SUKUK: *International Journal of Banking, Finance, Management and Business*
Vol. 5, No. I, 2026
ISSN: 2978-316X (British Library)
https://sukukjournal.org.uk/index.php/sukuk/issue/view/13

Financing the Energy Transition through Islamic FinTech: Mechanisms, Opportunities, and Risks

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Abstract

The financing of the global energy transition remains a critical challenge, particularly in emerging and developing economies where conventional green finance instruments face structural limitations and financial exclusion persist. This study examines the potential of Islamic FinTech as an ethical, inclusive, and technologically enabled mechanism to mobilise capital for renewable energy and low-carbon infrastructure. Adopting a qualitative and conceptual approach, the research synthesises insights from Islamic finance, FinTech, sustainable finance, and energy transition literature to analyse mechanisms, opportunities, and risks associated with Islamic FinTech in energy transition finance. The findings highlight key mechanisms, including Shariah-compliant crowdfunding, green and digital sukuk, blockchain-based smart contracts, AI-driven project screening, and waqf- or zakat-based platforms, which collectively enable inclusive, transparent, and scalable financing solutions. Islamic FinTech facilitates mobilisation of private and diaspora capital, enhances financial inclusion and energy access, improves transparency and trust, and supports SDGs and climate resilience. However, its effectiveness is constrained by Shariah compliance risks, technological vulnerabilities, regulatory fragmentation, greenwashing, and institutional capacity limitations. The study underscores the importance of integrated governance frameworks, risk management protocols, and alignment with Shariah and sustainability principles. Islamic FinTech thus represents a transformative yet challenging pathway for ethical and inclusive low-carbon energy finance, offering both practical and policy-relevant insights for regulators, financial institutions, and development stakeholders.

Keywords

Islamic FinTech, Sustainable Finance, Renewable Energy, Shariah Compliance, Energy Transitions

Introduction

The global transition toward low-carbon and sustainable energy systems has become an urgent economic, environmental, and developmental priority. Escalating climate risks, energy insecurity, and widening energy access gaps—particularly in emerging and developing economies—have intensified the need for innovative financing mechanisms capable of mobilising large-scale capital for renewable energy and clean infrastructure (Fabian, 2015; Semieniuk *et al*., 2021; Egli *et al*., 2022). Despite growing commitments to decarbonisation, a persistent financing gap continues to constrain the pace and inclusiveness of the energy transition, especially in regions with underdeveloped financial markets and limited access to conventional green finance instruments (Polzin *et al*., 2017; Anbumozhi *et al*., 2020).

Conventional approaches to financing the energy transition—such as green bonds, public subsidies, and development finance—have made important contributions but remain insufficient to meet global investment needs. These instruments often face structural limitations, including high entry barriers, risk concentration, weak financial inclusion, and misalignment with local socio-economic contexts (Maino, 2022; Zhou *et al*., 2021). In many Muslim-majority and developing economies, energy transition financing is further constrained by limited banking penetration, SME financing gaps, and energy poverty, underscoring the need for alternative, inclusive, and ethically grounded financial models (Wang *et al*., 2013; Roy *et al*., 2013).

Against this backdrop, Islamic finance and FinTech have emerged as promising complements to conventional climate finance, offering mechanisms that combine ethical principles, digital innovation, and financial inclusion. Islamic finance, grounded in Shariah principles such as risk-sharing, asset-backing, and the prohibition of speculative and extractive practices, aligns conceptually with sustainability objectives and long-term value creation (Atif *et al*., 2021; Kamila & Samsuri, 2025). These principles resonate strongly with the objectives of the energy transition, which emphasise resilience, intergenerational equity, and responsible resource allocation.

The rapid diffusion of FinTech technologies—including digital platforms, crowdfunding, blockchain, mobile payments, and data-driven credit assessment—has further expanded the potential of Islamic finance to support sustainable energy development. FinTech lowers transaction costs, broadens access to finance, enhances transparency, and enables innovative funding models that can mobilise small-scale and retail capital for green projects (Tidjani & Madouri, 2024; Bani Atta, 2025). Empirical studies increasingly demonstrate that FinTech contributes to energy access, financial inclusion, and human development, particularly in regions affected by energy poverty such as Sub-Saharan Africa and parts of the Middle East and Asia (Etudaiye-Muhtar *et al*., 2024; Yasmeen *et al*., 2024).

Recent scholarship has begun to explicitly link Islamic FinTech with sustainable and green finance, highlighting its potential role in financing renewable energy, climate resilience, and low-carbon development. Islamic crowdfunding, digital sukuk, zakat- and waqf-based FinTech platforms, and Shariah-compliant digital currencies have been proposed as mechanisms to support clean

energy investments while advancing social objectives (Thaker *et al*., 2022; Alamm *et al*., 2025; Jibo, 2025). Empirical evidence from the MENA region suggests that Islamic banking and FinTech can significantly influence sustainable energy access by improving financing availability and reducing institutional barriers (Ramaian Vasantha *et al*., 2025; Al-Kasasbeh *et al*., 2024).

However, despite its promise, the integration of Islamic FinTech into energy transition finance remains under-theorised and fragmented. Existing studies often examine FinTech, Islamic finance, or energy transition finance in isolation, with limited effort to conceptualise how Islamic FinTech mechanisms specifically contribute to low-carbon energy financing, value creation, and risk mitigation. Moreover, the growing complexity of digital finance introduces new challenges, including regulatory uncertainty, Shariah compliance risks, governance gaps, cybersecurity concerns, and the potential for greenwashing (Jegerson *et al*., 2025; Jibo, 2025). These risks are particularly salient in the context of energy transition finance, where long project horizons, technological uncertainty, and policy volatility already pose substantial financial risks (Semieniuk *et al*., 2021).

Importantly, Islamic FinTech must navigate a dual accountability framework: compliance with financial and technological regulations, and adherence to Shariah principles that emphasise ethical integrity, transparency, and social justice. Without robust institutional and governance frameworks, Islamic FinTech solutions risk reproducing the same exclusionary or speculative dynamics that have limited the effectiveness of conventional green finance (Kamila & Samsuri, 2025; Atif *et al*., 2021). This highlights the need for a structured and critical analysis of the mechanisms, opportunities, and risks associated with financing the energy transition through Islamic FinTech.

This study addresses this gap by providing a comprehensive conceptual analysis of Islamic FinTech as a financing pathway for the energy transition. Rather than treating Islamic FinTech merely as a technological innovation, the paper positions it as an institutional and financial ecosystem capable of reshaping how sustainable energy projects are funded, governed, and scaled. Drawing on interdisciplinary literature from Islamic finance, FinTech, energy economics, and sustainable development, the study examines how Islamic FinTech mechanisms can mobilise capital for renewable energy, enhance financial inclusion, and support climate-resilient development, while also identifying the associated governance and risk challenges.

The primary objective of this article is threefold. First, it seeks to identify and systematise the key Islamic FinTech mechanisms that can be leveraged to finance the energy transition. Second, it examines the opportunities for value creation arising from the integration of Islamic FinTech with sustainable energy finance, particularly in terms of inclusion, efficiency, and ethical alignment. Third, it analyses the risks and institutional challenges that may constrain the effectiveness and legitimacy of Islamic FinTech in supporting low-carbon energy transitions.

Guided by these objectives, the study addresses the following research questions; What Islamic FinTech mechanisms are most relevant for financing the energy transition? How does Islamic

FinTech contribute to sustainable energy development and inclusive growth? What risks and governance challenges arise from the use of Islamic FinTech in energy transition finance? By addressing these questions, the paper contributes to emerging debates on sustainable finance and Islamic FinTech, offering theoretical insights and policy-relevant implications for regulators, financial institutions, and development stakeholders seeking innovative and ethical pathways to finance the global energy transition

Literature review

The financing of the energy transition has been widely examined through the lenses of sustainable finance, financial system resilience, and climate economics. A central consensus in the literature is that achieving a low-carbon energy transition requires not only technological innovation but also deep financial transformation capable of mobilising long-term, risk-tolerant capital at scale (Fabian, 2015; Egli *et al*., 2022). Traditional financial systems, dominated by short-term risk-return logics and fossil fuel lock-ins, are often ill-equipped to support renewable energy investments characterised by high upfront costs, long payback periods, and policy uncertainty (Polzin *et al*., 2017; Semieniuk *et al*., 2021). As a result, scholars increasingly emphasise the need for diversified and inclusive financial architectures that can better align capital allocation with sustainability objectives.

From a theoretical perspective, sustainable finance theory and transition finance literature highlight the role of financial institutions in steering capital toward environmentally desirable outcomes while managing systemic transition risks (Zhou *et al*., 2021; Maino, 2022). Green bonds, blended finance, and public–private partnerships have emerged as key instruments in this context, yet empirical studies suggest that these mechanisms remain unevenly distributed across regions and often exclude small-scale projects, SMEs, and marginalised communities (Anbumozhi *et al*., 2020; Wang *et al*., 2013). This limitation is particularly pronounced in developing and Muslim-majority economies, where financial exclusion and energy poverty persist despite abundant renewable energy potential (Roy *et al*., 2013; Etudaiye-Muhtar *et al*., 2024).

Within this gap, Islamic finance offers a distinct theoretical and institutional alternative grounded in principles of risk-sharing, asset-backed financing, and ethical value creation. Islamic finance theory emphasises real economic activity, social justice, and the avoidance of speculative behaviour, aligning conceptually with sustainability and long-term development goals (Atif *et al*., 2021; Kamila & Samsuri, 2025). Several studies argue that Islamic financial instruments—such as sukuk, *musharakah*, and *mudarabah*—are inherently compatible with renewable energy financing due to their project-based and partnership-oriented structures (Anbumozhi *et al*., 2018; Ramaian Vasantha *et al*., 2025). Empirical evidence from MENA and ASEAN contexts further indicates that Islamic banking contributes positively to sustainable energy access and green investment when supported by enabling regulatory frameworks (Al-Kasasbeh *et al*., 2024).

The emergence of FinTech has significantly expanded the operational and developmental potential of Islamic finance. FinTech theory underscores the role of digital technologies in reducing transaction costs, mitigating information asymmetry, and enhancing financial inclusion through platform-based intermediation (Tidjani & Madouri, 2024; Bani Atta, 2025). In the context of energy transition, FinTech-enabled finance has been shown to support decentralised energy systems, micro-investments, and off-grid renewable solutions, particularly in regions affected by energy poverty (Etudaiye-Muhtar *et al*., 2024; Yasmeen *et al*., 2024). These findings resonate with development finance theories that view digital finance as a catalyst for inclusive growth and human development.

Islamic FinTech represents the intersection of these two paradigms, combining Shariah-compliant finance with digital innovation. The growing literature on Islamic FinTech positions it as a transformative force capable of advancing sustainable finance objectives while preserving ethical and religious legitimacy (Jegerson *et al*., 2025; Kamila & Samsuri, 2025). Conceptual models propose that Islamic FinTech platforms—such as Shariah-compliant crowdfunding, peer-to-peer financing, digital sukuk, zakat- and waqf-based platforms, and blockchain-enabled smart contracts—can mobilise capital for green and energy-related projects more inclusively and transparently than conventional finance (Thaker *et al*., 2022; Alamm *et al*., 2025; Jibo, 2025).

Empirical studies increasingly support these claims. Research on Islamic crowdfunding and digital microfinance shows positive effects on SME financing, renewable energy access, and community-based development initiatives (Bani Atta, 2025; Ramaian Vasantha *et al*., 2025). In Sub-Saharan Africa and emerging economies, FinTech-driven Islamic finance has been associated with reduced energy poverty and improved access to clean energy solutions by lowering entry barriers for underserved populations (Etudaiye-Muhtar *et al*., 2024; Tidjani & Madouri, 2024). These outcomes align with *maqasid al-shariah*, which frames economic activity as a means to promote welfare, equity, and environmental stewardship.

Nevertheless, the literature also highlights significant risks and institutional challenges associated with financing the energy transition through Islamic FinTech. Transition finance theory warns that climate-related financial risks—including stranded assets, policy shocks, and technological uncertainty—can destabilise financial systems if not properly managed (Semieniuk *et al*., 2021). When combined with FinTech-related risks such as cybersecurity threats, regulatory arbitrage, and data governance issues, these challenges become more complex for Islamic financial institutions operating under dual regulatory and Shariah compliance constraints (Jegerson *et al*., 2025; Jibo, 2025).

From an institutional and governance perspective, scholars caution that Islamic FinTech may face Shariah compliance risks if technological innovation outpaces regulatory and supervisory capacity. Weak governance can lead to superficial Shariah compliance, greenwashing, or the replication of conventional debt-based financing structures under Islamic labels (Kamila & Samsuri, 2025; Atif *et al*., 2021). These concerns echo broader critiques in sustainable finance literature

regarding the risk of misalignment between stated sustainability goals and actual financial practices (Fabian, 2015; Maino, 2022).

Importantly, while existing studies acknowledge the relevance of Islamic FinTech for sustainable and green finance, the literature remains fragmented. Energy transition finance studies often overlook Islamic financial mechanisms, while Islamic FinTech research frequently focuses on inclusion and digitalisation without explicitly linking these innovations to low-carbon energy transitions (Egli *et al*., 2022; Jegerson *et al*., 2025). This disconnects limits theoretical integration and policy coherence, particularly in regions where Islamic finance and energy transition needs coexist.

In summary, the literature suggests that Islamic FinTech holds significant potential to address financing gaps in the energy transition by combining ethical finance principles with digital efficiency and inclusiveness. However, realising this potential depends on robust institutional design, effective governance, and careful risk management. The absence of an integrated conceptual framework that systematically links Islamic FinTech mechanisms, energy transition objectives, and associated risks represents a critical gap. Addressing this gap is essential for advancing both academic understanding and practical policy solutions for financing a just and sustainable energy transition.

Methods

This study adopts a qualitative and conceptual research approach to examine the mechanisms, opportunities, and risks associated with financing the energy transition through Islamic FinTech. A qualitative design is appropriate given the study's focus on institutional, ethical, and technological dynamics that cannot be fully captured through quantitative methods. Rather than testing hypotheses, the research seeks to develop a theoretically grounded understanding of how Islamic FinTech can mobilise capital for sustainable energy while addressing governance, regulatory, and Shariah compliance challenges.

The analysis is based on secondary qualitative data derived from an extensive review of peer-reviewed literature in Islamic finance, FinTech, sustainable finance, energy transition, and development studies. In addition, reports, policy frameworks, and regulatory documents related to Islamic financial instruments, Shariah standards, and digital finance are examined to contextualise the integration of ethical finance principles with digital innovation. This approach enables a critical assessment of the opportunities and constraints associated with Islamic FinTech mechanisms in low-carbon energy financing.

To enhance analytical depth, the study adopts a thematic and theory-driven approach, synthesising insights from Islamic finance theory, FinTech theory, and sustainable finance literature. The data are analysed to identify recurring patterns in mechanisms such as digital sukuk, Shariah-compliant crowdfunding, and waqf-based platforms, as well as associated risks including

regulatory gaps, governance challenges, and potential greenwashing. By integrating literature-based insights with policy analysis and conceptual frameworks, the methodology provides a holistic understanding of how Islamic FinTech can support the energy transition and offers a foundation for future empirical research.

Result and Discussion

Islamic FinTech Mechanisms for Energy Transition

The financing of renewable energy and low-carbon infrastructure through Islamic FinTech relies on mechanisms that combine Shariah-compliant principles with digital innovation. These mechanisms operate at the intersection of ethical finance, technological efficiency, and inclusive development, offering alternatives to conventional financing channels that often exclude small-scale projects and underserved populations.

Islamic Crowdfunding

Crowdfunding platforms, particularly equity-based (*musharakah*) and donation-based (*qard hasan*) models, provide innovative avenues for mobilising capital for renewable energy projects. Equity-based crowdfunding allows investors to participate in project ownership, sharing profits and losses in line with Shariah principles. Donation-based crowdfunding channels, often structured around social objectives, enable the mobilisation of small-scale contributions to fund community solar, microgrid, or off-grid renewable projects. Studies indicate that crowdfunding reduces barriers to entry for smaller investors and SMEs while promoting financial inclusion in regions affected by energy poverty (Thaker *et al*., 2022; Etudaiye-Muhtar *et al*., 2024). By leveraging digital platforms, Islamic crowdfunding can scale participation beyond local boundaries, tapping into diaspora communities and socially conscious investors seeking both financial returns and ethical alignment (Ramaian Vasantha *et al*., 2025).

Green Sukuk and Digital Sukuk Platforms

Sukuk—Islamic bonds structured on asset-backed or project-based financing—remain one of the most robust mechanisms for large-scale renewable energy projects. The introduction of digital sukuk platforms enhances accessibility, efficiency, and transparency. Green sukuk can channel capital into solar, wind, and biomass projects while aligning with ESG objectives. Digital platforms enable automated issuance, investor management, and reporting, reducing transaction costs and improving traceability. Empirical evidence suggests that green sukuk issuance, particularly in MENA and Southeast Asia, has a positive effect on renewable energy financing, bridging gaps left by conventional debt markets (Alamm *et al*., 2025; Al-Kasasbeh *et al*., 2024).

Smart Contracts and Blockchains Applications

Blockchain technology and smart contracts introduce automated execution, transparency, and traceability to Islamic FinTech financing structures. Smart contracts can enforce Shariah-compliant agreements for profit-sharing (*mudarabah*/*musharakah*) and ensure timely disbursement of funds or returns based on predefined conditions. Blockchain enables secure, immutable record-keeping of project performance, fund allocation, and environmental impact reporting, mitigating risks of misreporting or greenwashing (Jibo, 2025; Tidjani & Madouri, 2024). This is particularly relevant for energy projects requiring long-term monitoring of technical and financial performance.

AI and Data Analytics for Project Screening and Risk Monitoring

Artificial intelligence (AI) and data analytics can enhance project evaluation, credit scoring, and risk monitoring for renewable energy investments. These technologies allow Islamic FinTech platforms to assess project feasibility, identify high-potential investments, and monitor operational and financial performance. AI algorithms can incorporate environmental, social, and governance metrics alongside traditional financial indicators, aligning investment decisions with both Shariah and sustainability objectives (Yasmeen *et al*., 2024; Bani Atta, 2025).

Waqf and Zakat-Based FinTech Models

Islamic FinTech also leverages social finance instruments such as waqf (endowment) and zakat (obligatory almsgiving) to fund energy access initiatives for underserved communities. Waqf-based renewable projects can provide long-term, community-oriented infrastructure, while zakat and *sadaqah* contributions can subsidise energy costs or finance off-grid solutions. These mechanisms foster inclusivity and social impact, contributing to SDGs such as affordable and clean energy, poverty reduction, and equitable development (Kamila & Samsuri, 2025; Thaker *et al*., 2022).

Opportunities and Value Creation

The integration of Islamic FinTech into energy transition finance generates multiple avenues for value creation across economic, social, and environmental dimensions.

Mobilising Private and Diaspora Capital

Digital platforms reduce barriers to participation, allowing private investors and diaspora communities to engage in renewable energy projects. By enabling fractional investment and broad-based participation, Islamic FinTech mobilises capital that might otherwise remain untapped in traditional banking channels. Evidence from MENA regions demonstrates that diaspora-driven crowdfunding and digital sukuk can significantly augment financing for solar and wind projects (Ramaian Vasantha *et al*., 2025; Al-Kasasbeh *et al*., 2024). Such mobilisation not only increases available capital but also strengthens community ownership and accountability.

Enhancing Financial Inclusion and Energy Access

Islamic FinTech mechanisms extend financing opportunities to underserved populations, SMEs, and rural communities. Crowdfunding, micro-sukuk, and waqf-based models reduce the entry threshold for small investors and local beneficiaries. As observed in Sub-Saharan Africa and BRICS economies, FinTech-enabled financing can provide access to decentralized renewable solutions, such as rooftop solar, mini-grids, or pay-as-you-go energy systems (Etudaiye-Muhtar *et al*., 2024; Yasmeen *et al*., 2024). This supports inclusive energy transitions by addressing both energy poverty and financial exclusion.

Improving Transparency, Trust, and Efficiency

Blockchain, smart contracts, and AI analytics enhance operational transparency, reduce transaction costs, and strengthen trust among investors, regulators, and project developers. These tools ensure that capital is used efficiently, project outcomes are verifiable, and profit-sharing arrangements comply with Shariah. Transparent reporting and real-time monitoring also reduce agency problems, increasing investor confidence and project sustainability (Jibo, 2025; Tidjani & Madouri, 2024)

Supporting SDGs and Climate Resilience

Islamic FinTech aligns financial innovation with broader sustainability and development goals. By funding renewable energy, decentralised solutions, and socially oriented energy projects, these mechanisms contribute to SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 10 (Reduced Inequalities). Furthermore, the ethical and risk-sharing principles embedded in Islamic finance promote resilience against systemic shocks and climate-related financial risks, fostering long-term energy security and community development (Atif *et al*., 2021; Kamila & Samsuri, 2025).

Risks and Challenges for FinTech Governance

Despite the opportunities, Islamic FinTech in energy transition finance faces several risks and institutional challenges that must be addressed to ensure sustainable and ethical outcomes.

Shariah Compliance Risks

Complex digital structures, including smart contracts, AI-driven investment platforms, and blockchain-based sukuk, may create challenges for Shariah compliance. The automation of profit-sharing, investment screening, and contract execution must be carefully designed to align with Shariah principles. Without robust oversight, there is a risk of superficial compliance or inadvertent deviation from ethical guidelines (Kamila & Samsuri, 2025; Atif *et al*., 2021). Effective Shariah governance mechanisms, such as advisory boards and audit frameworks, are critical for mitigating these risks.

Technological Risks

Digital innovations expose Islamic FinTech platforms to cybersecurity threats, data breaches, algorithmic bias, and system failures. AI and data analytics, while enhancing risk assessment, can inadvertently introduce biases that affect investment decisions or exclude vulnerable populations. Blockchain, though secure, requires careful management of network vulnerabilities and digital literacy among users (Jibo, 2025; Tidjani & Madouri, 2024).

Regulatory Fragmentation and Lack of Standardisation

Islamic FinTech operates under dual oversight: financial regulations and Shariah compliance frameworks. Variations in regulatory environments across jurisdictions may impede cross-border investment, standardisation, and scalability. Regulatory fragmentation can result in compliance uncertainties, investor hesitancy, and legal disputes (Alamm *et al*., 2025; Jegerson *et al*., 2025). Harmonised frameworks and international best practices are necessary to support robust and consistent governance.

Greenwashing and Impact Verification Challenges

Ensuring that investments genuinely contribute to low-carbon energy transition is critical. Lack of standardised environmental reporting and impact assessment methodologies may allow projects to be labelled as "green" without delivering measurable sustainability outcomes. Islamic FinTech platforms must integrate verifiable impact metrics into project evaluation and reporting processes to prevent greenwashing (Jibo, 2025; Semieniuk *et al*., 2021).

Institutional Capacity Constraints

Operationalising Islamic FinTech requires expertise in finance, technology, energy, and Shariah law. Limited institutional capacity, particularly in developing economies, can hinder platform development, risk management, and regulatory compliance. Building local knowledge, technical capabilities, and governance infrastructure is essential to ensure long-term effectiveness and ethical alignment of Islamic FinTech solutions (Ramaian Vasantha *et al*., 2025; Al-Kasasbeh *et al*., 2024).

Synthesis and Implications

The results suggest that Islamic FinTech mechanisms offer a promising pathway to finance the global energy transition by combining ethical finance principles with technological innovation. Crowdfunding, green and digital sukuk, smart contracts, AI analytics, and waqf- or zakat-based models enable inclusive, transparent, and scalable financing solutions. These mechanisms create value by mobilising private and diaspora capital, improving financial inclusion, enhancing transparency, and supporting SDGs and climate resilience.

However, the effectiveness of Islamic FinTech depends on addressing significant governance and risk challenges. Shariah compliance, technological vulnerabilities, regulatory fragmentation, greenwashing, and institutional capacity constraints represent potential barriers to impact. These findings underscore the importance of integrated governance frameworks, cross-jurisdictional regulatory harmonisation, and capacity-building initiatives to support sustainable, inclusive, and ethically aligned energy finance.

In conclusion, Islamic FinTech constitutes an innovative financial ecosystem with substantial potential to accelerate low-carbon energy transitions, particularly in emerging and developing economies. Realising this potential requires careful design, robust oversight, and alignment with both Shariah principles and sustainability objectives. Future research should empirically test the effectiveness of these mechanisms, evaluate their social and environmental impact, and explore scalable governance models to enhance the resilience and legitimacy of Islamic FinTech in energy transition finance.

Conclusion

Islamic FinTech occupies a strategically significant position in advancing sustainable energy financing, particularly in emerging and developing economies where conventional green finance instruments often fail to reach underserved communities or SMEs. The findings of this study demonstrate that Shariah compliance, coupled with technological innovation, constitutes a defining governance mechanism that shapes operational models, value creation, and institutional credibility in Islamic FinTech platforms. By embedding ethical finance principles, social responsibility, and religious adherence into digital financial practices, Islamic FinTech differentiates itself from conventional financing approaches while fostering trust among investors and communities who may otherwise face exclusion from traditional energy finance channels.

At the operational level, the analysis shows that Islamic FinTech mechanisms—including crowdfunding (*musharakah* and *qard hasan*), green and digital sukuk, smart contracts, AI-enabled project screening, and waqf- or zakat-based platforms—align financial intermediation with both Shariah norms and sustainability objectives. These instruments facilitate capital mobilisation for renewable energy projects, improve financial inclusion, and enhance transparency and traceability. Crowdfunding and micro-sukuk reduce entry barriers for small investors and rural communities, while digital platforms and blockchain solutions ensure operational efficiency and verifiable impact reporting. However, the study also highlights inherent tensions between ethical ideals and operational practicality. Technological risks, regulatory fragmentation, and the complexity of Shariah-compliant digital structures may constrain scalability, slow adoption, or expose platforms to compliance vulnerabilities. Balancing innovation with regulatory and Shariah rigor remains a persistent challenge.

The findings further indicate that value creation in Islamic FinTech is multidimensional, encompassing economic, social, and environmental benefits. Mobilising private and diaspora capital enhances access to renewable energy investments and strengthens community engagement. Financial inclusion is promoted through platforms that target underserved populations and SMEs, facilitating access to decentralised or off-grid energy solutions. Additionally, alignment with SDGs—including affordable and clean energy, climate action, and reduced inequalities—underscores the broader societal and environmental relevance of Islamic FinTech in supporting low-carbon transitions. Nevertheless, the potential for greenwashing, technological failures, and superficial Shariah compliance underscores the critical importance of robust governance and monitoring frameworks.

Institutional and capacity constraints emerge as key factors shaping the effectiveness of Islamic FinTech in energy transition finance. Limited expertise in finance, Shariah, and digital technology, coupled with governance asymmetries and policy uncertainty, can undermine the credibility and impact of these platforms. Addressing these challenges requires investment in regulatory harmonisation, Shariah supervisory capacity, and technological literacy, alongside standardised impact assessment mechanisms to ensure that sustainability claims are substantive and measurable.

The policy and practical implications are clear: Islamic FinTech offers a transformative pathway for financing sustainable energy, but its potential can only be realised through integrated governance frameworks, risk management protocols, and alignment with Shariah principles and sustainability goals. Future research should empirically evaluate the social, environmental, and financial impacts of Islamic FinTech in diverse contexts, while exploring scalable governance models that enhance resilience and legitimacy. In conclusion, Islamic FinTech represents both an opportunity and a challenge for ethical and sustainable energy finance. When effectively designed and governed, it serves as a powerful mechanism for mobilising capital, promoting inclusion, and advancing low-carbon energy transitions; when constrained by institutional and technological limitations, its transformative potential remains only partially realised.

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