Chapter 14
Harnessing Solar Energy for a Sustainable Society 5.0:
Legal and Regulatory Challenges in India

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ABSTRACT

The increasing scarcity and depletion of traditional energy sources and the environmental harm they inflict need a transition to renewable energy. India has significant geographical advantages for harnessing solar energy, although this potential has only been partially exploited. The proposed chapter seeks to examine the legal and regulatory framework for renewable energy, specifically focusing on solar energy. It will further analyze how the existing regulatory framework contributes to sustainable development and the idea of Society 5.0. Society 5.0 envisions a future world where sophisticated technology such as the Internet of Things (IoT), Artificial Intelligence (AI), and robots converge with humans to create a smarter, more sustainable society. The proposed chapter thus aims to comprehensively study India's renewable energy policy to identify shortcomings and recommend improvements that might enhance the country's transition to a more sustainable energy system.

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INTRODUCTION

Today, the world, with a particular emphasis on India, face a significant predicament: the deterioration of the environment and unsustainable development practices that put lives at risk. Environmental degradation has become a pervasive global challenge, casting a shadow over both the present and the future. Safeguarding the environment has now ascended to the highest priority, as it directly impacts the fundamental right to life. Human progress has historically been reliant on the environment due to the intricate interdependence among the physical, biological, and social surroundings, which collectively sustain all life forms (United Nations, 2022).

The destruction of the environment triggers a domino effect, ultimately leading to the demise of all living organisms, including humanity. Factors contributing to environmental degradation include excessive production, resource overexploitation, the adverse effects of nuclear radiation, industrial waste disposal, industrial accidents, ruthless exploitation of forests, unchecked quarrying activities, river, and water resource pollution, and the rapid escalation of air and noise pollution (Lampert, 2019). These elements collectively contribute to the deterioration of the environment. Furthermore, global warming, ozone layer depletion, and pollution are adverse outcomes resulting from the current development paradigm, directly impacting human well-being (Cirit & Aydemir, 2021). A heavy dependence on traditional energy sources such as coal, oil, and natural gas primarily characterises India's energy environment. Conventional energy sources such as these are responsible for causing environmental harm, including the release of air pollutants and greenhouse gases, which negatively impact human health and the environment. An immediate transition to renewable energy is desirable to guarantee a sustainable future (Jacob et al., 2023) by integrating technology that is cost-effective and feasible for the society and industry in India to implement solar energy systems (Deepti Deshwal & Pardeep Sangwan, 2023). The geographical location of India on the tropic of cancer offers abundant solar radiation, making it an excellent choice for harnessing solar energy. With an estimated annual average of 300 days of sunshine, the nation can produce substantial quantities of solar energy (Allen et al., 2024). Nevertheless, despite the promise, solar energy's contribution to India's energy combination is still restricted. The primary factors contributing to this underutilisation include inadequate regulatory frameworks, absence of incentives, and insufficient infrastructure. India has implemented many laws and legislations to foster the adoption and growth of renewable energy sources (Govind Bhutada, 2022). The National Solar Mission (NSM), a component of the National Action Plan on Climate Change, seeks to place India as a prominent solar energy player worldwide by developing a supportive policy structure. Additional notable legislations include the Electricity Act 2003, which promotes the production of renewable energy, and the Tariff Policy 2006, which offers directives for establishing rates for renewable energy. India has several obstacles and difficulties that inhibit the successful execution of its renewable energy policy despite its ongoing efforts. These factors incorporate variations in policy implementation among different states, financial obstacles such as increase in expenses and absence of financial incentives, regulatory challenges involving intricate procedures and administrative delays, and technological barriers such as restricted availability of cutting-edge technologies and technical proficiency (Kerr, 2024).

India's favourable geography offers substantial possibilities for solar energy development. Nevertheless, the absence of a comprehensive legislative framework and financial incentives obstructs achieving this potential. The current laws and policies have had a limited influence on the acceptance of solar energy in India. The lack of uniformity in policy execution among states of India and the absence of a cohesive regulatory framework are significant obstacles. In order to promote the use of solar energy and accomplish