Dyal Singh Journal of Humanities and Social Sciences (DSJHSS)
Vol. 4, No. 1, 2026, pp. 85-105
ISSN (P): 3006-6522
ISSN (E): 3006-6530

Energy Citizenship, Solar Energy Governance and Energy Security in Pakistan: A Qualitative Policy-Document Analysis

Sady Ahmad[1] (Corresponding Author)

Athar Rashid[2]

Abstract

Received: 12-01-26

Reviewed: 15-04-26

Accepted: 20-05-26

Published: 30-06-26

Energy security remains a pressing issue in Pakistan, worsened by dependence on fossil fuels, an unreliable power supply and rising energy costs. Solar power, as a renewable energy solution, has the potential to provide decentralized, sustainable and affordable energy access while reducing energy poverty. This study investigates the role of solar energy in alleviating energy poverty and promoting energy sustainability in Pakistan, examining how the concept of energy citizenship can empower society in decision-making and decentralized energy production through participatory governance. The study is situated within Pillar 4, "**Energy, Water and Food Security**" of Pakistan Vision 2025. Globally, energy poverty hinders social development and economic growth; in Pakistan, it exacerbates inequalities in affordability and slows development. A qualitative policy analysis was used, examining national policy documents critically in terms of their content and goals. The findings suggest that national policy frames community-led solar initiatives as a means of improving household energy security, reducing energy poverty, fostering economic development and contributing to climate change mitigation strategies, although these outcomes are not empirically measured in this documentary analysis. Policy recommendations include incentivizing solar energy adoption, improving regulatory frameworks and promoting local participation in energy governance.

Keywords: Energy Security, Energy Citizenship, Pakistan Vision 2025, Energy Poverty, Climate Mitigation

This is an open access article distributed under the terms of CC-BY-4.0, which permits unrestricted use, distribution, reproduction, and adaptation in any medium and for any purpose with proper attribution to the original author(s), title, journal, and URL.

[1] Department of Governance and public policy, National University of Modern Language (NUML), Islamabad
[2] Department of Governance and public policy, National University of Modern Language (NUML), Islamabad

ISSN (P): 3006-6522
ISSN (E): 3006-6530

1. INTRODUCTION

Energy is known as one of the key pillars of economic development, social development and now environmental sustainability. Energy systems are reliable, affordable and sustainable, contributing to the productivity of industries, agricultural development, public services and better living (Emmanuel & Ngabala, 2026; Kabeyi & Olanrewaju, 2022). Therefore, the achievement of energy security has emerged as a high priority for the governments globally as they combat the rising energy demands, climate change and the shift towards low carbon economies. The 7th Sustainable Development Goal (SDG 7) is focused on "Access to affordable, reliable and sustainable energy. It underscores the critical importance of renewable energy in realizing sustainable development. The global energy transition has helped countries move towards increasing energy resilience and reducing greenhouse gas emissions, particularly for solar PV. The International Energy Agency's World Energy Outlook 2025 similarly reports that energy security concerns have broadened beyond traditional oil and gas supply risks to include critical-mineral supply chains, affordability and system resilience, with governments increasingly prioritizing energy security and affordability alongside the transition to cleaner energy sources (IEA, 2025). Despite the recent advancements in energy technologies, energy insecurity is a recurring problem in many developing countries (Osman et al., 2023). The lack of infrastructure, reliance on imported fossil fuels, increasing electricity demands and institutional limitations are still threatening sustainable development.

Energy insecurity is not just about energy resources, it is also about their cost, access, availability, reliability, resilience and the ability of the governance system to deliver fair distribution of energy. Ongoing research explores how to achieve successful energy transitions, highlighting the need for both technological advances and governance changes to foster greater engagement of stakeholders, institutional coordination and community involvement (Rabbi et al., 2022). Energy insecurity is a constraint on economic growth and sustainable development in Pakistan. The national energy system is under a lot of stress due to the high growth rate of the population, urbanization, industrialization and rising electricity consumption. There has been a significant increase in the generation capacity of electricity in the last 10 years due to the substantial investments made. However, the country is still facing electricity shortages, hiked up pricing tariffs, transmission losses, circular debt and high reliance on imported fossil fuels. These difficulties constantly drive-up production costs, undermine competitiveness in industry, deter investment and especially impact on the rural areas and low-income groups (Amir & Manzoor, 2025).

Energy security has emerged as a top on policy agenda to ensure sustainable economic development and social well-being. Pakistan is blessed with a lot of opportunities in the domain of renewable energy to mitigate these challenges (Rehman et al., 2026). Solar energy has the immense potential, with an average solar irradiation over the country of about 5-7 kWh/m²/day which means that distributed photovoltaic solar systems are technically and economically viable in most parts of the country. Minimizing technology expenses, better energy storage solutions and assisting regulatory frameworks like net metering have additionally raised the acceptance level of solar energy to boost climate resilience, increase availability of affordable energy services and reduce reliance on imported fuels (Rumbayan et al., 2025). Government of Pakistan has recognized opportunities and has begun to implement a few strategic policy measures to speed up renewable energy development. In this context, four important policies to encourage renewable energy, energy diversification and climate change mitigation are Pakistan Vision 2025, the Alternative and Renewable Energy Policy 2019, the National Electricity Policy 2021 and the National Climate

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Change Policy 2021, alongside the revised Nationally Determined Contributions (NDCs) of Pakistan. Existing policy frameworks are largely directed towards increasing the generation of renewable energy (RE), with relatively little focus on participatory governance and citizen engagement (Wang et al., 2025).

Renewable energy governance in Pakistan is overall very centralized, with few institutional arrangements at the community level that allow for a meaningful and sustainable engagement in energy planning, implementation, or ownership (Iqbal et al., 2022). Public involvement in renewable energy production, community ownership, policymaking, energy savings and local decision-making remains important: current literature indicates that community involvement plays a crucial role in strengthening renewable energy transitions, as it fosters greater acceptance among the public, boosts the legitimacy of institutions, local ownership and inclusive energy governance. The concept of energy citizenship is now emerging as a key governance tool for understanding the potential of decentralized renewable energy systems for sustainable development and energy security (Wahlund & Palm, 2022).

The literature on energy citizenship has grown significantly over the last ten years and the empirical evidence comes mainly from countries in Europe where supportive institutional frameworks provide an enabling context for community energy and renewable energy cooperatives (RECs). Earlier studies have focused on the role of energy citizenship in the governance of renewable energy in contexts of strong central authority, institutional disintegration and ongoing energy insecurity which is relatively limited for developing countries (Roberto et al., 2023).

The objective of the study is to answer this important research gap by investigating how energy citizenship can enhance energy governance of solar energy in Pakistan and help in ensuring energy security. The study does not assess the technological and economic aspects of renewable energy, but rather treats it from a governance perspective, putting citizens in the active role of renewable energy transitions. The study, through a qualitative policy analysis approach, addresses the issue, critically analyzing the extent of engagement of those principles in the policies of major renewable energy and climate in Pakistan, namely energy citizenship, participatory governance and decentralized renewable energy development.

1.1. Research Objectives

- To examine how energy citizenship, as a governance concept represented within Pakistan's national energy and climate policy framework.
- To assess how solar energy governance positions in these documents in relation to citizen empowerment and decentralization.
- To assess the extent to which Pakistan Vision 2025 supports citizen-driven energy transitions.
- To map the institutional and governance barriers to energy citizenship that these documents reveal or leave unaddressed.

1.2. Research Questions

- How do Pakistan's national energy and climate policy documents frame the relationship between energy citizenship and energy security?
- How is solar energy governance represented in these documents in relation to citizen empowerment and decentralized renewable energy systems?
- To what extent does Pakistan Vision 2025 address citizen-driven renewable energy transitions?
- What institutional and governance barriers to energy citizenship are identifiable within Pakistan's solar energy policy framework?

ISSN (P): 3006-6522
ISSN (E): 3006-6530

2. LITERATURE REVIEW

The study contributes to literature in three important ways. First, it extends the growing landscape of energy citizenship by examining its application within the context of a developing country experiencing persistent energy insecurity. Second, it integrates Energy Citizenship Theory and Sustainable Governance Theory to develop a governance-oriented analytical framework linking citizen participation, decentralized solar energy governance and energy security. Third, the study provides evidence-based policy recommendations for strengthening participatory renewable energy governance, improving institutional coordination and promoting community-led solar energy initiatives under Pakistan Vision 2025.

2.1. Energy Citizenship: Concept, Evolution and Governance Perspectives

Initiatives to speed up shift to low carbon energy systems have revolutionized citizen participation in energy governance. The present energy transformations are no longer seen only as technological or economic processes. However, it needs socio-technical changes for active engagement from civil society, markets and governments (Chilvers et al., 2021). The concept of "energy citizenship" has become a governance-related term and characterizes citizenship as an active partner in the production of renewable energy. This will need institutional frameworks to enable communities to influence the design of energy systems to achieve democratic governance, social acceptability and long-term energy resilience (Fritz et al., 2024).

Literature of the last few years confirms a shift from the original focus on behavior change to adopt political engagement. Community action and technological innovation, with energy citizenship is a multidimensional concept that encompasses environmental responsibility, public engagement and institutional participation (Segales et al., 2023). The governance aspect of energy citizenship has been gaining prominence in recent years. The analysis shows that inclusion of citizens contributes to the legitimacy of policies as it promotes transparency, accountability and trust among the actors because of governance arrangements that are embedded in the local context (Araujo-Vizuete & Robalino, 2025). To scale up renewables, there is a need for institutional structures that put citizens in a meaningful place, that make citizens care about energy governance and make them feel the benefit of renewable investments. It shows when communities are left out of decision making, renewable energy projects often produce resistance, reduce institutional trust and reduce policy effectiveness (Anfinson, 2023).

It is also noted that there are significant geographical differences in the implementation of energy citizenship in literature. Most experiential evidence comes from European countries with a legislative and regulatory environment that supports the active involvement of citizens; in mature energy markets with longstanding renewable energy communities. Developing countries remain dependent on undemocratic and fragmented governance structures that lack institutional capacity, are poorly resourced and exclude the public from participation (Hanke et al., 2021).

Roberts, 2020 emphasizes that importance of renewable energy growth is gaining more focus in national policies, their implementation still focuses more on infrastructure and investment incentives than citizen participation and community ownership. Krug et al., 2022 highlight governance aspect of renewable energy is therefore not very well discussed in the policy discourse in Pakistan. This gap is the conceptual driving force of the present study which explores the energy citizenship as a governance mechanism to support citizen-centric solar energy transition in the context of Pakistan Vision 2025 (Ganaie et al., 2025).

2.2. Solar Energy Transition and Energy Security

Shifting from fossil fuel energy systems to renewable energy has emerged as a key policy issue for governments aiming to enhance energy security and tackle climate change and sustainable

ISSN (P): 3006-6522
ISSN (E): 3006-6530

development. Solar PV systems have grown the fastest of all renewable energy technologies in terms of global expansion, due to reductions in the cost of technology, a growing demand for energy and policy measures (Elkhatat & Al-Muhtaseb, 2024). Solar PV is also the biggest share of new electricity generation capacity added to the world's grid which reinforces the vital importance of this resource for the transition to net zero and for greater energy resilience in future.

Governance quality, social acceptance and institutional adaptability become more important than ever in driving energy security, especially in transitioning to renewables. This broader view shows that investments in technologies alone are not enough to ensure secure energy systems and governance mechanisms that facilitate the participation of stakeholders and institutional effectiveness are necessary (Guarascio et al., 2025). The decentralized nature of solar energy and its ability to lower reliance on imported fossil fuels makes it a strategic tool to enhance energy security. Community-led renewable energy (CLRE) initiatives also offer various socio-economic and environmental advantages beyond energy production, as evidenced by recent empirical research, with activities such as local economic development, job creation and local investment all benefiting from CLRE (Grignani et al., 2021).

Hoicka et al., 2021 discuss implementation of community based renewable energy is also not uniform in various institutional settings. Most of the successful initiatives come from Europe where citizens' participation in renewable energy markets is supported by legislation, financial incentives and well-developed policies. Nijsse et al. (2023) share that financial accessibility has also been cited as one of the main challenges to successful transition to solar energy. Solar energy is a technology with an attractive price decline. The use of innovative financial options, such as green finance, microcredit, public-private partnerships and community investment models are being promoted to enable broader roll-out of decentralized RE systems.

Hassan et al. (2021) argue that the application of decentralized solar energy has gained a lot of importance because of the problem of electricity scarcity, the increasing cost of electricity and reliance on imported fossil fuels. Renewable energy is a key priority in the national policies such as Alternative and Renewable Energy Policy 2019 and pillar 4 of Pakistan Vision 2025 to ensure energy security and sustainable development.

2.3. Pakistan's Renewable Energy Policy Landscape

Raza and Cucculelli (2024) highlight that in the last decade or so, the country's energy security, growing power demand and climate change commitments have attracted policy attention for transitioning the energy landscape to renewable energy sources in Pakistan. The Government of Pakistan has identified these issues and has taken several strategic measures to encourage renewable energy and ensure future energy security. Energy, Water and Food Security is also one of the major pillars of development of the country outlined in the Pakistan Vision 2025. The Alternative and Renewable Energy Policy 2019 sets a high target for development of renewable sources and mandates the participation of the private sector, facilitation of investments and creating competitiveness in the market. The government's commitment to reinforce policies, such as the National Electricity Policy 2021, the National Climate Change Policy 2021 and Pakistan's updated Nationally Determined Contributions (NDCs). These policy structures reflect significant advances on the road towards greater acceptance of the value of renewables. Baker et al., (2022) argue that the policies for RENs are still technocratic in nature and have been mainly about increasing generation capacity, enhancing the grid infrastructure and encouraging private investment, with little space for community participation or local energy governance.

Wang et al., (2025) highlight the challenges of fragmented institutional responsibilities, inadequate coordination between federal and provincial levels and inconsistent regulatory

ISSN (P): 3006-6522
ISSN (E): 3006-6530

frameworks that can delay the implementation of policies. Ali et al. (2026) Obi et al., (2025) believe that weak governance systems deter investments, create uncertainty in regulations and hamper the implementation of decentralized renewable energy projects. This means that the national policy goals are often being translated into a more disarrayed implementation plan and are not even addressing issues of local governance.

Shahzad et al., (2023) explain that decentralized renewable energy has great potential for rural electrification and decrease in energy poverty, it is still underdeveloped. Other challenges such as financial constraints and regulations are also holding back the transition towards renewable energy in Pakistan. But access to cheap finance is limited to many households, small businesses and rural communities. High initial investment requirements, shifting import policies, taxes and lack of access to green finance are limiting the adoption of decentralized solar energy (Aslam et al., 2022).

2.4. Research Gap and Conceptual Linkages

Over the last decade, Pakistan's energy insecurity, rising demand, climate change pledges have garnered a lot of policy focus for a transition towards renewable energy. The country is still facing the issue of structural problems, such as generation deficit, transmission and distribution losses, financial instability in the power sector and inequitable access to affordable energy especially in remote and rural areas (Del-Aguila-Arcentales et al., 2022). The successive governments have adopted policy changes to diversify energy sources in the country with emphasis on harnessing indigenous renewable energy sources like solar and wind energy. Pakistan has significant potential of renewable energy in terms of high solar irradiation potential of the country which is estimated to be between 5 and 7 kWh/m^2/day for most parts of the country. The geographical advantage makes solar energy potentially one of the best renewable energy sources for lowering the reliance on imported fuels and for increasing access to electricity for underserved communities (Aziz, 2021).

Taken together, the literature reviewed above establishes that citizen participation and decentralized governance arrangements are widely recognized, mainly in European and other high-income contexts. As its enablers of successful renewable energy transitions and that Pakistan's policy framework has expanded substantially in scope and ambition over the past decade. What remains unresolved is whether and how, this expanding policy corpus itself incorporates citizen participation as a governance principle, as opposed to treating renewable energy primarily as a generation-capacity and investment problem: existing studies on Pakistan (Baker et al., 2022; Wang et al., 2025) describe this technocratic tendency in general terms, but have not systematically traced it across the country's principal renewable-energy and climate policy documents using the text of those documents as evidence. The present study advances this line of inquiry by applying a structured, documentary methodology directly to the primary policy sources, rather than relying on secondary characterizations of Pakistani energy governance.

Present study makes three principal contributions to existing literature. First, it contributes theoretically by integrating Energy Citizenship Theory with Sustainable Governance Theory to explain how participatory governance can strengthen national energy security through decentralized renewable energy systems. Second, it contributes analytically by providing one of the first systematic documentary analyses examining the institutional integration of energy citizenship within Pakistan's renewable energy governance framework. Third, it contributes practically by identifying governance and policy reforms capable of strengthening community participation, improving institutional coordination and promoting citizen-driven solar energy transitions under Pakistan Vision 2025. To address these theoretical, documentary and policy gaps, the study advances a governance-oriented understanding of renewable energy transitions that are

ISSN (P): 3006-6522
ISSN (E): 3006-6530

particularly relevant for developing countries seeking to achieve sustainable, inclusive and resilient energy systems.

2.5. Theoretical Framework

Theoretical framework provides the conceptual foundation for examining how energy citizenship contributes to strengthening solar energy governance and improving energy security in Pakistan. This study integrates Energy Citizenship Theory and Sustainable Governance Theory to explain the relationship between citizen participation, decentralized renewable energy governance and national energy security. Energy Citizenship Theory explains how individuals and communities actively participate in renewable energy transitions; Sustainable Governance Theory provides the institutional perspective necessary to understand how governance arrangements facilitate or constrain such participation.

2.5.1. Energy Citizenship Theory

Wahlund and Palm (2022) describe Energy Citizenship Theory as a key concept in sustainability transitions because it positions citizens as agents of change rather than merely energy consumers. Unlike traditional energy governance, which emphasizes centralized decision-making and utility-led electricity generation, it highlights the role of individuals and communities in renewable energy production, energy conservation, policymaking and collective decision-making. Energy citizenship is commonly understood through four interrelated dimensions: participatory citizenship, involving consultation, advocacy and local energy decision-making; productive citizenship, where households and communities generate renewable energy through decentralized technologies; collective citizenship, involving shared renewable energy projects, cooperatives and collaborative governance; and transformative citizenship, which emphasizes citizens' role in institutional reform and long-term sustainability transitions (Debourdeau et al., 2024; Lennon et al., 2020). In Pakistan, this theory provides a relevant analytical framework because renewable energy policies remain largely focused on infrastructure, investment and electricity generation, with limited opportunities for citizen participation, while also helping assess how community engagement and decentralized solar energy can contribute to long-term energy security.

2.5.2. Sustainable Governance Theory

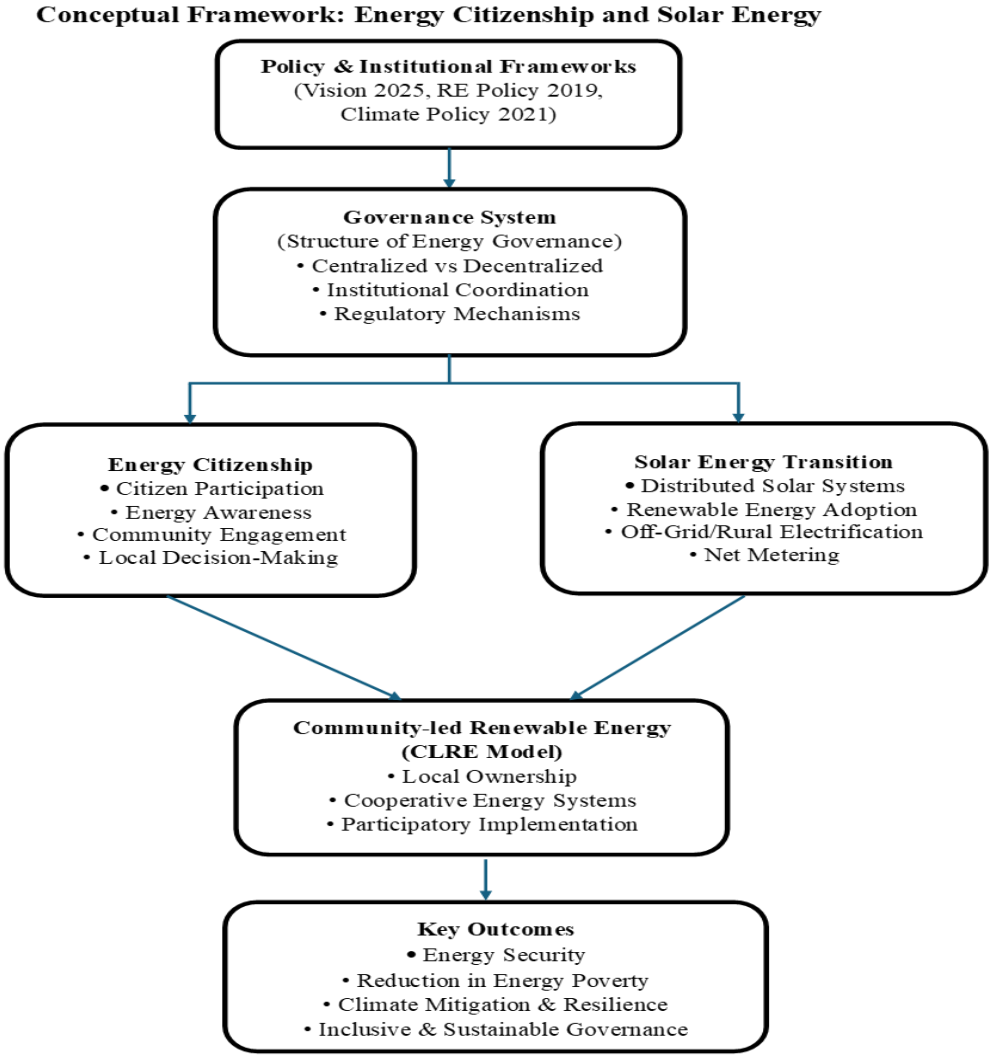
Energy Citizenship Theory explains the role of citizens, while Sustainable Governance Theory examines how governance structures shape renewable energy transitions. It argues that complex sustainability challenges cannot be addressed through hierarchical government alone but require collaboration among governments, private organizations, local communities, civil society and other actors. The theory emphasizes institutional coordination, stakeholder engagement, transparency, accountability, policy coherence and adaptive decision-making, stressing that effective governance depends not only on policy formulation but also on institutions' ability to coordinate actors and respond to environmental, technical and socio-economic changes. In Pakistan, this framework is particularly relevant because renewable energy governance requires cooperation among ministries, regulatory bodies, provincial governments, private investors and institutions.

2.5.3. Energy Citizenship and Sustainable Governance integration

Both Sustainable Governance Theory and Energy Citizenship Theory explain important aspects of the transition towards renewable energy, and their integration provides a more holistic analytical perspective for this study. Sustainable Governance Theory focuses on the institutional conditions that enable or constrain citizen participation, while Energy Citizenship Theory explains who participates in renewable energy governance and how such participation contributes to the energy transition, together suggesting that energy security requires both active citizen involvement

ISSN (P): 3006-6522
ISSN (E): 3006-6530

and governance systems that support participatory decision-making. Operationally, the dimensions of Energy Citizenship Theory were traced through specific indicator language in the reviewed documents: participatory citizenship was coded where documents referred to public consultation, feedback mechanisms or citizen involvement in energy-related decision-making; productive citizenship where provisions enabled households, businesses or communities to generate renewable energy, including the Alternative and Renewable Energy Policy 2019's net-metering, off-grid and captive-generation provisions; collective citizenship where community-level or cooperative arrangements were identified, such as municipal-authority provisions for public-private solar projects; and transformative citizenship where institutional reforms sought to shift decision-making authority towards citizens or local bodies rather than merely expand generation capacity. In parallel, Sustainable Governance Theory's constructs of institutional coordination, stakeholder engagement, transparency and accountability were coded wherever documents specified coordinating bodies, multi-stakeholder committees, reporting or oversight mechanisms, such as the ARE Policy 2019's Steering Committee, with this dimension-by-dimension coding illustrated for Theme 2 in Section 5.



Radtke, J. (2025)

Figure.1: The Conceptual Framework

ISSN (P): 3006-6522
ISSN (E): 3006-6530

To analyze the qualitative policy analysis, this framework is used, which discusses the role of citizen participation in the institutionalization of renewable energy policies. How decentralized governance of solar energy is being promoted and how the policies are helping in strengthening the energy security of Pakistan. It also sets foundations for the analysis of the governance gaps and policy recommendations to assist citizens to realize renewable energy transitions in Pakistan Vision 2025.

The integrated theoretical framework directly corresponds to the research objectives and questions. Energy Citizenship Theory is used to investigate citizens participation in renewable energy governance and Sustainable Governance Theory. These theories are paired with each other and be used in the study to identify good governance practices, institutional vulnerabilities and opportunities for strengthening decentralized solar energy by participatory governance. The framework provides a coherent explanation on how renewable energy policies can help in sustainable development and resolve the long-term problems of energy security and governance effectiveness by providing linkages between the two.

3. METHODOLOGY

3.1 Research Philosophy

This research approach is interpretivist that suggests that public policies and governance arrangements are socially constructed and are best understood in their political, institutional and socio-economic setting. Interpretivism aims to explore how the following policy documents, energy governance, citizen participation and energy security are conceptualized rather than testing causal relationships with quantitative data as in positivist approaches. This is philosophical as the study is about how much renewable energy policies in Pakistan adopt energy citizenship and participatory governance. The interpretivist paradigm allows for an in-depth consideration of policy narratives, institutional priorities and governance mechanisms that influence renewable energy transitions.

3.2 Research Design

This study uses qualitative policy analysis to examine Government of Pakistan policy documents. This approach is suitable for analyzing policy goals, governance processes, implementation and institutional arrangements, while also examining how policies define problems, allocate authority, enable stakeholder participation and address governance challenges (Enserink et al., 2022). It aligns with the study's objective of understanding energy citizenship in Pakistan's renewable energy governance and assessing how existing policies enable or constrain citizen-led transitions. This qualitative approach complements, rather than replaces, existing quantitative evidence on Pakistan's energy sector, including the World Bank's Multi-Tier Framework, NTDC's Indicative Generation Capacity Expansion Plan (IGCEP) and IRENA capacity statistics. While these sources measure access, reliability and generation outcomes, they do not show how policy documents allocate decision-making authority, define citizens' roles or institutionalize participatory governance. These issues are embedded in policy text and therefore require qualitative document analysis.

For this study, energy security is treated as a policy construct rather than a measured outcome and is operationalized through indicators used in the reviewed documents. Pakistan Vision 2025, for example, targets generation capacity above 45,000 MW, electricity access above 90%, a reduction in average unit cost of over 25% and an indigenous generation share above 50% (Government of Pakistan, 2014), while the Alternative and Renewable Energy Policy 2019 uses its "20x25 and 30x30" renewable-capacity targets. The study examines whether these policy-defined indicators are linked to citizen participation and decentralized governance, rather than assessing their

ISSN (P): 3006-6522
ISSN (E): 3006-6530

achievement in practice. This approach is narrower than the IEA's multidimensional conception of energy security, which includes supply diversification, affordability, resilience and critical-mineral availability (IEA, 2025). This distinction is discussed further in Section 3.9.

3.3 Research Strategy

The research uses qualitative policy analysis method. Policy analysis is a common approach in governance and public policy research that examines policy documents critically in terms of their content, goals, institutional structure and implementation processes. It allows researchers to determine policy priorities, governance issues, institutional inconsistencies and opportunities for policy change (Bacchi & Goodwin, 2025).

Qualitative policy analysis is employed in this study to examine how national policy documents in Pakistan frame energy security, renewable energy development, decentralized governance and citizen participation, rather than to capture the perceptions of policy makers directly, since the data consist of documents rather than interviews. Special efforts are made to determine whether the principles of energy citizenship and community-based renewable energy are explicitly or implicitly included in policy frameworks.

The analysis further examines coherence of policy goals in various national policy documents and examines the proposed institutional mechanisms for carrying out the renewables transition in Pakistan Vision 2025.

3.4 Data Sources

Data used in the study is secondary qualitative data, which is obtained from official policy documents, government documents and famous international institutional publications. Documentary evidence is used as an effective means to provide governance for renewable energy, which is largely institutionalized in national legislation, strategic plans, regulatory frameworks and policy guidelines.

Table 1

Key Policy and Institutional Documents reviewed for the study:

Ser	Policy/Institutional Document	Organization/Authority	Year	Web link of the documents
1	Pakistan Vision 2025	Government of Pakistan	2014	https://short-url.cc/1uZhJ
2	Alternative and Renewable Energy (ARE) Policy	Government of Pakistan	2019	https://short-url.cc/1AANl
3	National Electricity Policy	Government of Pakistan	2021	https://short-url.cc/1AANW
4	National Climate Change Policy (Updated)	Government of Pakistan	2021	https://short-url.cc/1uZip
5	Pakistan Nationally Determined Contributions (Updated NDC)	Government of Pakistan	2021	https://short-url.cc/1AAOB
6	Indicative Generation Capacity Expansion Plan (IGCEP)	NTDC	2025	https://short-url.cc/1uZj2
7	World Energy Outlook	International Energy Agency (IEA)	2025	https://short-url.cc/1AAP3
8	Renewable Capacity Statistics and Energy Transition Reports	International Renewable Energy Agency (IRENA)	2026	https://short-url.cc/1uZjt
9	Energy Sector Assessment and Country Reports	World Bank	2024	https://short-url.cc/1AAPH

These national and international policy documents were reviewed for the study and to support the policy analysis of energy citizenship, renewable energy governance and community-led renewable energy in Pakistan. These documents have been chosen as they collectively outline the

ISSN (P): 3006-6522
ISSN (E): 3006-6530

strategic direction of Pakistan on Renewable Energy development, Climate Action, Governance reforms and Energy Security.

3.5 Document Selection Criteria

The four criteria used to select policy documents were: (1) resources on the subject, (2) accessibility of documents, (3) the necessity of the documents and (4) the relevance of the documents. First, the documents should have been published by the Government of Pakistan or any recognized organization. Secondly, the documents cover one or more of the following themes:

Renewable energy, Solar energy, Energy governance, Energy security, Climate change, climate mitigation strategies and energy justice, Sustainable development and Citizen participation and Institutional governance. Thirdly, documents dated from 2020 to 2026 were prioritized to incorporate the latest policy changes. Two older documents, Pakistan Vision 2025 (2014) and the Alternative and Renewable Energy Policy (2019), were retained outside this window because they remain the foundational. currently active legislative instruments establishing Pakistan's renewable energy and energy-security commitments. The more recent documents in the sample build directly on the targets and institutional mandates that these two documents set out, so excluding them would have removed necessary policy context. Lastly, documents were chosen according to the research aims and conceptual framework of the study.

3.6 Data Collection Procedure

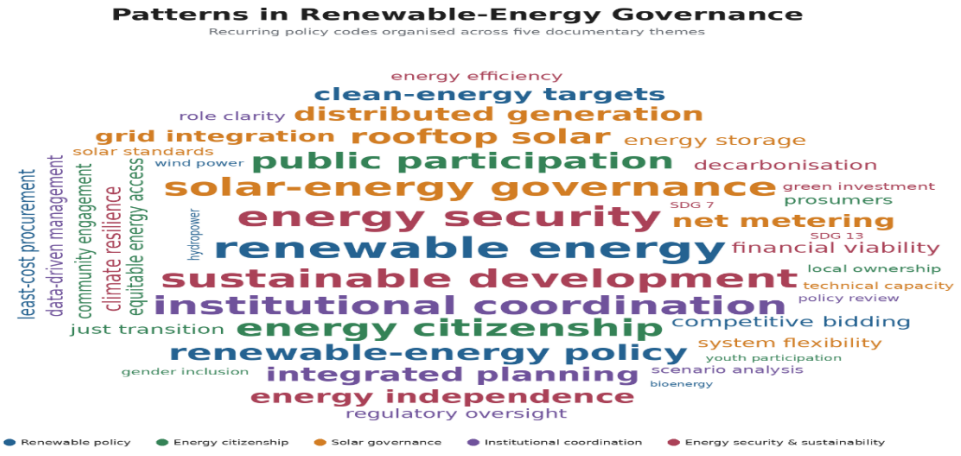
Official government and international organization's websites, institutional repositories were used for collecting policy documents to ensure authenticity and reliability. The documents were downloaded in their original format and then systematically sorted by their year of publication, issuing institution, policy domain and governance focus.

Prior to formal coding, each document was read multiple times to gain familiarity with the document's content. The following policy aims; implementation methods, institutional roles, stakeholder involvement, renewable energy policies and decentralized governance were given special attention during the review process.

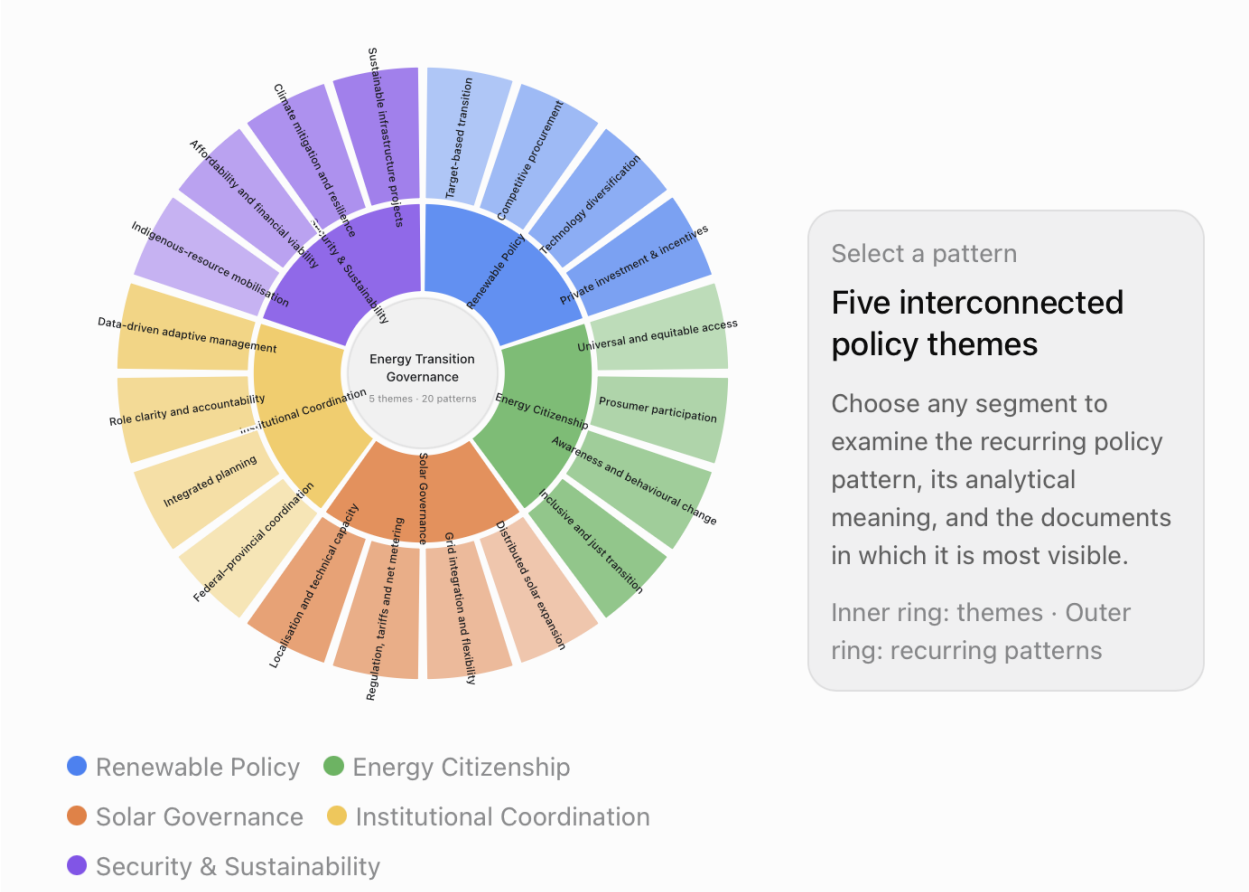
3.7 Data Analysis

Thematic analysis was used to analyze the data collected, which followed the six-step framework outlined by Braun and Clarke (2021). Thematic analysis was chosen as the method for analyzing the qualitative policy documents because it was the most systematic and transparent method to identify common themes and patterns in the documents (Ahmed et al., 2025).

The analysis consisted of six stages:



ISSN (P): 3006-6522
ISSN (E): 3006-6530



Codes, Patterns and Theme (Renewable-Energy Policy)

Ser	Identified Codes	Patterns	Theme
1.1	Renewable-energy targets; 20% by 2025; 30% by 2030; clean-energy commitments; reduction of fossil-fuel dependence	**Target-oriented renewable-energy transition**	**Renewable-Energy Policies**
1.2	Competitive bidding; least-cost procurement; transparent tariff determination; technology-neutral auctions	**Competitive and least-cost procurement**	
1.3	Wind power; solar power; hydropower; bioenergy; geothermal energy; emerging renewable technologies	**Diversification of renewable-energy sources**	
1.4	Private-sector investment; fiscal incentives; investment facilitation; predictable tariffs; risk mitigation	**Market-based renewable-energy development**	

The first stage is to get an understanding of the data.

Phase 1: Familiar with the data Policy documents were read many times to gain a full understanding of policy messages and institutional agendas.

Phase 2: Initial coding – Text sections relevant to governance of renewable energy, energy security, citizen participation, decentralized governance, institutional coordination and solar energy were systematically coded.

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Phase 3: Theme development – Codes having similar meanings were clustered together into larger analytical themes that represent common issues of governance.

Phase 4: Theme review – All the policy documents were reviewed for emerging themes to provide consistency and conceptual coherence.

Phase 5: Theme definition – Themes were developed and distilled based on the relationship to the research goals and theory.

Phase 6: Report generation – The final themes were elaborated and translated through Energy Citizenship Theory and Sustainable Governance Theory, which provide an explanation of the ways in which policy narratives enable or hinder citizen-driven renewable energy transitions.

Based on thematic analysis, five main themes were derived:

1. The policy on renewable energy is a commitment.
2. Energy citizenship and public participation.
3. Solar energy governance
4. Coordination and management of institutions.
5. Energy security and sustainable development components and project

To gain methodological accuracy, the study is based on the criteria of trustworthiness proposed by Lincoln and Guba (1985) which are credibility, dependability, confirmability and transferability.

Multiple policy documents from various institutional sources were analyzed and thus triangulated across policy sources, enhancing credibility.

A transparent analytical process has been created by documenting each part of the data collection, coding and thematic development, thus ensuring dependability.

Systematic coding procedures were followed to ensure confirmability, that is, documentary evidence was used to support the coding process and not personal assumptions or subjective interpretation.

The transferability of the findings was boosted with detailed descriptions of Pakistan's institutional and policy environment to facilitate comparison with other renewable energy governance environments in developing countries.

3.8 Ethical Considerations

In this study only publicly available policy documents and institutional reports are used. No human subjects being involved and there was no informed consent required. All documents were obtained from official websites of organizations and the government to meet the requirements of academic research ethics.

3.9 Methodological Limitations

Qualitative policy analysis can reveal information about governance structures and institutional priorities. It cannot measure the implementation of a policy or citizens' behavior. Findings are based on official policy documents and based on policy intentions rather than policy outcomes. In particular, energy security is analyzed here as it is framed and targeted within policy documents (see Section 4.2), not as a realized, empirically measured outcome. Whether Pakistan's declared targets for generation capacity, electricity access or cost reduction have actually been met falls outside the scope of this documentary method and would require the quantitative indicator data referenced in Section 4.2.

The analysis presented here can be supplemented in future studies with interviews from policy makers, regulators, renewable energy developers, community organizations and citizens and by surveys of people's attitudes towards energy citizenship and decentralized solar energy uptake.

4. RESULTS AND POLICY ANALYSIS

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Various policy documents in Pakistan on renewable energy and climate change were analyzed and five cross-cutting themes emerged from the thematic analysis that clarifies the present situation of the governance of solar energy and its implications for energy security in Pakistan. These themes are policy commitment for renewable energy transition, energy citizenship and public participation, institutional coordination and governance capacity, decentralized solar energy governance and energy security and sustainable development.

Theme 1 is about strong policy commitment and some governance reform. The result shows that Pakistan has taken a clear political stance in the direction of renewable energy through the policy of Pakistan Vision 2025, the policy of Alternative and Renewable Energy 2019, the National Electricity Policy 2021 and the National Climate Change Policy 2021. Renewable energy features in these policy documents as a key focus to improve energy security, greenhouse gas emissions and sustainable economic development. The high solar irradiation level and its potential in diversifying the national energy mix along with its potential to be a major source of energy are presented as a key resource in Pakistan. For example, Pakistan Vision 2025 targets doubling national generation capacity to over 45,000 MW and raising electricity access from 67% to over 90% of the population, while the Alternative and Renewable Energy Policy 2019 commits to at least 20% renewable on-grid generation capacity by 2025 and 30% by 2030 (the "20x25 and 30x30" target). Yet, all the documents reviewed focused mainly on finding ways to boost power generation capacity, attract private investments and expand renewable energy infrastructure, rather than tackling the more complex task of embedding participatory governance and citizen engagement within these policies.

Theme 2: Institutionalization of energy citizenship. The other theme identified from analysis relates to the lack of energy citizenship in energy policies in Pakistan. The recognition of the need to raise awareness among citizens and promote the use of renewable energies in policy documents, citizens are mainly represented as consumers or beneficiaries and not actively involved in energy governance. The policies include some very basic references to community energy cooperatives, participatory decision-making or local ownership of renewable energy projects. Citizens' opportunities to participate directly in the planning, implementing and managing of renewables are therefore underdeveloped. This indicates that despite the increasing international acceptance of energy citizenship as a key factor in sustainable energy transitions, a policy level shift to more participatory governance is still missing from Pakistan.

Coded evidence illustrates this pattern across the four dimensions of Energy Citizenship Theory. Participatory citizenship: Pakistan Vision 2025's broader governance pillar calls for "citizen feedback" and "citizen-centric" public service delivery, but this consultation language does not extend into the document's own energy pillar and no equivalent mechanism appears in the Alternative and Renewable Energy Policy 2019 or the National Electricity Policy 2021. Productive citizenship: the Alternative and Renewable Energy Policy 2019 permits household and business self-generation through net metering, off-grid systems and captive power, but frames these as unregulated market activity rather than as a governance right. Collective citizenship: the same policy's municipal-authorities provisions allow public-private renewable projects led by civic bodies. However, this space is confined to municipal infrastructure, such as street lighting and parking, rather than residential community ownership. Transformative citizenship: none of the three core energy documents contains a provision that shifts renewable-energy decision-making authority to citizens or local bodies. This pattern indicates that participatory and transformative citizenship are largely absent from Pakistan's energy-specific policy instruments, while productive and collective citizenship exist only in narrow, market- or municipal-level forms.

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Theme 3: Institutional fragmentation and governance challenges. The analysis also shows that institutional division is one of the key challenges for efficient governance of renewable energy. The jurisdiction of energy planning, electricity regulation, climate policy and development of renewable energy is spread between several federal and provincial agencies that have overlapping mandates. This institutional diversity can foster specialization but often coordination issues lead to policy inconsistencies, implementation barriers and uncertainty. All policy documents reviewed show good strategic intentions and offer relatively little direction on inter-agency co-ordination, monitoring processes and stakeholder collaboration. Such governance gaps damage the effectiveness of policies and are also a barrier to decentralized renewable energy projects. This pattern is directly visible in the National Electricity Policy 2021 itself: its dedicated "Governance" section (5.9) addresses institutional and corporate governance, such as board appointments, performance benchmarks and periodic regulatory assessments. However, contains no provision for citizen or community consultation. Similarly, none of the policy's six Key Guiding Principles (efficiency, transparency, competition, financial viability, indigenization/research and development and environmental responsibility) names citizen participation as an organizing principle for the sector, even though citizen-facing goals such as "access to affordable energy" and "energy security" appear among its stated goals.

Theme 4: Decentralized solar energy as a strategic opportunity. All the reviewed policy documents have consistently highlighted that solar energy is one of the most promising sources of renewable energy in Pakistan. Net metering and private sector investment are being promoted by policy, which has been done due to the economic and environmental benefits of distributed solar installations. But the analysis shows that the governance arrangements are still largely market-based, focusing on commercial investment not community-led renewable energy.

Theme 5: Governance as a basis for Energy Security. The last theme shows that energy security in Pakistan isn't just about generating power and building infrastructure. It also highlights the need for renewable energy diversification much more than in the past. But they tend to focus much less on governance mechanisms that enhance institutional trust, citizen engagement and collaborative decision-making. The analysis thus indicates that in addition to technological changes, governance changes that can include energy citizenship in the development of renewable energy policies are essential for long-term energy security.

The thematic analysis indicates that Pakistan has a well-designed policy framework for the promotion of renewable energy but still has yet to achieve citizen-centered energy governance. To bridge this governance gap, the focus needs to shift from infrastructure-based policies to participatory approaches to governance which involve citizens and local communities as active partners in the country's renewable energy transition. This would enhance the deployment of decentralized solar generation systems, as well as national energy security and climate resilience.

5. DISCUSSION

This study analyzed the incorporation of energy citizenship in the governance of solar energy in Pakistan using a qualitative analysis of all the energy policies of Pakistan and climate change policies. The results show that Pakistan has really set its ambitious targets in the renewable energy policy for expansion. The management structure is not yet decentralized and there are no effective institutional mechanisms for the engagement of citizens and for the implementation and monitoring of CLRE projects. The results are discussed in the context of previous studies and the theoretical perspective used in this study.

Pakistan's policies for renewable energy emphasize the energy diversification, development of infrastructure and investment in the private sector. Renewable energy is considered as an

ISSN (P): 3006-6522
ISSN (E): 3006-6530

effective strategy for energy security and less reliance on imported fossil fuels in the frameworks of Pakistan Vision 2025, the Alternative and Renewable Energy Policy 2019 and the National Electricity Policy 2021 (Asghar et al., 2023). The National Electricity Policy 2021 itself defines energy security narrowly, as "uninterrupted availability of energy sources" achieved by diversifying the generation fuel mix (Section 3.2), with no reference to citizen participation or governance inclusion as a component of that security. The results are in line with recent international studies that show that renewable energy is playing a key role in national energy security measures, as it diversifies energy supply, lowers carbon emissions and increases climate resilience (Elkhatat & Al-Muhtaseb, 2024).

The second finding was the lower institutionalization of energy citizenship in the policy framework in Pakistan. Across the documents coded, Pakistan Vision 2025, the Alternative and Renewable Energy Policy 2019 and the National Electricity Policy 2021 all call for public awareness of renewable energy, but none of them explicitly acknowledge citizens as active players in the governance of renewable energy, for example through community ownership provisions or formal participation mechanisms (Khalid et al., 2024).

The third finding underscores the need for institutional coordination, to ensure effective renewable energy governance. A major governance challenge identified in the analysis was a lack of coordination of institutional responsibilities between the ministries, the regulatory agencies and the provincial governments. Sustainable Governance Theory posits that governance effectiveness is not just about hierarchical administrative control, but also on coordination of institutions, policy coherence, cooperation of stakeholders and adaptive decision making (Di Nucci & Prontera, 2021).

Another significant finding is that the adoption of community based RE projects in Pakistan is still very low as the country has a great potential to harness solar energy. The widespread adoption of decentralized solar energy systems is now being shown by international studies to increase public acceptance, boost community ownership and increase energy resilience, due to the role of communities in planning and managing renewable energy (Rehman et al., 2026).

Overall, the discussion highlights that Pakistan has good policy intentions and a high potential for access to renewable energy. However, Pakistan has yet to establish governance frameworks that allow for the complete integration of energy citizenship into solar energy governance. Hence, making participatory governance and community-led renewable energy projects a policy direction to strengthen energy security, institutional effectiveness and the pace of transition towards a more sustainable and resilient energy landscape in Pakistan is a critical one.

6. LIMITATIONS AND FUTURE RESEARCH

This study is confined to qualitative policy analysis and thus does not consider implementation effects but rather intentions. While documentary analysis can give insights into the institutional priorities and governance structures, it may not reflect the perceptions and experiences of renewable energy developers, local communities or policy makers. Going forward, research designs involving mixed methods or comparative studies would be appropriate, which would include interviews, focus group discussions and surveys with government officials, regulators, renewable energy practitioners and citizens. Comparative studies on the different countries from South Asia would also give insights into the different governance models and its impact on the institutionalization of energy citizenship and the effectiveness of the community-based renewable energy programs. Such studies would enhance empirical evidence for the benefits of participatory governance of renewables and help design better policies in developing nations.

6.1. Policy Implications

The findings of this study have several important implications for policymakers, regulatory

ISSN (P): 3006-6522
ISSN (E): 3006-6530

institutions and renewable energy stakeholders.

First, future renewable energy policies should explicitly incorporate energy citizenship as a governance principle. National energy strategies should recognize citizens not only as consumers but also as active participants, investors, producers and decision-makers within renewable energy systems. Institutionalizing citizen participation would strengthen public ownership of renewable energy policies and improve their long-term effectiveness.

Second, the Government of Pakistan should promote community-led renewable energy initiatives by establishing supportive legal and regulatory frameworks for renewable energy cooperatives, community-owned solar projects and local energy partnerships. Such initiatives would improve rural electrification, increase local investment and expand access to affordable clean energy, particularly in underserved communities.

Third, strengthening institutional coordination should become a strategic priority. Improved collaboration among federal ministries, provincial governments, regulatory authorities and local institutions would reduce policy fragmentation, improve implementation efficiency and enhance governance coherence across the renewable energy sector.

Fourth, policymakers should expand financial support mechanisms for decentralized solar energy by introducing targeted subsidies, concessional financing, green investment funds and low-interest loan schemes for households, small businesses, agricultural communities and local renewable energy cooperatives. These financial instruments would reduce barriers to solar energy adoption while encouraging broader community participation.

Fifth, Pakistan should strengthen public awareness and capacity-building programmes that promote renewable energy literacy, energy conservation and citizen engagement in local energy planning. Universities, research institutions, civil society organizations and local governments can play an important role in developing technical knowledge and encouraging public participation in renewable energy governance.

Finally, renewable energy governance should be integrated more closely with Pakistan's broader sustainable development agenda, including the Sustainable Development Goals, the Nationally Determined Contributions and future revisions of Pakistan Vision 2025. Embedding participatory governance principles within national development planning would strengthen institutional resilience, improve climate adaptation and accelerate the country's transition towards a low-carbon and energy-secure future.

7. CONCLUSION

The shift toward renewable energy is one of Pakistan’s most important policy priorities for achieving sustainable development, climate resilience and long-term energy security. This study examined how energy citizenship is incorporated into solar energy governance in Pakistan and, in doing so, addresses each of the four research questions guiding the analysis. On energy citizenship and energy security (RQ1), the analysis shows that Pakistan Vision 2025, the Alternative and Renewable Energy Policy 2019, the National Electricity Policy 2021 and the National Climate Change Policy 2021 collectively establish renewable energy and solar energy in particular, as a key tool for reducing reliance on imported fossil fuels and strengthening energy security and reducing energy poverty. Although none of these documents frame citizen participation as central to that strategy. On solar energy governance and citizen empowerment (RQ2), the findings indicate that current governance arrangements remain centralized and infrastructure-focused, offering only limited institutional space for community ownership or decentralized decision-making. On Pakistan Vision 2025’s support for citizen-driven transitions (RQ3), the policy commits to expanding renewable energy access but does not translate this commitment into formal

ISSN (P): 3006-6522
ISSN (E): 3006-6530

participatory mechanisms. On institutional and governance barriers (RQ4), the study identifies fragmented inter-agency coordination and a persistent policy focus on generation capacity, private investment and technology deployment as the principal obstacles to institutionalizing energy citizenship. Theoretically, the study contributes to the literature by integrating Energy Citizenship Theory and Sustainable Governance Theory to show that, in the Pakistani context, energy security depends not only on generation and infrastructure but also on citizen participation, institutional coordination and collaborative decision-making. As a documentary analysis, it extends the small but growing body of energy citizenship research to a developing-country setting where governance capacity, rather than technical potential, is the binding constraint. Overall, the findings suggest that Pakistan has ample renewable energy potential and a broadly supportive policy environment, but that realizing this potential for citizen-centred energy security will require a shift from technology-based to governance-based renewable energy policy.

REFERENCE

Ahmed, S. K., Mohammed, R. A., Nashwan, A. J., Ibrahim, R. H., Abdalla, A. Q., Ameen, B. M. M., & Khdhir, R. M. (2025). Using thematic analysis in qualitative research. Journal of Medicine, Surgery and Public Health, 6, 100198.

Ali, J. (2026). Power Struggles: Understanding Political Economy Forces in Pakistan's Energy Governance. In Navigating "Sustainable Energy Transition" in South Asia (pp. 151-167). Springer, Singapore.

Amir, M. U., & Manzoor, B. (2025). Renegotiating Contracts of Independent Power Projects (IPPS) in Pakistan: Prospects, Challenges and Legal Implications. The Critical Review of Social Sciences Studies, 3(3), 2703-2721.

Anfinson, K. (2023). Capture or empowerment: governing citizens and the environment in the European Renewable Energy Transition. American Political Science Review, 117(3), 927-939.

Araujo-Vizuete, G., & Robalino-López, A. (2025). A systematic roadmap for energy transition: Bridging governance and community engagement in Ecuador. Smart Cities, 8(3), 80.

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.

Aslam, H., Nazir, A., & Zia, U. (2022). Pakistan's way forward towards a green economy: Perspectives for a clean energy transition. Sustainable Development Policy Institute.

Aziz, A. (2021). Rethinking digital financial inclusion: Evidence from Bangladesh. Aziz, A., & Naima, U. (2021). Rethinking digital financial inclusion: Evidence from Bangladesh. Technology in Society, 64.

Bacchi, C., & Goodwin, S. (2025). Poststructural policy analysis: A guide to practice. Springer Nature.

Baker, L., Hook, A., & Sovacool, B. K. (2021). Power struggles: Governing renewable electricity in a time of technological disruption. Geoforum, 118, 93-105.

Chilvers, J., Bellamy, R., Pallett, H., & Hargreaves, T. (2021). A systemic approach to mapping participation with low-carbon energy transitions. Nature Energy, 6(3), 250-259.

Debourdeau, A., Schäfer, M., Pel, B., Kemp, R., & Vadovics, E. (2024). A conceptual typology of energy citizenship. Energy Research & Social Science, 117, 103720.

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Del-Aguila-Arcentales, S., Alvarez-Risco, A., Jaramillo-Arévalo, M., De-la-Cruz-Diaz, M., & Anderson-Seminario, M. D. L. M. (2022). Influence of social, environmental and economic sustainable development goals (SDGs) over continuation of entrepreneurship and competitiveness. Journal of Open Innovation: Technology, Market and Complexity, 8(2), 73.

Di Nucci, M. R., & Prontera, A. (2021). The Italian energy transition in a multilevel system: Between reinforcing dynamics and institutional constraints. Zeitschrift fur Politikwissenschaft, 1, 1-24.

Elkhatat, A., & Al-Muhtaseb, S. (2024). Climate change and energy security: a comparative analysis of the role of energy policies in advancing environmental sustainability. Energies, 17(13), 3179.

Elkhatat, A., & Al-Muhtaseb, S. (2024). Climate change and energy security: a comparative analysis of the role of energy policies in advancing environmental sustainability. Energies, 17(13), 3179.

Emmanuel, J. K., & Ngabala, F. J. (2026). Global energy demand and the role of technological innovation towards renewable energy generation for economic growth and a cleaner environment: A review. Sustainable Environment, 12(1), 2633481.

Enserink, B., Thissen, W., Ruijgh, T., Kwakkel, J., Koppenjan, J., Kortmann, R., ... & Slinger, J. (2022). Policy analysis of multi-actor systems. TU Delft OPEN Publishing.

Fritz, L., Baum, C. M., Low, S., & Sovacool, B. K. (2024). Public engagement for inclusive and sustainable governance of climate interventions. Nature communications, 15(1), 4168.

Ganaie, N. A., Saikia, T., Mir, T. A., & Jan, I. (2025). Dynamics Of Public Policy and Good Governance in India. Authors Click Publishing.

Grignani, A., Gozzellino, M., Sciullo, A., & Padovan, D. (2021). Community cooperative: A new legal form for enhancing social capital for the development of renewable energy communities in Italy. Energies, 14(21), 7029.

Guarascio, D., Reljic, J., & Zezza, F. (2025). Energy vulnerability and resilience in the EU: concepts, empirics and policy. Journal of Industrial and Business Economics, 52(3), 683-726.

Hanke, F., Guyet, R., & Feenstra, M. (2021). Do renewable energy communities deliver energy justice? Exploring insights from 71 European cases. Energy Research & Social Science, 80, 102244.

Hassan, M., Khan, M. I., Mumtaz, M. W., & Mukhtar, H. (2021). Energy and environmental security nexus in Pakistan. In Energy and Environmental Security in developing countries (pp. 147-172). Cham: Springer International Publishing.

Hoicka, C. E., Lowitzsch, J., Brisbois, M. C., Kumar, A., & Camargo, L. R. (2021). Implementing a just renewable energy transition: Policy advice for transposing the new European rules for renewable energy communities. Energy Policy, 156, 112435.

IEA. (2025). World Energy Outlook 2025. International Energy Agency, Paris.

IEA. (2025). World Energy Outlook 2025. International Energy Agency, Paris.

Iqbal, K. M. J., Waheed, F., Azhar, U., Akhtar, N., & Khan, M. I. (2022). Modeling energy governance index for the adequacy of policy, legal and institutional response measures for climate compatible development. Frontiers in Environmental Science, 10, 985340.

Kabeyi, M. J. B., & Olanrewaju, O. A. (2022). Sustainable energy transition for renewable and low carbon grid electricity generation and supply. Frontiers in Energy research, 9, 743114.

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Khalid, R., Basit, A., Sohail, M., Ahmad, T., & Muhammad, N. (2024). Community energy and socio-technical infrastructure resilience: analysis of mini/micro hydro power projects in Khyber Pakhtunkhwa, Pakistan. Environmental Research: Infrastructure and Sustainability, 4(3), 035015.

Krug, M., Di Nucci, M. R., Caldera, M., & De Luca, E. (2022). Mainstreaming community energy: is the renewable energy directive a driver for renewable energy communities in Germany and Italy?. Sustainability, 14(12), 7181.

Naqvi, F. N., Bukhari, W. A. A., Bukhari, A. A. A., & Pervaiz, A. (2023). Behind the Veil: Unveiling the Mysteries of Net Trade Credit Determinants in the Cement Sector. *Dyal Singh Journal of Humanities & Social Sciences*, *1*(2), 20-31.

Nijsse, F. J., Mercure, J. F., Ameli, N., Larosa, F., Kothari, S., Rickman, J., ... & Pollitt, H. (2023). The momentum of the solar energy transition. Nature Communications, 14(1), 6542.

Obi, J. N., Ojo, E., & Ujah, C. O. (2025). Decentralised renewable energy in sub-Saharan Africa: A critical review of pathways to equitable and sustainable energy transitions. Unconventional Resources, 100267.

Osman, A. I., Chen, L., Yang, M., Msigwa, G., Farghali, M., Fawzy, S., ... & Yap, P. S. (2023). Cost, environmental impact and resilience of renewable energy under a changing climate: a review. Environmental chemistry letters, 21(2), 741-764.

Rabbi, M. F., Popp, J., Máté, D., & Kovács, S. (2022). Energy security and energy transition to achieve carbon neutrality. Energies, 15(21), 8126.

Radtke, J. (2025). Understanding the complexity of governing energy transitions: introducing an integrated approach of policy and transition perspectives. Environmental Policy and Governance, 35(4), 595-614.

Raza, M. Y., & Cucculelli, M. (2024). Sustainable energy changeover in Pakistan: prospects, progress and policies. Environmental Science and Pollution Research, 31(5), 6610-6627.

Rehman, A. U., Atzori, D., Corasaniti, S., & Coppa, P. (2026). Smart Grids and Renewable Energy Communities in Pakistan and the Middle East: Present Situation, Perspectives, Future Developments and Comparison with EU. Energies, 19(2), 535.

Rehman, A. U., Atzori, D., Corasaniti, S., & Coppa, P. (2026). Smart Grids and Renewable Energy Communities in Pakistan and the Middle East: Present Situation, Perspectives, Future Developments and Comparison with EU. Energies, 19(2), 535.

Roberto, R., Ferruzzi, G., Negro, V., & Noussan, M. (2023). Mapping of energy community development in Europe: state of the art and research directions. Energies, 16(18), 6554.

Roberts, J. (2020). Power to the people? Implications of the Clean Energy Package for the role of community ownership in Europe's energy transition. Review of European, Comparative & International Environmental Law, 29(2), 232-244.

Rumbayan, M., Kindangen, J., Sambul, A., Sompie, S., & Cross, J. (2025). Solar energy implementation in rural communities and its contributions to SDGs: A systematic literature review. Unconventional Resources, 6, 100180.

Segales, M., Hewitt, R. J., & Slee, B. (2023). Social innovation and global citizenship: Guiding principles for sustainable, just and democratic energy transition in cities. Energy Research & Social Science, 106, 103295.

Shahzad, S., Abbasi, M. A., Ali, H., Iqbal, M., Munir, R., & Kilic, H. (2023). Possibilities, challenges and future opportunities of microgrids: A review. Sustainability, 15(8), 6366.

ISSN (P): 3006-6522
ISSN (E): 3006-6530

Wahlund, M., & Palm, J. (2022). The role of energy democracy and energy citizenship for participatory energy transitions: A comprehensive review. Energy Research & Social Science, 87, 102482.

Wang, S., Li, Y., Cui, Y., Yu, J., Zhou, C., Ametefe, D. S., & Darboe, T. (2025). Integrating renewable energy into building energy systems: A systematic review of strategies, barriers and policy interfaces. Discover Sustainability, 6(1), 1116.

Wang, S., Li, Y., Cui, Y., Yu, J., Zhou, C., Ametefe, D. S., ... & Darboe, T. (2025). Integrating renewable energy into building energy systems: a systematic review of strategies, barriers and policy interfaces. Discover Sustainability, 6(1), 1-22.