Chapter 4
Renewable Energy Sources for a Sustainable Worldwide Prospective:
Forecasting Future Multi-Sector Sustainable Regulations

Shweta Katre
Bhilai Institute of Technology, India

Jayasri Kotti
https://orcid.org/0000-0001-6501-1948
GMR Institute of Technology, India

Namra Joshi
https://orcid.org/0000-0003-0515-3156
SVKM'S Institute of Technology, India

Nagorao Pawar
MGM's College of Engineering and Technology, India

Sabyasachi Pramanik
https://orcid.org/0000-0002-9431-8751
Haldia Institute of Technology, India

Ankur Gupta
https://orcid.org/0000-0002-4651-5830
Vaish College of Engineering, Rohtak, India

ABSTRACT

First of all, concerns about climate change and environmental damage, coupled with the depletion of fossil fuels, are driving global shifts towards renewable energy sources. Two especially notable and widely adopted alternatives that have the potential to change our energy landscape and mitigate the effects of global warming are wind and solar energy. As a sustainable resource, wind energy has evolved from simple windmills to intricate, high-tech wind turbines. It includes wind farms that are both onshore and offshore and is characterized by scalability, versatility, and capacity

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to use natural forces. Although there are challenges in incorporating wind energy into the present energy infrastructure, innovative solutions are emerging swiftly. The majority of solar energy is generated utilizing solar photovoltaic (PV) and concentrated solar power (CSP) technologies. Solar energy is an abundant and clean energy source. CSP methods focus sunlight to produce electricity and heat energy, whereas solar PV systems are very flexible and suitable for distributed production.

INTRODUCTION

Assurance on non-renewable resources, like fossil fuels, is a defining feature of the modern energy environment. These resources give considerable to greenhouse gas emissions, and also represent dangers to energy security. A worldwide pattern transfer towards renewable energy origins has obtained traction as a result of people realizing how urgent a change is. Wind and solar energy have become more popular throughout this shift, providing greener alternates which use the immense capability of the natural world. Wind energy has been used for years; from simple windmills to sophisticated wind turbines that can produce large amounts of power, the technology has advanced throughout time. Technological developments in turbines, together with advantageous geographic locations, have provided to gain wind energy on a never-before-seen amount. The revolutionary potential of wind energy in the global energy grid is further highlighted by the possibilities for offshore wind farms and creative turbine designs. With significant technical developments, solar energy—which is collected from the sun's endless rays—has become a more and more practical source of electricity. Photovoltaic cells have improved in efficiency and affordability as a means of absorbing sunlight and producing power. Solar energy is positioned as a flexible option for a wide range of energy demands due to the scalability of solar installations, which range from tiny home setups to massive solar farms. Therefore, a comprehensive strategy that goes beyond technical developments is required to realize the complete possibility of solar and wind energy. It is difficult to amplify the importance of supporting policy frameworks. Global agreements like the Paris Agreement, which aim to cut carbon emissions and switch to renewable energy, provide the groundwork for coordinated actions. Governments at the federal level are essential in developing rules which energize the use of solar and wind energy. This study will examine current regulations and provide forward-thinking frameworks that tackle the particular difficulties in integrating renewable energy into various industries.

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