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EXPLORING REGULATORY FRAMEWORK RELATED TO GREEN ENERGY: AN ANALYTICAL STUDY

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KEYWORDS

Renewable energy, green energy, Legal framework

ABSTRACT

At present not only legislation but judiciary has taken tremendous steps toward the environment, without it would be impossible, the existence of human beings. Green energy protects environment. Green energy is that energy which does not pollute the environment and it is renewal in nature. These energy sources, are really available on earth and can be naturally replenished and don't even harm environment. Solar energy, geothermal energy, wind energy, ocean energy, hydro power energy, bio energy is example of green energy.

In this research paper, researcher by adopting doctrine research evaluate and compare the legal framework of India related to green energy such as- "Environmental laws, constitutional law, Tariff policy 2006, integrated energy policy, 2006, National action plan on climate change, 2008, etc."

Introduction

Given the increasing environmental challenges and the need for sustainable development, the significance of green energy has become more important than ever. Green energy, sourced from renewable resources that have minimal to no negative effects on the environment, plays a crucial role in tackling climate change, mitigating pollution, and fostering ecological equilibrium. Green energy, which includes solar, wind, geothermal, hydro, ocean, and bioenergy, provides a sustainable alternative to traditional energy sources like fossil fuels. It helps reduce the negative impacts associated with conventional energy production. The global transition to green energy is motivated by the pressing necessity to address the harmful effects of climate change. The combustion of fossil fuels for energy has resulted in substantial rises in greenhouse gas emissions, which have contributed to the phenomenon of global warming and the deterioration of the environment. As a result, countries around the world are reassessing their energy policies and regulations to adopt renewable energy sources that offer both environmental protection and the ability to meet energy needs. India, being a rapidly developing economy, is confronted with the task of balancing economic growth with the urgent need for environmental sustainability. India has taken significant steps towards transitioning to green energy by developing and implementing policies and regulations that promote renewable energy sources. This comprehensive approach reflects the country's recognition of the critical importance of

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sustainable energy. The country has a comprehensive regulatory framework that includes various legislative measures, policies, and strategic plans to promote the development of green energy and its seamless integration into the national energy mix.

This research paper explores the regulatory framework that governs green energy in India, offering a comprehensive analysis of the legislative and policy landscape. It examines at important laws that together constitute the backbone of the nation's environmental regulations, including the Water (Prevention and Control of Pollution) Act of 1974, the Air (Prevention and Control of Pollution) Act of 1981, and the Environment Protection Act of 1986. The paper delves into the constitutional provisions that support India's dedication to environmental protection, alongside the examination of environmental legislation. Articles 51A and 48A of the Indian Constitution highlight the crucial role of citizens and the state in protecting and enhancing the environment, demonstrating a constitutional commitment to environmental stewardship.

This paper lays the groundwork for a thorough examination of India's green energy regulatory framework, emphasising the significance of legal and policy measures in promoting sustainable development and addressing environmental issues. In the following sections, the paper will delve into a comprehensive examination of the legal framework, comparative perspectives, and suggestions for improving green energy regulation in India.

Conceptual Understanding of Green Energy

Green energy is known for its minimal environmental impact. It is derived from natural resources that replenish naturally and quickly, ensuring a steady supply of energy. Green energy stands apart from traditional energy sources by avoiding the production of harmful emissions like greenhouse gases and pollutants. These emissions are notorious for their role in climate change and environmental degradation. Key features of green energy include:

1. **Renewability:** Green energy sources are naturally replenished on an ongoing basis. These resources do not diminish over time and can be used indefinitely as long as the natural processes continue.
2. **Environmentally Friendly:** Green energy systems have a minimal or no impact on the environment, resulting in cleaner air and water. They contribute to reducing the carbon footprint and addressing the impacts of climate change.
3. **Sustainability:** Green energy is crucial for maintaining a healthy and sustainable environment in the long run. It enhances energy security by decreasing reliance on limited fossil fuels.

Different Categories Green Energy Sources

- **Solar Energy**: The sun is an immense source of solar energy that sustains all life on Earth. “This source of energy is renewable and clean, producing nearly 10,000 times more energy than the Earth can generate in the 21st century.” This solar energy can be utilized as a green energy source, making it an ideal renewable

option. It provides us with direct and indirect energy, including hydro and wind power, while minimizing its impact on the environment. Unlike other sources, solar energy does not contribute to the increase of carbon dioxide emissions or global warming. "This energy's conversion can be achieved through different technologies, which can be classified into two main categories: Solar Photovoltaic and Solar Thermal." Solar photovoltaic technology uses photovoltaic cells to directly transform sun energy into electricity. The effective development of the solar cell occurred in 1975, making this technology relatively new. Solar cells harness the power of sunlight to produce electricity using the photoelectric effect. The arrangement of these objects is optimized to capture the maximum amount of sunlight. Solar Thermal involves harnessing the heat energy emitted by the sun. To begin, solar "collectors" can soak up the sun's rays and use them to heat water or rooms at modest temperatures. Solar energy can be concentrated to generate high temperatures using parabolic mirrors in large-scale applications.

- **Wind Energy**: The utilisation of wind turbines to capture the wind's kinetic energy is known as wind energy. This energy source is renewable and can serve as a viable alternative to fossil fuels. Wind energy is an environmentally friendly source of power that does not contribute to pollution or the release of harmful gases, such as greenhouse gases. This is because it is regarded as a reliable source of renewable energy. The wind generation is a result of the sun's heat, the earth's rotation, and the irregularities on its surface. It is worth noting that wind is a form of solar energy. Wind turbines are commonly installed in expansive land farms. By December 2014, the capacity of wind power had reached 369.553 MW, with the total wind energy production rapidly increasing. It accounted for approximately 4% of the total electricity usage[1]. In general, the structure of large wind turbines is similar, with a horizontal axis and an upwind rotor consisting of three blades. A wind farm's communication and power gathering systems use medium voltage connections for each turbine. These days, wind turbines consist of a generator with variable speed and a power converter, either partial or full scale, that connects to the collector system. An apparatus that converts the kinetic energy of wind into usable electrical current is known as a wind turbine. Among the many typical uses for the smaller turbines are the powering of signs, traffic lights, and battery charging. Most homes get their electricity from large turbines, and if there's any surplus, it's sold back to the utility company via the grid.
- **Geothermal Energy: "**The term 'geo' refers to the earth, while 'thermal' refers to heat."[2] Energy from the heat released into

the atmosphere as a result of radioactive decay is known as geothermal heat, and it is a sustainable and renewable resource. The first geothermal power plant was constructed in Larderello. The substantial amount of geo-thermal heat produced by magma is due to the radioactive decay of uranium and potassium deep inside the Earth's crust. "According to the US National Renewable Energy Laboratory (NREL), hot dry rock resources have the potential to provide over 4 million MW of capacity, surpassing the current electricity consumption in the US."[3] The vastness and reliability of geothermal energy make it a promising candidate for a greener, more long-term power grid.

- **Hydro Power Energy:** Hydro energy is classified as renewable due to its reliance on the sun's energy to drive the global hydrologic cycle. The power is harnessed from the water cycle, a perpetual process of cascading and swiftly flowing water that generates electricity. "Hydroelectric power is a well-established form of renewable energy that currently contributes a significant portion of the world's electricity, accounting for approximately 19%."[4] Most of the hydroelectric power generated worldwide comes from large-scale projects. Furthermore, there is ample opportunity for the expansion of small-scale hydroelectric projects due to:

  A) Constructing massive dams to supply enough head to the turbine is necessary for large-scale schemes that can produce hundreds of megawatts.

  B) Small scale schemes, on the other hand, have a smaller capacity and therefore require smaller dams, resulting in less influence upon the environment.

- **Ocean Energy:** It is possible to use the tremendous kinetic energy produced by the ocean's flowing water to power generators using a variety of renewable energy sources. "These include wave energy, tidal energy, ocean current energy, salinity gradient energy, and ocean thermal gradient energy. There are four main types of ocean energy: tidal energy, wind energy, current energy, and ocean thermal energy." India, with its extensive coastline and abundant estuaries and gulfs, has great potential for harnessing this particular energy. Ocean currents & Tidal Streams offer vast and virtually limitless resources for large-scale electricity generation, with minimal impact on the environment. The National Institute of Ocean Technology in Chennai, under the Ministry of Earth Sciences, is currently leading the way in research and development in this field. However, collaboration with other prominent institutions would further enhance our understanding and expedite the development of these technologies.

Regulatory Framework for Green Energy in India

India's regulatory framework for green energy has undergone significant changes in response to

increasing environmental concerns and the demand for sustainable energy solutions. This framework includes a range of laws, legislation, regulatory bodies, and key policies that work together to encourage and oversee the advancement and implementation of environmentally friendly energy technologies. This overview offers a thorough analysis of these components, emphasising their roles and effects on India's green energy sector.

1. **Constitutional Provisions**

   The Indian Constitution lays down the fundamental principles for safeguarding the environment and encouraging the use of renewable energy sources. There are a few provisions that are relevant:

   a) Fundamental Rights-

   "The fundamental right to life under Article 21 implicitly includes the right to a healthy environment."[5] Judicial interpretations have reinforced the belief that environmental protection is inextricably linked to the Right to life & personal liberty.

   b) DPSP- "Articles 48A and 51A(g) of the Constitution highlight the State's duty to safeguard and enhance the environment."[6] It is required by law for the State to ensure the protection and enhancement of the environment, including the preservation of forests and wildlife. Similarly, every citizen has a fundamental duty to safeguard and enhance the natural environment.

2. **Legislative measures**

   India has a comprehensive legislative framework in place to regulate environmental protection and promote the use of renewable energy sources:

   a) **The Energy Conservation Act, 2001:** The Act promotes the responsible use of energy and discourages wastefulness, thereby supporting the adoption of renewable energy. It is implemented through the Bureau of Energy Efficiency, an autonomous organization established under the Act. Using energy efficiently helps decrease the overall demand and enables the integration of more renewable energy sources into the grid. This Act outlines policies to encourage energy efficiency projects and provides incentives for adopting Renewable Energy solutions like Solar Water Heaters and Green Buildings. This act inspires a heightened awareness of energy conservation. This cultural shift promotes greater acceptance and advancement of renewable technology.

   b) **The National Renewable Energy Act 2015**: This Act aims to encourage the generation of energy from renewable sources, taking into account climate, environmental, and macroeconomic factors. The goal is to decrease reliance on fossil fuels, enhance energy security, and minimize CO2 and other greenhouse gas emissions. This Act aims to support the achievement of national and international goals in promoting the use of renewable energy sources.

c) **The Electricity (Amendment) Bill, 2018**: The Bill provides a clear definition of 'renewable energy', which was missing in the Electricity Act of 2003. Stations that generate power through coal are required to establish stations for power generation through renewable energy sources. Failure to comply will result in a penalty. The Bill also includes provisions for the development of a National Renewable Energy Policy.

d) **The draft Electricity (Amendment) Bill, 2020**: The Bill aims to establish an authority to address disputes related to the enforcement of contracts involving the sale, purchase, and transmission of electricity.

e) **The draft Renewable Energy Act, 2015:** In order to enhance inter-ministerial coordination and ensure the provision of expert assistance, the Ministry of New and Renewable Energy introduced the draft Renewable Energy Act in 2015. The draft suggests the creation of the National Renewable Energy Committee and National Renewable Energy Advisory Group to achieve its goals.

3. Key Initiatives and Policies:

India has a robust regulatory framework for green energy, which is complemented by a range of policies and plans that offer guidance and incentives for the growth of renewable energy.

a) The topic of electricity is covered by both the Centre and State in the Constitution of India, allowing them to create laws on the matter. Efforts have been made by governments at both the Centre and State levels to promote renewable energy through facilitative and enabling policies.

b) **National Tariff Policy:** Another important tool in achieving equal tariffs and pricing for electricity generated from renewable sources is the National Tariff Policy. The policy offers guidance on establishing tariffs for electricity generated from renewable sources. This will involve implementing long-term power purchase agreements or PPAs, as well as feed-in tariffs, to guarantee the sustainability of the project. The policy's predictable and preferential tariff structures attract investments into the renewable sector. Long-term sustainability is crucial for the success of Renewable Projects. The policy also considers cross-subsidies, ensuring that the cost of promoting renewable and green energy remains reasonable for the consumer. The delicate equilibrium between the two is crucial for gaining widespread acceptance and successful implementation. The National Tariff Policy plays a crucial role in shaping the financial landscape to ensure the

economic viability of renewable energy projects.

c) **National Action Plan on Climate Change (NPACC), 2008:** The Prime Minister unveiled the National Action Plan on Climate Change (NAPCC) on June 30, 2008. The document presents a comprehensive plan that seeks to help the nation effectively respond to climate change and promote the long-term environmental sustainability of India's development trajectory. Emphasising the importance of sustaining a rapid growth rate is crucial for enhancing the quality of life for the majority of India's population and minimising their susceptibility to the consequences of climate change. The National Action Plan is centred around eight "National Missions". Their main focus is on promoting a deeper understanding of climate change, as well as strategies for adaptation and mitigation. They also emphasise the importance of energy efficiency and natural resource conservation.

4. Regulatory bodies:

India's green energy policies and regulations are overseen and implemented by several regulatory bodies.

a) **Ministry of New and Renewable Energy (MNRE):** When it comes to India's renewable energy revolution, the Ministry of New and Renewable Energy is at the forefront. The focus of the MNRE is on the comprehensive policy framework which governs the advancement of renewable energy sources. Its aim is to increase investment, streamline project clearances, and encourage private participation. MNRE closely oversees the execution of various Programs/Projects on Renewable Energy. It collaborates with other Ministries/Departments of the Central Government, State Governments, & private sector to ensure seamless implementation. MNRE provides a variety of fiscal incentives for renewable energy projects, including subsidies, grants, and tax benefits. These incentives help alleviate the financial strain on developers, thus promoting the expansion of renewable energy. With its multifaceted roles, MNRE plays a crucial role in India's journey towards renewable energy, ensuring that policies are not only available but also effectively implemented.

b) **State Regulatory Commissions:** State regulatory commissions play a crucial role in facilitating renewable energy projects at the state level. Every state in India has its own regulatory commission that adapts policies and regulations to meet the specific needs and conditions of the region. This entails overseeing the implementation

of the national renewable energy policy at the state level by state commissions. They customize their policies to meet the specific requirements of each state, ensuring full compliance. They take into account local factors and aim to create enticing tariffs that will appeal to investors. These commissions help streamline the process of establishing renewable energy projects by issuing necessary clearances and resolving local issues. State regulatory bodies diligently oversee the progress of renewable energy projects, ensuring strict adherence to both State and National regulations at the local level. This helps to raise awareness and promote renewable energy's use.

c) **The Bureau of Energy Efficiency:** This bureau has been established by Energy Conservation Act, 2001 which provides guidelines for the energy usage, offering accreditation for energy-efficient goods, and carrying out educational initiatives.

d) **Central Electricity Regulatory Commissions:** The CERC's role is to oversee and control the electricity sector in India, specifically focusing on tariff regulations & seamless integration of renewable energy sources along the grid. The CERC is responsible for approving rates for power that comes from renewable sources. It establishes competitive pricing for the Renewable Energy Sector, making it an appealing industry for both investors and consumers. CERC is dedicated to creating guidelines and frameworks that ensure the seamless integration of renewable and green energy into the national grid. This involves tackling associated technical obstacles and ensuring seamless grid integration of green energy projects. Additionally, it acts as a neutral party to help resolve conflicts that may arise between two parties involved in the electricity sector. This would create a regulatory environment that is fair and efficient. The importance of CERC is evident in its role in ensuring a fair and equal electricity market, allowing renewable energy to coexist with traditional sources.

The Role of Judiciary in Green Energy

The Indian court has been essential in developing the country's environmental law, especially when it pertains to green energy. When it comes to interpreting and implementing environmental legislation as well as addressing legislative gaps to promote sustainable development, the Indian judiciary has been instrumental This section delves into the role of the judiciary and significant judicial decisions that have had a profound impact on the green energy sector in India.

- **Landmark decisions:**

  The following are landmark decisions given by judiciary on green energy:

a. **M. C. Mehta v. Union of India[7]:** This present case also called by the name of Oleum Gas Leak case, is one of the most historic and significant cases in Indian environmental law. As per the decision of the court, it is the responsibility of a company involved in hazardous activities to ensure that no harm is caused to the community. This duty is absolute and cannot be delegated.

b. . This case established the principle of absolute liability, which has important implications for industries, including those in the green energy sector.

c. **Rural Litigation and Entitlement. Kendra v. State of Uttar Pradesh[8]:** The issue presented in the present judgement is the continuation of mining activities in uneven regions, which causes ecological contamination. "The SC, while upholding the right to a clean environment as a basic right guaranteed by Part III of the Constitution, requested that mining activities in sloping areas be halted."[9] The Court also ruled that while halting mining activities would cause extraordinary financial hardship for individuals, the cost should be paid for the environment and the protection of various aspects of environmental rights guaranteed by the Right to life (Article 21). Further, the Hon'ble Supreme Court has preserved and upheld the principles and conventions of sustainable development in a succession of decisions by ensuring a legitimate balance between ecological insurance and public development operations.

d. **T.N. Godavarman Thirumulpad vs. Union of India[10]:** This ongoing case, also known as the Forest Case, has resulted in numerous orders for forest conservation & environmental protection. Apex Court has issued directives to halt deforestation and promote afforestation, which indirectly support green energy initiatives by preserving natural carbon sinks.

e. **Vellore Citizens Welfare Forum vs. Union of India (1996)[11]: "**The Supreme Court upheld the principle of Polluter Pay and Pecuniary Principle as an essential part of ecological law."[12] It emphasized the significance of protecting the environment for sustainable development. This particular case, highlights that the polluter was held accountable for compensating the victims and contributing to the restoration of the damaged climate. It was held by Court that industries to adopt cleaner technologies and practices, clearing the way for the promotion of green energy solutions.

f. **Centre for Environmental Law, WWF-I vs. Union of India:[13]** An equilibrium between progress and preservation of natural resources was stressed by the Sc in its ruling. The Court's directives included measures to ensure that renewable energy projects, for ex- solar farms & winds, adhere to environmental standards and do not harm biodiversity.

Recommendations and Suggestions:

For improving the effectiveness & efficiency of regulation related to green energy in India, there are several areas that can be enhanced. These recommendations are focused on addressing current challenges, streamlining processes, and creating a more favorable environment for the development of renewable energy technologies.

a) Establishing a structure for renewable/green energy certificates (RECs) would broaden the scope of the green energy transition. These market-based certificates have the desired capability in promoting renewable energy resources and expand the green energy market.

b) MNRE, in cooperation with CERC and SERCs, should develop a comprehensive policy and regulatory framework. SERCs should be granted authority to resolve policy uncertainties and identify key locations for renewable energy development.

c) India imports more than 85% of its solar photovoltaic panels from China and Taiwan; therefore, the Make in India Programme should reduce import dependence while increasing domestic manufacturing of solar PV panels by providing incentives to foreign investors and domestic developers.

d) The government should priorities R&D in the renewable energy sector, and budget allocation should be enhanced accordingly, with effective monitoring of R&D and budget allocation. India should foster industry-academia partnerships to address technological challenges in the renewable energy sector through innovative R&D applications.

e) There should be adequate infrastructure to facilitate the installation and maintenance of renewable energy equipment, and the government should establish educational and research institutes to disseminate knowledge of green energy technologies.

Conclusion:

India is poised to take the global lead in embracing renewable energy through the implementation of effective regulations, enticing incentives, and well-crafted policies. The country's commitment to Sustainable Development is evident in its focus on Renewable Energy Laws and Clean Energy Regulations. Collaboration among stakeholders is crucial in navigating the challenges and capitalizing on the potential amongst renewable energy sector, as the nation navigates complexities of the transition of energy. India's ongoing efforts to refine its policies and regulations will undoubtedly bring about a brighter and greener future for the nation and the world.

Endnotes:

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