**Green Energy**

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Green energy, also known as renewable energy, refers to energy derived from sources that are environmentally sustainable and have a minimal impact on the planet compared to traditional energy sources like fossil fuels. These sources are considered “green” because they are typically more environmentally friendly, produce fewer greenhouse gas emissions, and have the potential for long-term use without depleting natural resources. Common forms of green energy include:

Solar Energy: Generated from the sun’s rays using solar panels to convert sunlight into electricity or solar thermal systems to harness heat.

Wind Energy: Produced by harnessing the power of the wind using wind turbines to generate electricity.

Hydropower: Generated by harnessing the energy of flowing water, often through the use of dams or river systems, to produce electricity.

Geothermal Energy: Extracted from the Earth’s internal heat, either through steam turbines or direct heating.

Biomass Energy: Derived from organic materials such as plants, wood, and agricultural or municipal waste, and converted into energy through processes like combustion or biofuel production.

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These sources of energy are considered more sustainable because they are naturally replenished and have lower environmental impacts in terms of air and water pollution, as well as the emission of greenhouse gases. The development and utilization of green energy play a crucial role in mitigating climate change and reducing dependence on finite and polluting fossil fuel resources.

The importance of green energy is multifaceted, encompassing environmental preservation, climate change mitigation, economic development, and improved public health. Transitioning to green energy is a crucial step toward a more sustainable and resilient future. The green energy lies in addressing pressing environmental, economic, and social challenges associated with traditional energy sources.

Green energy sources, such as solar, wind, and hydropower, produce energy with significantly lower or zero emissions of greenhouse gases compared to fossil fuels. This helps combat climate change and reduces air pollution. Green energy relies on renewable resources like sunlight, wind, and water, which are continuously replenished. Unlike fossil fuels, these resources are not finite, and their extraction and use have less impact on ecosystems. The use of green energy helps reduce the concentration of greenhouse gases in the atmosphere, playing a crucial role in mitigating global warming and its associated impacts, such as rising sea levels and extreme weather events. Green energy sources contribute to diversifying the energy mix, reducing dependence on a single, often geopolitically sensitive, source of energy.

This enhances energy security by making nations less vulnerable to supply disruptions. Distributed renewable energy systems, such as rooftop solar panels, contribute to a more resilient and decentralized energy infrastructure, reducing vulnerability to large-scale outages. The green energy sector provides employment opportunities in manufacturing, installation, maintenance, and research and development. As the industry grows, it stimulates economic activity and fosters innovation.

Advances in technology have made many green energy sources increasingly cost-competitive with traditional sources. As costs continue to decline, the economic case for adopting green energy becomes stronger. The transition to green energy reduces air pollution associated with the burning of fossil fuels. This has direct health benefits, particularly in urban areas where poor air quality can lead to respiratory problems and other health issues. Unlike fossil fuels, the cost of renewable energy is not subject to the same price volatility influenced by geopolitical events. This stability contributes to long-term energy planning and reduces uncertainties in energy markets. The pursuit of green energy solutions drives technological innovation. Advances in energy storage, grid management, and efficiency improvements benefit not only the green energy sector but also have broader applications across various industries.

Smog and green energy are interconnected through their impact on air quality and the environment. Smog is a type of air pollution that results from the interaction of pollutants in the atmosphere, particularly in urban areas. It is often associated with the burning of fossil fuels and can have detrimental effects on human health and the environment. Green energy, on the other hand, represents a cleaner and more sustainable approach to energy production, which can help mitigate the factors contributing to smog formation.

While the adoption of green energy is a positive step in addressing air quality issues and reducing smog formation, it’s important to note that other measures, such as sustainable urban planning, regulations on industrial emissions, and public transportation improvements, also play crucial roles in combating smog and enhancing overall environmental health. Pakistan has been making efforts to increase the share of renewable and green energy in its energy mix. Pakistan has implemented various policies and initiatives to promote renewable energy, including the Alternative and Renewable Energy Policy 2019. This policy aims to increase the share of renewable energy in the total power generation capacity and encourages investment in clean energy projects. Pakistan has made significant investments in solar energy projects.

The Quaid-e-Azam Solar Park in Bahawalpur is one of the largest solar power plants in the country, with a capacity of several hundred megawatts. Wind energy projects have also gained traction in Pakistan. The country has several wind farms in operation, and new projects have been planned to harness the wind potential in different regions. Hydropower is a traditional source of renewable energy in Pakistan. The country has existing hydropower plants, and there are ongoing efforts to explore additional hydropower potential. Efforts have been made to enhance the integration of renewable energy into the national grid. The government has been working on improving the grid infrastructure to accommodate the intermittent nature of renewable energy sources.

Pakistan has introduced net metering policies to encourage the use of solar panels on rooftops. This allows consumers to generate their electricity and feed excess energy back into the grid, providing an incentive for the adoption of solar energy. Both the public and private sectors in Pakistan have shown interest in investing in green energy projects. Foreign investors have also participated in the development of renewable energy infrastructure. Despite progress, challenges such as financial constraints, policy implementation, and grid reliability still exist. However, there are opportunities for further growth, and ongoing efforts are being made to address these challenges. Pakistan, like many other countries, faces energy challenges, including a reliance on conventional fossil fuels and associated environmental concerns. Implementing solutions for green energy can help address these challenges and promote sustainable development. Implementing these solutions requires a coordinated effort from the government, private sector, and civil society. By embracing green energy solutions, Pakistan can not only address its energy challenges but also contribute to global efforts to combat climate change and promote sustainable development.

Pakistan can accelerate its transition to a more sustainable and resilient energy system, reaping the economic, environmental, and social benefits of green energy adoption. Collaboration between the government, private sector, and civil society is crucial for the successful implementation of these efforts and initiatives.

Green energy represents a critical and transformative shift towards a more sustainable and environmentally responsible energy paradigm. The adoption of renewable energy sources such as solar, wind, hydropower, and others offers a myriad of benefits that extend beyond the energy sector. The transition to green energy is imperative for a sustainable and resilient future. It requires coordinated efforts from governments, businesses, communities, and individuals to overcome challenges, embrace innovations, and collectively shape a cleaner, more sustainable world for generations to come.

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