacts related to large-scale increases in forest and bioenergy plantations, and resulting deforestation and land-use change.

A shift to renewables has been motivated by multiple global crises such as discouraging climate scenarios, skyrocketing fossil fuel prices, macroeconomic instability, and especially a pressing energy crisis. Thankfully then, renewables have become more stable and affordable over time. As a result, since 2011, renewable energy has been growing faster than all other energy forms. Renewable energy had another record-breaking year in 2022, as installed power capacity grew by 348 gigawatts (GW) – its largest increase ever.

Now 30% of our electricity comes from renewable energy – and this percentage keeps growing. The rising share of electricity in the total final energy consumption of end-use sectors has enabled the higher integration of renewables. Despite consensus that a move from fossil fuels to renewable energy is needed and the resultant growth in renewable sources of energy, this sector is still facing significant barriers as it is unable to compete fairly against heavily subsidised fossil fuels. As a result, the world still relies predominantly on fossil fuels to obtain energy. Meanwhile, the pollution caused by fossil fuels has reached record levels.

Key benefits of renewable energy for people and the planet

Like any human activity, all energy sources have an impact on our environment. Renewable energy is no exception, and each source has its own trade-offs. However, the advantages over the devastating impacts of fossil fuels are undeniable: from the reduction of water and land use, less air and water pollution, less wildlife and habitat loss, to no or lower greenhouse gas emissions. In addition, their local and decentralised character as well as technology development generate important benefits for the economy and people.

- **Renewable energy emits no or low air pollutants:** That's better for our health worldwide increases in fossil fuel-based road transport, industrial activity, and power generation (as well as the open burning of waste in many cities) contribute to elevated levels of air pollution. In many developing countries, the use of charcoal and fuelwood for heating and cooking also contributes to poor indoor air quality. According to studies by the World Health Organisation, the presence of particles and other air pollutants above urban skies are responsible for millions of premature deaths and cost billions in health and economic costs. Renewable energy does not impact air quality during operations. Replacing the current fossil fuel-based energy system to a renewables-based system is the most urgent and efficient way to tackle air pollution.
- **Renewable energy emits no or low greenhouse gases** That's good for the climate. The combustion of fossil fuels for energy results in a significant amount of greenhouse gas emissions that contribute to global warming. Most sources of renewable energy result in little to no emissions, even when considering the full life cycle of the technologies.
- **Renewable energy prices are more stable and secure** That's good for keeping energy prices at affordable levels. Evolving energy markets and geopolitical uncertainty have moved energy security and energy infrastructure resilience to the forefront of many national energy strategies. Geopolitical strife and upheavals often come with increasing energy prices and limited access to resources, which threatens security of energy supply. Since renewable energy is produced locally and reduces the need for energy imports, it is less affected by geopolitical crisis, price spikes, or sudden disruptions in the supply chain, thereby enhancing regional energy security.

- **Renewable energy comes at lower costs:** That's good for development and energy access. In most parts of the world, renewable energy technologies, and particularly wind and solar energy, remain more cost-effective than fossil fuels. Furthermore, the levelised cost of electricity (LCOE) for renewable technologies continue to decline rapidly as seen in the above figure. In situations where fossil fuels do appear to be the lower-cost option, this is largely due to them being heavily subsidised by financial institutions and governments.
- **Renewable energy creates jobs and can address gender inequality. That's good for local communities.** Deployment of renewables creates employment opportunities and contributes to growth in gross domestic product, largely through the expansion of renewable energy manufacturing and deployment. The energy transition is projected to result in a global net gain in employment, with more jobs created by ramping up renewable capacity than lost by phasing out fossil energy. Providing further hope is that an estimated 70% of jobs in the oil and gas industry overlap with the skills needed for the energy transition. Renewables can also play a key role in reducing gender inequality, for instance by creating jobs and entrepreneurial opportunities for women.
- **Renewable energy is democratic. That's good for inclusion:** Energy communities are citizen-driven groups that organise collectively owned renewable energy projects. In recent years, the number of community energy projects using renewable sources have surged in various parts of the world. Although community energy is frequently associated with Northern European countries such as Denmark and Germany, such projects are emerging in other parts of the world including Thailand, Japan, and Canada. Energy communities enable citizens to directly participate in the energy transition, increasing overall community engagement and societal support of renewable energy projects. Renewables provide opportunity for further inclusion through their potential for decentralised energy supply, as this allows for increased electricity access to rural areas far from the main power grid. Decentralised renewables are the fastest way to scale up electricity access, which works to alleviate poverty and support low-income communities. In order to assure a better future for everyone, sustainable development attempts to balance economic, social, and environmental factors. The goal is to develop a society where everyone has access to the resources they require to lead respectable lives without endangering the environment. As an engineer at the best m.e. power systems engineering college in Coimbatore, you might be involved in network infrastructure, efficient recycling implementation, and environmental impact evaluation of energy-producing projects. The objective is to make sure that development's social, economic, and environmental components are interconnected and mutually supportive of one another. Let's discuss a few of the most important ways that technologies for renewable energy contribute to sustainable development.
- **Reducing emissions of greenhouse gases:** Greenhouse gas emissions can be reduced, and the effects of climate change can be mitigated, by using renewable energy sources. The usage of fossil fuels and the damage caused by the carbon dioxide that is released into the environment can be reduced with the help of clean renewable energy sources like solar and wind power. This sustainable development will help India's financial sector experience exceptional growth.
- **Further developing energy security:** Renewable energy sources can boost energy security by reducing the need for imported fuels and boosting the reliability of the energy supply. By using readily available resources like solar and wind power, nations can increase their energy independence and decrease their reliance on foreign energy sources. In the contemporary world, renewable energy is a trustworthy source of power. Fuel diversification reduces the likelihood of fuel spills and reduces the nation's reliance on imported fuels.
- **Providing energy access:** Especially in poor countries, previously powerless groups can now use renewable energy sources. While having access to energy is essential for many parts of daily life, like lighting, cooking, and heating, it also has the potential to lower hunger rates and raise living standards. The Indian government has initiated a number of measures to bring electricity to all areas. Investment policies in renewable energy have boosted energy accessibility to a larger level and helped people all around the country, even those in distant places.
- **Promoting the growth of rural areas:** By providing rural people with access to energy, renewable energy technologies can support the development of rural areas by enhancing agricultural output, driving economic growth, and enhancing the quality of life. It is vital to consider how our environment is impacted by everything in it. It is everyone's responsibility to protect the environment and natural resources. Over many years, severe climatic shifts have resulted from the uncontrolled utilisation of non-renewable resources. As a result, adopting renewable energy will contribute to reducing climate change and ensuring a sustainable future for future generations.
- **Creating Job Prospects:** Particularly in the production and installation of renewable energy systems, renewable energy technologies have the potential to boost economic expansion and create jobs. For instance, the expansion of the solar power industry has resulted in the creation of a large number of jobs in the fields of solar panel manufacturing and system installation. Since carbon is an essential component of the earth's ecosystem, a sustainable equilibrium is required, which is not the case right now. Between the earth's surface and the ozone layer, carbon atoms have become stuck in the atmosphere. This is insulating and warming our planet, resulting in catastrophic effects: sea levels are rising, extreme weather is getting worse, and glaciers are melting. Climate change can only be stopped by using renewable energy. The engineering college in Coimbatore offers courses on energy and power systems for both undergraduate and graduate students. A degree in renewable energy will prepare you for employment in that profession and other related fields.

In essence, renewable energy is the future. Its myriad advantages, from environmental to economic, present an irrefutable argument for its widespread adoption. As we stand at the crossroads of an energy revolution, the importance of renewable energy sources becomes paramount. The energy sources of the future are here, and they promise a brighter, greener, and more sustainable tomorrow.

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