Sarhad Journal of Legal Studies

July-December 2025, Vol. 01, No. 02, [35–44]
Published: 30th November 2025
Publisher: Sarhad Institute of Legal Studies, SUIT
https://journal.suit.edu.pk/index.php/sjls

RESEARCH PAPER

Renewable Energy Laws in Pakistan: Bridging the Gap between Policy and Implementation

Syeda Kashmala Susan[1]*

ABSTRACT

Pakistan continues to experience chronic energy shortages, rising dependence on imported fossil fuels, and worsening environmental impacts. In response, the state has introduced an extensive renewable energy framework, including the Alternative and Renewable Energy Policy 2019, the National Electricity Policy 2021, and NEPRA's regulatory mandates. Despite these measures, implementation remains inconsistent. Using a doctrinal and policy-analysis approach, this study examines why legislative ambition has not translated into practical outcomes. Key barriers include fragmented governance, regulatory uncertainty, weak financial incentives, inadequate grid infrastructure, and limited technical capacity. Short-term planning cycles often conflict with long-term renewable energy goals, further slowing progress. The study concludes that Pakistan's energy transition requires coordinated reforms such as regulatory stability, targeted financial support, institutional capacity building, modernization of transmission systems, and broader stakeholder engagement. Strengthening implementation mechanisms is essential to enhance energy security, reduce environmental harm, and advance sustainable development.

Keywords: Energy security, Policy implementation, Regulatory framework, Institutional coordination, Renewable energy adoption

INTRODUCTION

Pakistan's energy sector has long struggled with chronic supply shortages, heavy reliance on imported fossil fuels, and increasing environmental pressures. These challenges have significant economic, social, and ecological implications, including high energy costs, industrial inefficiencies, and elevated greenhouse gas emissions. In response, the government has introduced an array of legal and policy instruments to promote renewable energy, such as the Alternative and Renewable Energy Policy 2019, the National Electricity Policy 2021, and regulatory frameworks administered by the NEPRA and the Private Power and Infrastructure Board PPIB. These measures aim to diversify the energy mix, encourage private investment, enhance sustainability, and reduce environmental impacts (Amjad et al., 2022). The purpose of this study is to critically examine the

[1] Advocate High Court Islamabad, Pakistan. adv.kashmalasyeda@gmail.com **(corresponding)**

extent to which Pakistan's renewable energy laws and policies have been successfully implemented, and to identify the structural, economic, regulatory, and technical barriers that hinder their effectiveness. The central research questions guiding this study are: What factors contribute to the gap between renewable energy policy and implementation in Pakistan? How can governance, regulatory, and institutional reforms enhance policy outcomes? The study hypothesizes that while Pakistan's legal framework is comprehensive on paper, deficiencies in institutional coordination, financial incentives, technical capacity, and planning alignment impede tangible progress in renewable energy adoption. The methodology adopted is doctrinal and policy-oriented, involving critical analysis of primary legal instruments, policy documents, regulatory rules, and secondary literature on renewable energy development in Pakistan. The study examines case examples, identifies implementation bottlenecks, and evaluates the alignment of short-term planning with long-term policy goals (Din, & Bibi, 2025; Khan & Ullah, 2024).

The key outcomes highlight persistent challenges, including fragmented governance, regulatory uncertainty, inadequate grid infrastructure, limited financing, and insufficient public awareness, all of which constrain renewable energy deployment. The remainder of this article is organized as follows: the next section reviews Pakistan's legal and institutional framework for renewable energy, followed by an analysis of implementation challenges (Amjad et al., 2022). This is succeeded by recent developments and governance analysis, recommendations for bridging the policy-implementation gap, and a concluding section summarizing the study's findings and suggesting directions for future research. Pakistan's energy sector has long been plagued by inefficiencies, insufficient generation capacity, and a reliance on imported fossil fuels, leading to high costs and environmental harm. Renewable energy including solar, wind, small hydro, and biomass presents an opportunity to enhance energy security, reduce costs, and mitigate environmental damage. Recognizing these benefits, Pakistan has articulated several legal and policy frameworks to encourage renewable energy adoption. However, the translation of these policies into practical outcomes has been inconsistent, raising questions about the efficacy of legal instruments, institutional coordination, and economic and technical constraints (Raja & Khan, 2025; Ghani et al., 2025).

CONCEPTUAL AND THEORETICAL FRAMEWORK

This study is grounded in the theoretical perspectives of energy governance, policy implementation theory, and sustainable development. Energy governance theory provides the basis for examining how institutional arrangements, regulatory bodies, and policy actors shape decision-making in Pakistan's renewable energy sector. Drawing on policy implementation theory, particularly the top-down and bottom-up approaches, the framework explains why ambitious legislative instruments—such as the Alternative and Renewable Energy Policy 2019 and the National Electricity Policy 2021—often fail to achieve intended outcomes due to administrative fragmentation, weak coordination, and inconsistent regulatory enforcement. The study also applies the principles of sustainable development and energy transition theory to assess how economic, environmental, and institutional factors interact to either enable or hinder renewable energy uptake. Together, these theoretical lenses guide the analysis of gaps between policy formulation

and implementation, highlighting the systemic reforms required for Pakistan to achieve a reliable, low-carbon energy future.

RESEARCH METHODOLOGY

This study adopts a doctrinal and policy-analysis research design to investigate the gap between renewable energy laws and their implementation in Pakistan. Primary sources, including the Alternative and Renewable Energy Policy 2019, National Electricity Policy 2021, NEPRA regulations, and official government planning documents, were reviewed to understand the legal and institutional framework governing renewable energy. Secondary sources, such as academic literature, policy reports, and media analyses, were analysed to identify implementation challenges, institutional bottlenecks, financial constraints, and technical limitations. The rationale for this approach lies in its ability to critically evaluate both the legal provisions and their practical application, highlighting divergences between policy objectives and on-the-ground outcomes. Data were systematically categorized under themes including regulatory frameworks, financial incentives, grid infrastructure, institutional coordination, and stakeholder engagement, allowing for a comprehensive assessment of the factors influencing renewable energy adoption. This methodology provides a structured basis for identifying gaps, analysing causes, and formulating recommendations to enhance the effectiveness of Pakistan's renewable energy policies (Mathlouthi et al., 2025).

LEGAL AND INSTITUTIONAL FRAMEWORK

Pakistan's renewable energy sector is governed by a combination of policies, laws, and regulatory mechanisms designed to facilitate investment, promote clean energy, and ensure integration into the national grid. The cornerstone of this framework is the Alternative and Renewable Energy Policy 2019 which sets ambitious targets for diversifying Pakistan's energy mix. The policy envisages that renewables, including solar, wind, biomass, and small hydro, should contribute 20% of electricity generation by 2025 and 30% by 2030, while hydropower continues to play a significant role in meeting long-term energy demands. The policy provides guidelines for project approval, tariff determination, competitive bidding, and incentives aimed at attracting both local and foreign investment. Complementing the ARE Policy, the National Electricity Policy 2021 reinforces the government's commitment to sustainable energy by promoting the least-cost principle in generation planning and ensuring that renewable energy is prioritized within overall energy strategy (Usman et al., 2021). These policy instruments are implemented and regulated through NEPRA, which licenses projects, determines tariffs, and oversees grid connectivity, ensuring that renewable energy is integrated in a technically and economically feasible manner. NEPRA's role is critical in creating regulatory certainty for investors and consumers alike. The Private Power and Infrastructure Board PPIB further facilitates renewable energy deployment by acting as a one-window facilitator for private sector and public-private partnership projects. Through PPIB, developers can navigate project approvals, land acquisition, financing arrangements, and power purchase agreements, which are essential for encouraging private sector participation in renewable energy generation (Ullah, et al., 2024; Khan et al., 2025).

The legal framework also includes financial and fiscal incentives designed to stimulate adoption. These include exemptions from taxes and duties on imported machinery, support for net-metering and distributed generation, and facilitation of public-private partnerships. For smaller-scale projects, net-metering regulations allow households and businesses to generate electricity, consume it, and sell excess power back to the grid, thereby promoting decentralized renewable energy adoption (Khan et al., 2020). Despite the comprehensiveness of the legal and institutional framework on paper, implementation requires coordination among multiple federal and provincial agencies, technical integration into the national grid, and alignment with financing mechanisms. While the framework provides a roadmap for renewable energy development, the practical effectiveness of these laws and institutions is influenced by regulatory stability, inter-agency coordination, and the ability to attract sufficient investment. Consequently, understanding this framework is essential to analysing the implementation challenges and the gap between policy objectives and on-ground outcomes (Sheikh, et al., 2024; Hui et al., 2025).

IMPLEMENTATION CHALLENGES

Despite a comprehensive legal and institutional framework, Pakistan's renewable energy sector continues to face significant implementation challenges that hinder the translation of policy into tangible outcomes. One of the primary obstacles is institutional fragmentation and regulatory complexity. Multiple federal and provincial agencies are involved in project approval, land acquisition, environmental clearances, and grid integration, often resulting in overlapping responsibilities and delayed decision-making. This lack of coordination creates inefficiencies, prolongs project timelines, and increases transaction costs, which can discourage potential investors (Khan et al., 2020). Regulatory uncertainty further exacerbates the problem. Although NEPRA provides a regulatory framework for licensing and tariff determination, frequent amendments and ad-hoc exceptions, such as exemptions for projects under the Inter-Governmental Commercial Transactions Act, have introduced unpredictability. Such inconsistencies undermine investor confidence and reduce the attractiveness of renewable energy projects, particularly for private and small-scale developers. Economic and financial constraints also impede implementation. High upfront costs, limited access to affordable financing, and fluctuating tariff structures make renewable energy investments less viable. While fiscal incentives such as tax exemptions and subsidies exist, they are often insufficient to offset the risks associated with inflation, currency devaluation, and policy reversals. Small-scale and distributed projects, in particular, face difficulties in securing long-term financing, which limits grassroots adoption of solar and wind energy (Khan, et al., 2024; Khan, 2024).

Technical and infrastructural limitations are equally significant. The national grid is often not equipped to handle intermittent renewable energy sources, leading to inefficiencies, curtailment, and underutilization of installed capacity. Additionally, a shortage of trained technical personnel and weak maintenance infrastructure reduces the operational efficiency and reliability of renewable energy systems. Social and informational barriers further constrain implementation. Many households, businesses, and local authorities are either unaware of renewable energy incentives or lack the capacity to navigate regulatory requirements. Moreover, recent planning documents, such as the Indicative Generation Capacity Expansion Plan 2024–34, have shifted

focus toward large hydropower, nuclear, and fossil-fuel projects, creating a mismatch between long-term policy goals and short-term planning. This divergence undermines investor confidence and slows the pace of renewable energy adoption. Collectively, these institutional, economic, technical, and social barriers explain the persistent gap between Pakistan's renewable energy policies and actual implementation. Addressing these challenges requires coordinated governance, regulatory stability, financial support mechanisms, technical capacity building, and effective stakeholder engagement (Xin, et al., 2022; Khan, 2024).

Despite a robust policy and legal framework, Pakistan's renewable energy sector faces multiple implementation challenges. Institutional and bureaucratic hurdles, such as unclear guidelines for project siting, weak inter-agency coordination, and regulatory uncertainty, have slowed project approvals and created investor hesitancy. The national grid is often ill-equipped to handle intermittent renewable energy sources, leading to technical inefficiencies and underutilization of installed capacity. Financial and economic barriers further complicate the scenario. High upfront costs, difficulties in securing financing, and inconsistent tariff regimes discourage both private and small-scale investors. While fiscal incentives exist on paper, they are often insufficient to offset risks associated with currency devaluation, inflation, and policy unpredictability. Social, technical, and informational constraints also contribute to the implementation gap. Many potential stakeholders, including households, businesses, and local authorities, remain unaware of renewable energy benefits or lack the technical capacity to adopt these technologies effectively. Additionally, skilled Labor shortages, insufficient maintenance infrastructure, and weak technical standards limit the efficiency and reliability of renewable installations. Recent planning documents, such as the Indicative Generation Capacity Expansion Plan 2024–34, further exacerbate the issue by favouring hydropower, coal, and nuclear generation over solar and wind, contradicting earlier policy targets (Asghar, et al.,2023; Khan & Jiliani, 2023).

RECENT DEVELOPMENTS

In recent years, Pakistan's renewable energy landscape has experienced several notable developments, highlighting both progress and emerging challenges. In December 2024, the NEPRA amended its regulations to exempt certain renewable energy projects under the Inter-Governmental Commercial Transactions Act from standard licensing and tariff procedures. While intended to streamline approvals and attract investment, this move raised concerns about transparency, regulatory consistency, and fairness, signalling potential governance weaknesses that could undermine investor confidence. Simultaneously, government actions affecting distributed generation have generated mixed signals. In early 2025, the national government reaffirmed its commitment to renewable energy, asserting that existing solar policies would remain intact. However, net-metering tariffs for rooftop solar were reduced from Rs 27 to Rs 10 per unit, a decision that weakened incentives for small-scale residential and commercial solar adoption. This illustrates a recurring tension in Pakistan's energy policy: while high-level commitments to renewable energy are maintained, specific regulatory and financial decisions sometimes reduce practical support for implementation. In the broader energy planning context, the Indicative Generation Capacity Expansion Plan 2024–34 IGCEP reflects a shift toward hydropower, nuclear, and fossil-fuel projects, reducing the relative share of solar and wind energy. This divergence from

earlier renewable energy targets under the Alternative and Renewable Energy Policy 2019 highlights the challenges of aligning short-term planning with long-term policy goals (Qudrat-Ullah, 2022; Khan & Usman, 2023).

Additionally, there have been efforts to enhance public-private partnerships and encourage private investment, particularly through the Private Power and Infrastructure Board (PPIB). While some large-scale solar and wind projects have successfully entered the grid, the pace of adoption remains slower than anticipated due to financing difficulties, technical integration issues, and limited skilled Labor. These developments collectively underscore the dual reality of Pakistan's renewable energy sector: while legal and policy frameworks remain ambitious, regulatory adjustments, economic constraints, and planning shifts continue to affect the sector's ability to meet intended targets. Understanding these recent trends is essential for designing effective governance reforms and bridging the gap between policy and implementation. Recent regulatory and policy adjustments highlight the ongoing tension between renewable energy goals and practical realities. In December 2024, NEPRA exempted certain renewable energy projects under the Inter-Governmental Commercial Transactions Act from standard regulations, raising concerns about transparency and consistency. Concurrently, the government reduced net-metering tariffs for rooftop solar users, signalling tighter support for small-scale projects. These developments illustrate the fragility of investor confidence and the potential divergence between policy ambition and actual implementation (Uddin, et al., 2021; Khan et al., 2023).

STRUCTURAL AND GOVERNANCE ANALYSIS

The persistent gap between renewable energy policy and implementation in Pakistan can be largely attributed to structural and governance-related challenges. One of the primary issues is fragmented authority. Multiple federal and provincial institutions share overlapping responsibilities for project approvals, land acquisition, environmental clearances, financing, and grid integration. This division of authority often leads to delays, conflicting decisions, and bureaucratic inefficiencies, reducing the effectiveness of renewable energy policies. Regulatory instability is another critical factor. Amendments to NEPRA regulations, ad-hoc exemptions, and sudden changes to tariffs create uncertainty for investors and developers. Such unpredictability discourages private sector participation, particularly for small-scale or distributed renewable energy projects, and undermines confidence in long-term commitments. Consistent and transparent regulatory frameworks are essential for fostering investor trust and facilitating sustainable project development. Economic and financial limitations further constrain implementation. High upfront costs, inflationary pressures, and limited access to low-interest financing reduce the economic viability of renewable energy projects. Even with fiscal incentives such as tax exemptions and subsidies, the financial risk remains significant, particularly for decentralized solar and wind installations (Waheed, et al.,2021; Khan, 2023).

Technical capacity gaps also impede progress. The national grid is inadequately equipped to manage intermittent renewable energy sources, while shortages in trained technical personnel and weak maintenance infrastructure limit operational efficiency. Moreover, misalignment between short-term planning documents, such as the Indicative Generation Capacity Expansion Plan 2024–34, and long-term policy targets exacerbates the structural challenge, often favoring

hydropower, nuclear, or fossil-fuel projects over solar and wind energy. insufficient stakeholder engagement and public awareness contribute to slower adoption rates. Households, businesses, and local authorities often lack knowledge of available incentives, technical requirements, and regulatory procedures, limiting grassroots participation. Addressing these structural and governance issues requires a coordinated approach that strengthens institutional capacity, ensures regulatory consistency, improves financing mechanisms, modernizes grid infrastructure, and engages stakeholders effectively. Several structural factors explain the persistent gap between renewable energy policy and implementation. Fragmented authority and overlapping jurisdictions result in regulatory complexity and project delays. Regulatory instability, frequent policy adjustments, and sudden tariff changes undermine investor confidence. Economic constraints, including limited public finances and high financing costs, further limit project viability. Weak institutional and technical capacity hinders the effective deployment, maintenance, and integration of renewable energy infrastructure. Finally, insufficient public awareness and stakeholder engagement restrict grassroots adoption, while misaligned short-term planning often contradicts long-term renewable energy goals (Tumewang, et al.,2025; Khan & Ximei, 2022).

CONCLUSION

Pakistan has developed a comprehensive legal and institutional framework to promote renewable energy, encompassing the Alternative and Renewable Energy Policy 2019, the National Electricity Policy 2021, NEPRA regulations, and facilitation through the Private Power and Infrastructure Board. These instruments demonstrate a clear policy commitment to diversifying the energy mix, enhancing energy security, and addressing environmental challenges. However, the study reveals that significant gaps persist between policy ambition and on-the-ground implementation. Institutional fragmentation, regulatory instability, financial and economic constraints, technical capacity gaps, and insufficient stakeholder engagement collectively impede the realization of renewable energy targets. Bridging this gap requires coordinated reforms across multiple dimensions. Strengthening governance through a central Renewable Energy Authority, ensuring regulatory stability and transparency, providing robust financial incentives, modernizing grid infrastructure, and building technical and human capacity are essential steps. In addition, aligning short-term planning documents with long-term policy goals and actively engaging communities, households, and businesses can enhance adoption and sustainability. This research underscores the critical importance of moving beyond policy statements to actionable implementation strategies. Future studies could examine international best practices for translating renewable energy policies into successful outcomes, conduct empirical case studies of renewable energy projects in Pakistan, and explore legal and institutional designs for more effective governance. By addressing these challenges, Pakistan can accelerate its renewable energy transition, contributing to sustainable development, economic resilience, and environmental sustainability. Pakistan has developed a comprehensive legal and policy framework to promote renewable energy, including incentives for private investment and regulatory mechanisms to support large-scale and distributed generation. However, institutional fragmentation, regulatory uncertainty, economic constraints, technical capacity gaps, and misaligned planning have hindered effective implementation. Bridging this gap requires coordinated reforms across legal, institutional, financial, and technical domains. Successfully doing so could transform Pakistan's

energy landscape, improve energy security, reduce environmental impacts, and contribute to sustainable development.

REFERENCES

Amjad, S. O. H. A. I. L., Khan, A. S. I. F., & Usman, M. U. H. A. M. M. A. D. (2022). Analyzing International Environmental Law in Addressing Air Pollution. *Asian Social Studies and Applied Research (ASSAR)*, *3*(01), 272-283.

Amjad, S., Usman, M., & Khan, A. (2022). Environmental Jurisprudence in Pakistan: A Comprehensive Analysis of National Laws, Judicial Role, and Legislative Instruments Impacting Air Quality and Public Health.

Asghar, R., Sulaiman, M. H., Mustaffa, Z., Ullah, N., & Hassan, W. (2023). The important contribution of renewable energy technologies in overcoming Pakistan's energy crisis: Present challenges and potential opportunities. *Energy & Environment*, *34*(8), 3450-3494.

Din, R. U., & Bibi, N. (2025). Solar Energy Development in Pakistan: Overcoming Barriers through Policy Reform and Stakeholder Engagement. *Journal of Engineering and Computational Intelligence Review*, *3*(1), 82-98.

Ghani, H. U., Gong, X., Haider, A., & Khan, A. (2025). The Indian concern on China-Pakistan Economic Corridor (CPEC) and justification from the perspective of international law. *China and WTO Review*, *11*(2), 25-39.

Hui, Z., Haider, A., & Khan, A. (2025). International trade and plastic waste in oceans: legal and policy challenges. *Frontiers in Marine Science*, *12*, 1627829.

Khan, A. (2023). Rules on Digital Trade in the Light of WTO Agreements. *PhD Law Dissertation, School of Law, Zhengzhou University China*.

Khan, A. (2024). The Emergence of the Fourth Industrial Revolution and its Impact on International Trade. *ASR: CMU Journal of Social Sciences and Humanities (2024) Vol*, *11*.

Khan, A. (2024). The intersection of artificial intelligence and international trade laws: Challenges and opportunities. *IIUMLJ*, *32*, 103.

Khan, A., & Jiliani, M. A. H. S. (2023). Expanding The Boundaries Of Jurisprudence In The Era Of Technological Advancements. *IIUMLJ*, *31*, 393.

Khan, A., & Ullah, M. (2024). The Pakistan-China FTA: legal challenges and solutions for marine environmental protection. *Frontiers in Marine Science*, *11*, 1478669.

Khan, A., & Usman, M. (2023). The effectiveness of international law: a comparative analysis. *International Journal of Contemporary Issues in Social Sciences*, *2*(3), 780-786.

Khan, A., & Ximei, W. (2022). Digital economy and environmental sustainability: do information communication and technology (ICT) and economic complexity matter?. *International journal of environmental research and public health*, *19*(19), 12301.

Khan, A., Amjad, S., & Usman, M. (2020). The Role of Customary International Law in Contemporary International Relations. *International Review of Social Sciences*, *8*(08), 259-265.

Khan, A., Jillani, M. A. H. S., Ullah, M., & Khan, M. (2025). Regulatory strategies for combatting money laundering in the era of digital trade. *Journal of Money Laundering Control*, *28*(2), 408-423.

Khan, A., Usman, M., & Amjad, S. (2020). Enforcing Economic, Social, and Cultural Rights: A Global Imperative. *International Review of Social Sciences (IRSS)*, *8*(09).

Khan, A., Usman, M., & Amjad, S. (2023). The digital age legal revolution: taped's trailblazing influence. International journal of contemporary issues in social sciences, 2(4), 524-535.

Khan, N. S., Kazmi, S. A. A., Anwar, M., Mughal, S. U. R., Ullah, K., Rathi, M. K., & Salal, A. (2024). Enhancing renewable energy integration in developing countries: a policy-oriented

analysis of net metering in Pakistan amid economic challenges. *Sustainability*, *16*(14), 6034.

Mathlouthi, N., Haider, A., Khan, A., & Ahmad, N. (2025). The role of Hainan Free Trade Port in shaping China's WTO commitments and international trade policies. *China and WTO Review*, *11*(1), 71-82.

Qudrat-Ullah, H. (2022). A review and analysis of renewable energy policies and CO2 emissions of Pakistan. *Energy*, *238*, 121849.

Raja, S. I., & Khan, S. M. (2025). Advancing Renewable Energy Policies as a Solution to Climate Change in Pakistan.

Sheikh, N., Laverge, J., & Delghust, M. (2024). A critical analysis of institutional and regulatory framework for building stock energy efficiency and transition in Pakistan. *Environmental Science & Sustainable Development*, *9*(1), 32-41.

Tumewang, Y. K., Supriani, I., Dewi, H. R., & Alam, M. K. (2025). An extended review on Sharia governance studies from 1985 to 2022. *Journal of Islamic Accounting and Business Research*, *16*(2), 321-347.

Uddin, R., Shaikh, A. J., Khan, H. R., Shirazi, M. A., Rashid, A., & Qazi, S. A. (2021). Renewable energy perspectives of Pakistan and Turkey: Current analysis and policy recommendations. *Sustainability*, *13*(6), 3349.

Ullah, A., Aslam, N., Rehman, H., & Hongfei, H. (2024). An empirical analysis to examine the role of institutions in bridging the gap between environmental policy stringency and energy poverty. *Journal of Environmental Management*, *366*, 121901.

Usman, M. U. H. A. M. M. A. D., Khan, A. S. I. F., & Amjad, S. O. H. A. I. L. (2021). State Responsibility and International Law: Bridging the Gap.

Waheed, A., Bernward Fischer, T., & Khan, M. I. (2021). Climate change policy coherence across policies, plans, and strategies in Pakistan—implications for the China–Pakistan economic corridor plan. *Environmental Management*, *67*(5), 793-810.

Xin, Y., Bin Dost, M. K., Akram, H., & Watto, W. A. (2022). Analyzing Pakistan's renewable energy potential: a review of the country's energy policy, its challenges, and recommendations. *Sustainability*, *14*(23), 16123.