West Science Social and Humanities Studies
Vol. 03, No. 04, April 2025, pp. 570-582

A Bibliometric Review of Renewable Energy Financing and Sustainable Development

Loso Judijanto[1], Ardi Azhar Nampira[2], Restu Auliani[3], Jernita Sinaga[4]
[1] IPOSS Jakarta, Indonesia
[2] Institute Teknologi Sepuluh November (ITS)
[3,4] Poltekkes Kemenkes Medan

Article Info

Article history:

Received Apr, 2025
Revised Apr, 2025
Accepted Apr, 2025

Keywords:

Renewable Energy Financing
Sustainable Development
Green Finance
Bibliometric Analysis
VOSviewer

ABSTRACT

This study presents a comprehensive bibliometric review of the scholarly literature on renewable energy financing and its link to sustainable development. Utilizing data from the Scopus database and analyzed through VOSviewer, the study maps thematic clusters, keyword co-occurrences, author collaborations, and country-level partnerships from 2000 to 2024. The findings reveal that "sustainable development" serves as the conceptual core of this research domain, closely associated with terms such as "green finance," "energy efficiency," and "climate change." Recent trends indicate a growing scholarly focus on financial instruments like green bonds and the broader policy landscape of energy transition. Co-authorship and country collaboration networks demonstrate strong regional concentrations, with China, the United States, and India emerging as key contributors. While the literature is rich in financial and technological insights, gaps remain in addressing social equity, regional financing models, and the integration of digital finance. This study contributes to the literature by offering a systematic overview of research developments, identifying influential contributors, and suggesting future directions for interdisciplinary inquiry into sustainable energy finance.

Corresponding Author:

Name: Loso Judijanto
Institution: IPOSS Jakarta, Indonesia
Email: losojudijantobumn@gmail.com

1. INTRODUCTION

The transition to renewable energy has become a pivotal strategy in global efforts to mitigate climate change, reduce dependence on fossil fuels, and advance the Sustainable Development Goals (SDGs). Renewable energy sources—such as solar, wind, hydro, biomass, and geothermal—offer the potential to decarbonize the energy sector and simultaneously enhance energy security and social equity. As the world grapples with the environmental consequences of industrialization and carbon-intensive development models, renewable energy stands out as a critical solution. However, achieving this transition requires not only technological innovation but also robust

financial mechanisms that can mobilize investments at scale and in time [1], [2].

Renewable energy financing encompasses a broad spectrum of funding instruments and institutional arrangements designed to support the deployment of sustainable energy technologies. Public investment, private capital, green bonds, international development financing, and blended finance are among the tools used to support renewable projects. Each plays a unique role in addressing risk, attracting co-financiers, and ensuring long-term project viability. In developing economies, financing challenges are more pronounced due to perceived risks, weaker institutional frameworks, and limited access to global capital markets [3]. As such, understanding the landscape of renewable energy financing is essential to unlocking its potential for sustainable development.

Simultaneously, the concept of sustainable development—defined by the Brundtland Commission as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"—has evolved into a global policy framework integrating economic growth, environmental protection, and social inclusion [4], [5]. The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, explicitly links access to clean energy (SDG 7) with climate action (SDG 13), poverty reduction (SDG 1), and economic development (SDG 8). In this context, renewable energy financing is not merely a technical or economic issue—it is a multidimensional policy tool central to sustainable development.

In recent years, scholarly interest in the intersection of renewable energy financing and sustainable development has grown significantly. Research has explored various themes, including financial instruments, policy incentives, barriers to investment, cross-country comparisons, and the role of multilateral institutions. However, this body of literature is often fragmented across disciplines such as energy economics, environmental policy, development finance, and international relations. A holistic understanding of this field requires synthesizing the evolution of key research areas, identifying influential publications and authors, and mapping knowledge clusters that have emerged over time [6].

Bibliometric analysis provides a systematic and quantitative method for achieving such synthesis. By analyzing large volumes of academic literature based on citation patterns, co-authorship networks, keyword co-occurrence, and publication trends, bibliometric tools help reveal the intellectual structure and research dynamics of a field. In the case of renewable energy financing and sustainable development, bibliometric analysis can illuminate the thematic progression of scholarship, key contributors and institutions, and gaps that warrant further investigation. Tools such as VOSviewer and Scopus-based metadata enable visual and statistical exploration of these relationships, offering insights beyond conventional literature reviews [7].

Despite the increasing relevance of renewable energy financing in achieving sustainable development, there remains a lack of consolidated knowledge regarding the intellectual structure and trends within this interdisciplinary research field. Current reviews often focus narrowly on specific financing mechanisms or regional case studies, while overlooking the broader bibliometric landscape that could inform future research directions and policy interventions. As the global energy transition accelerates, there is an urgent need for a comprehensive bibliometric review that captures the diversity, evolution, and knowledge frontiers of renewable energy financing in relation to sustainability goals. The objective of this study is to conduct a comprehensive bibliometric review of scholarly literature on renewable energy financing and its connection to sustainable development.

2. LITERATURE REVIEW

2.1 Sustainable Development Theory

At the heart of this study lies the concept of sustainable development, which has evolved from a normative ideal into a multidimensional theoretical framework. Sustainable development theory is grounded in the integration of three pillars: economic growth, social equity, and environmental sustainability [8], [9]. This triadic model posits that economic progress should not compromise ecological integrity or social well-being. From this standpoint, renewable energy emerges as a strategic sector that can simultaneously drive economic activity, reduce greenhouse gas emissions, and improve access to modern energy services—particularly in underserved communities.

The SDGs provide a practical articulation of sustainable development theory, especially in their emphasis on energy (SDG 7), climate (SDG 13), and economic growth (SDG 8). The financing of renewable energy projects thus becomes a means of operationalizing these goals. The theory suggests that for sustainability to be achieved, financial flows must be redirected from unsustainable sectors to those that support environmental and social progress. This redirection aligns with the "transformative shift" called for in Agenda 2030, which requires aligning financial systems with sustainable outcomes [10].

2.2 *Environmental Kuznets Curve (EKC)*

The Environmental Kuznets Curve (EKC) hypothesis is another relevant theoretical framework. It suggests an inverted-U relationship between economic development and environmental degradation: in early stages of development, environmental harm increases with income, but after a certain threshold, further income growth leads to improvements in environmental quality. This theory has been widely debated and applied in the context of energy consumption and carbon emissions [11], [12].

In the context of renewable energy financing, EKC implies that countries at different stages of development will exhibit varying propensities to invest in clean energy. Developing economies may prioritize fossil fuels for rapid industrialization due to cost and infrastructure constraints, while developed economies, having reached the "turning point," are more likely to allocate financial resources toward renewables. This uneven distribution underscores the need for financial mechanisms—such as concessional loans, blended finance, and climate funds—that can help developing nations leapfrog to clean energy technologies, thus altering the traditional EKC trajectory [13].

2.3 *Institutional Theory*

Institutional theory offers a valuable lens to examine how formal and informal structures influence renewable energy financing. This theory posits that institutions—defined as the rules, norms, and routines that guide behavior—shape economic and environmental outcomes [14]. In the energy sector, institutions encompass regulatory frameworks, property rights, financial norms, and international agreements.

Effective institutions reduce transaction costs, mitigate investment risks, and promote transparency—conditions that are essential for mobilizing capital for renewable energy projects.

Institutional theory also explains the divergence in financing success across countries. For instance, strong governance, transparent procurement processes, and reliable legal systems tend to attract more private sector participation in renewable energy financing. Conversely, weak institutions deter investment due to high perceived risks. Therefore, policy reforms aimed at strengthening institutions can have a multiplier effect by facilitating greater financial flows into sustainable energy infrastructure [15].

3. METHODS

This study employs a bibliometric analysis approach to systematically examine the academic literature on renewable energy financing and its relationship to sustainable development. The data were extracted from the Scopus database, which is widely recognized for its comprehensive coverage of peer-reviewed publications. The search strategy utilized a combination of keywords including *"renewable energy financing," "green finance," "sustainable development,"* and related terms, focusing on articles, reviews, and conference papers published between 2000 and 2024. The resulting metadata were exported in RIS and CSV formats and analyzed using VOSviewer, a tool designed for constructing and visualizing bibliometric networks. Key analyses included co-authorship, citation, and co-occurrence of keywords to identify influential authors, institutions, and thematic clusters. The inclusion criteria were limited to English-language publications to maintain consistency.

4. RESULTS AND DISCUSSION

4.1 Keyword Co-Occurrence Network

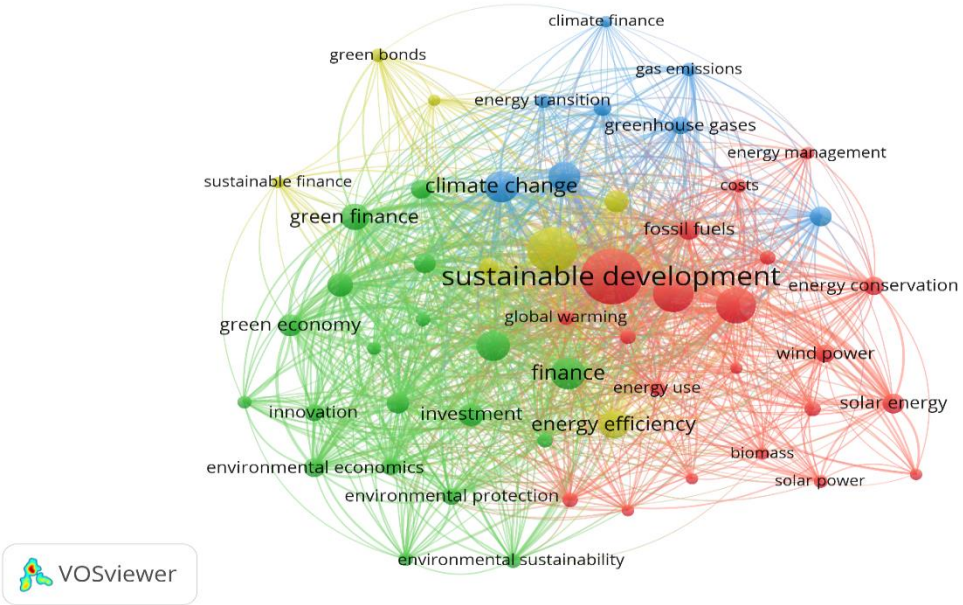

Figure 1. Network Visualization

Source: Data Analysis Result, 2025

The network visualization presented offers a comprehensive map of keyword co-occurrence in the literature on renewable energy financing and sustainable development. The clustering of terms is based on their co-appearance within academic documents, which reflects the thematic structures and intellectual landscape of the field. The central node, "sustainable development," dominates the visualization in both size and connectivity, indicating its position as the most frequently occurring and broadly connected term across all publications analyzed. This centrality reflects its role as the thematic anchor around which various subdomains. The green cluster, situated to the left of the visualization, emphasizes the economic and financial dimensions of sustainability. Keywords such as green finance, green economy, green bonds, sustainable finance, and investment dominate this segment. This cluster illustrates the growing scholarly focus on aligning financial mechanisms with environmental objectives through innovative tools such as green bonds and ESG (Environmental, Social, Governance) investing. The presence of terms like innovation and environmental economics suggests an emphasis on policy frameworks and market-based solutions to fund sustainable energy transitions.

To the right side of the map, the red cluster encompasses keywords related to renewable energy technologies and energy management practices. Terms like solar energy, wind power, biomass, energy efficiency, energy use, and energy conservation are prominent here. This indicates a strong body of literature dedicated to the technical and operational aspects of renewable energy adoption. The interconnectedness of these terms with costs and energy management further highlights the practical challenges and considerations involved in financing these technologies. This cluster aligns with applied research that deals with project implementation, cost-benefit analyses, and energy systems optimization.

The blue cluster in the upper central portion of the map is closely aligned with climate-oriented themes. Keywords such as climate change, greenhouse gases, gas emissions, climate finance, and energy transition cluster tightly, reflecting the environmental imperatives driving investment in renewable energy. This segment of literature likely includes discussions of carbon markets, climate policy, the Paris Agreement, and climate mitigation strategies. The co-location of climate finance with energy transition suggests that financial support mechanisms are critical to enabling decarbonization pathways, particularly in the context of global climate governance.

The yellow cluster, though smaller, plays an integrative role by connecting keywords from multiple themes. It includes terms such as finance, global warming, and energy transition, acting as conceptual bridges across clusters. The proximity of "finance" to both technical energy terms and sustainability-related concepts emphasizes its mediating function in the broader discourse. This reflects an emerging consensus in the literature that financial systems must be restructured to support not just economic development, but also environmental preservation and social equity. The visualization thus confirms the interdisciplinary nature of the research field and suggests a rich potential for integrated studies that span economics, environmental science, and energy policy.

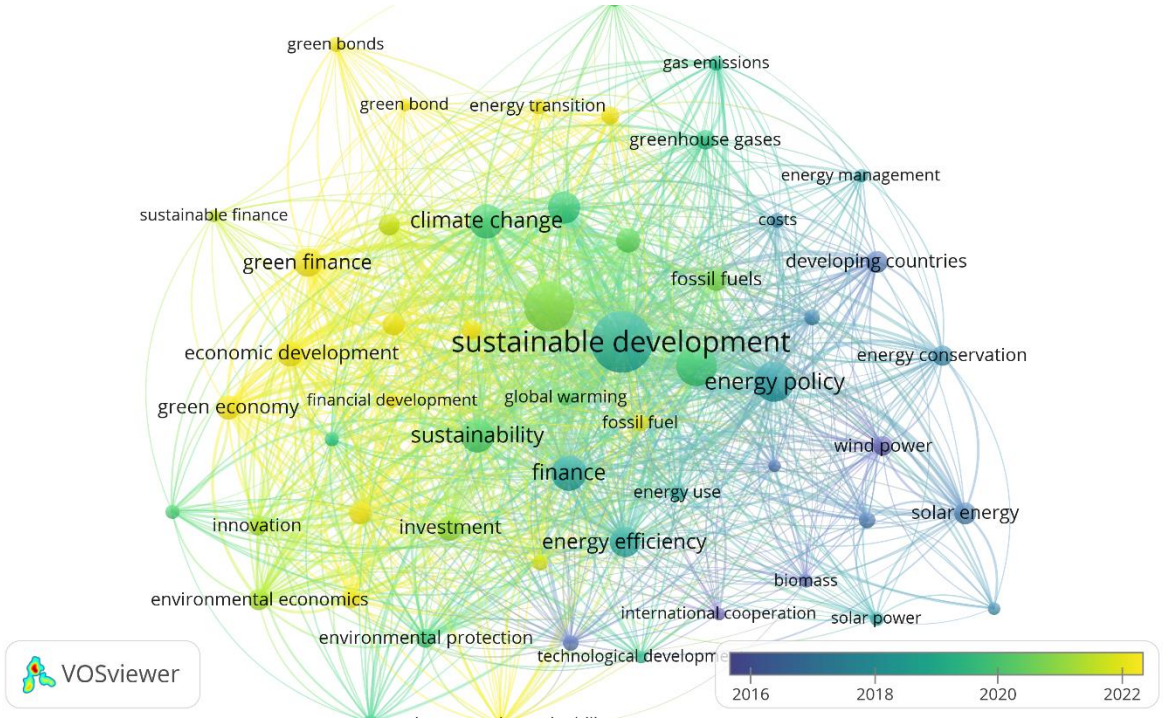

Figure 2. Overlay Visualization

Source: Data Analysis Result, 2025

The overlay visualization map provides a temporal dimension to the bibliometric landscape of renewable energy financing and sustainable development. The color gradient—from blue (older) to yellow (newer)—represents the average publication year of documents in which each keyword appears. Notably, the central term "sustainable development" appears in green, indicating its consistent and enduring presence across the timeline. Around this central concept, keywords such as "energy efficiency," "finance," and "climate change" are similarly colored, suggesting that they have been longstanding focal points in the discourse and continue to remain relevant. Newer research themes are visible in the yellow-highlighted zones, indicating emerging or recently emphasized areas in the literature. Terms like "green bonds," "green finance," "energy transition," and "financial development" have shifted into sharper focus post-2020. This reflects the global policy momentum following the Paris Agreement and COVID-19 economic recovery strategies, where sustainable finance and innovative funding mechanisms began receiving renewed attention. These terms suggest a growing academic interest in aligning capital markets with sustainability objectives and designing financial instruments that can drive systemic change in energy investment practices.

In contrast, terms shaded in blue or purple, such as "solar energy," "wind power," "developing countries," and "technological development," indicate older areas of inquiry that may have matured or plateaued in scholarly focus. These topics were prominent in earlier years when attention was heavily oriented toward specific renewable technologies and geographic deployment challenges. Their peripheral placement also implies that while foundational, these topics are increasingly being integrated into broader frameworks involving policy, finance, and systemic sustainability.

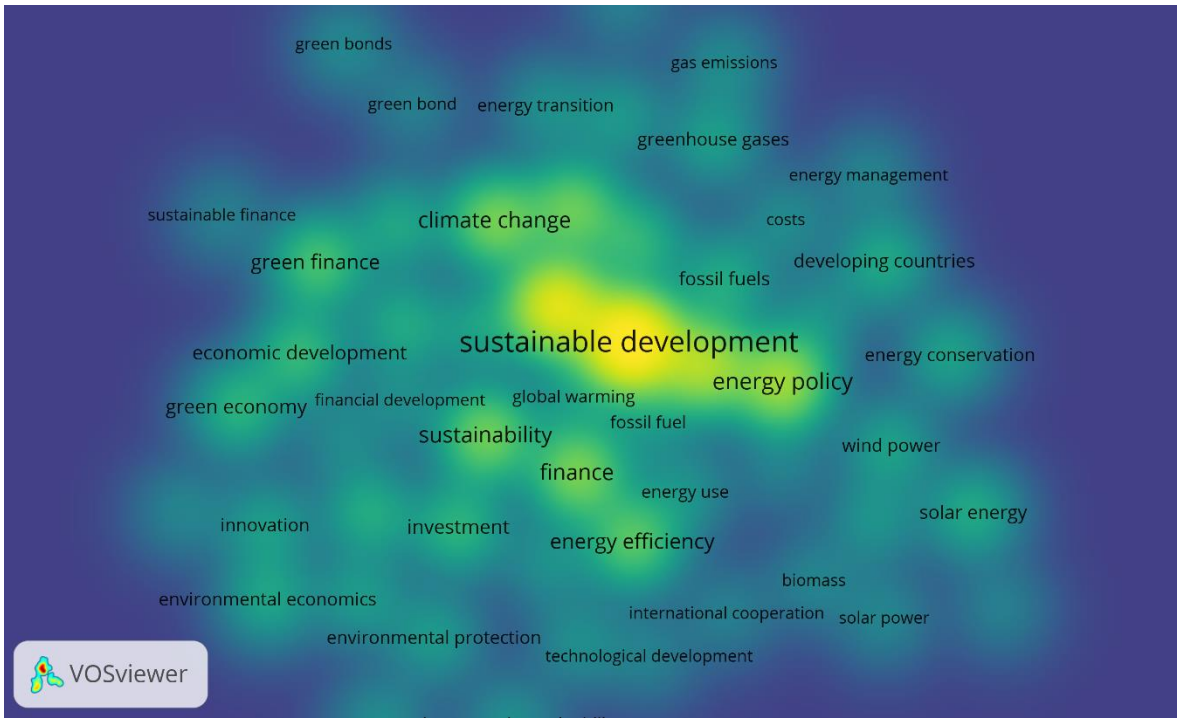

Figure 3. Density Visualization

Source: Data Analysis, 2025

The heatmap visualization from VOSviewer provides a density-based overview of keyword co-occurrence within the academic literature on renewable energy financing and sustainable development. The brighter and more yellow a region appears, the higher the frequency and centrality of the keywords in that zone. Unsurprisingly, "sustainable development" emerges as the most densely connected and frequently cited term, serving as the thematic nucleus of the field. Surrounding it are other high-density terms like "energy policy," "finance," "energy efficiency," "climate change," and "green finance", indicating their central role in scholarly discussions and their close conceptual linkages. As the heatmap radiates outward into cooler tones, it reveals the peripheral or emerging themes in the research. Keywords such as "solar power," "biomass," "costs," "developing countries," and "technological development" appear less frequently or are less connected to the central discourse. These terms represent either specialized subfields or earlier-stage research foci that, while relevant, are less integrated into the dominant academic narrative.

4.2 Co-Authorship Network

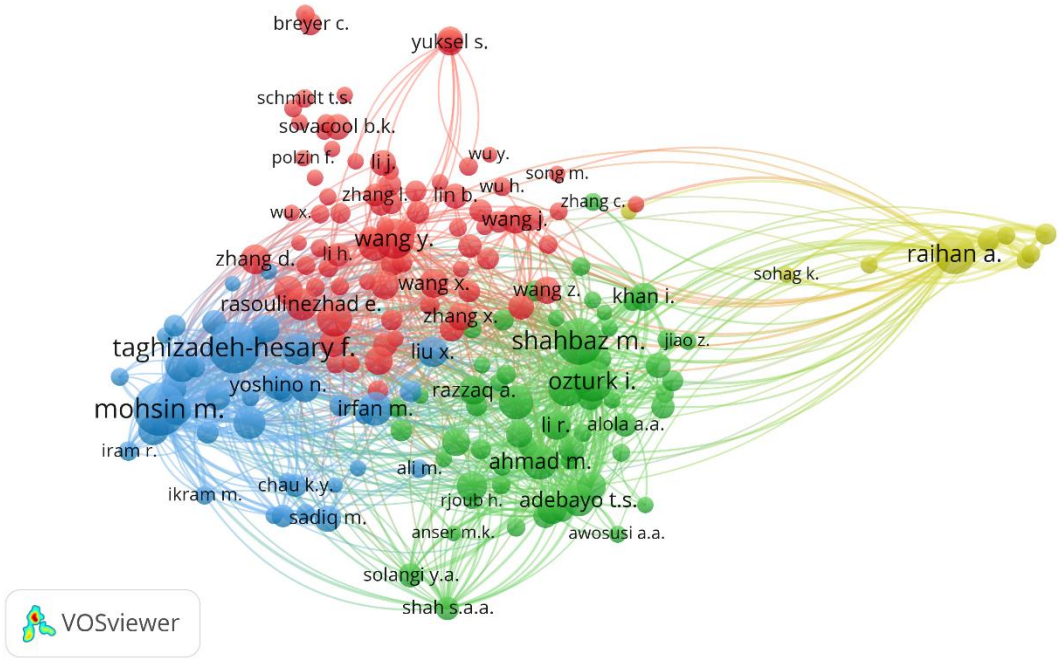

Figure 4. Author Collaboration Visualization
Source: Data Analysis, 2025

The co-authorship network visualization illustrates the collaborative landscape among prolific authors in the field of renewable energy financing and sustainable development. Distinct clusters indicate communities of authors who frequently co-publish. The green cluster, dominated by figures such as Shahbaz M., Ozturk I., and Ahmad M., appears to form the most densely interconnected group, suggesting a strong, recurring collaboration network, likely focused on empirical analyses in developing regions. The red cluster, centered around Wang Y., Zhang Y., and Zhang C., represents another major academic bloc, possibly with a focus on energy economics and policy in China. The blue cluster, featuring Taghizadeh-Hesary F. and Mohsin M., shows strong international collaboration, likely rooted in Asian economic contexts. Notably, the yellow cluster, led by Raihan A., appears more isolated yet cohesive, indicating a distinct research trajectory or niche specialization.

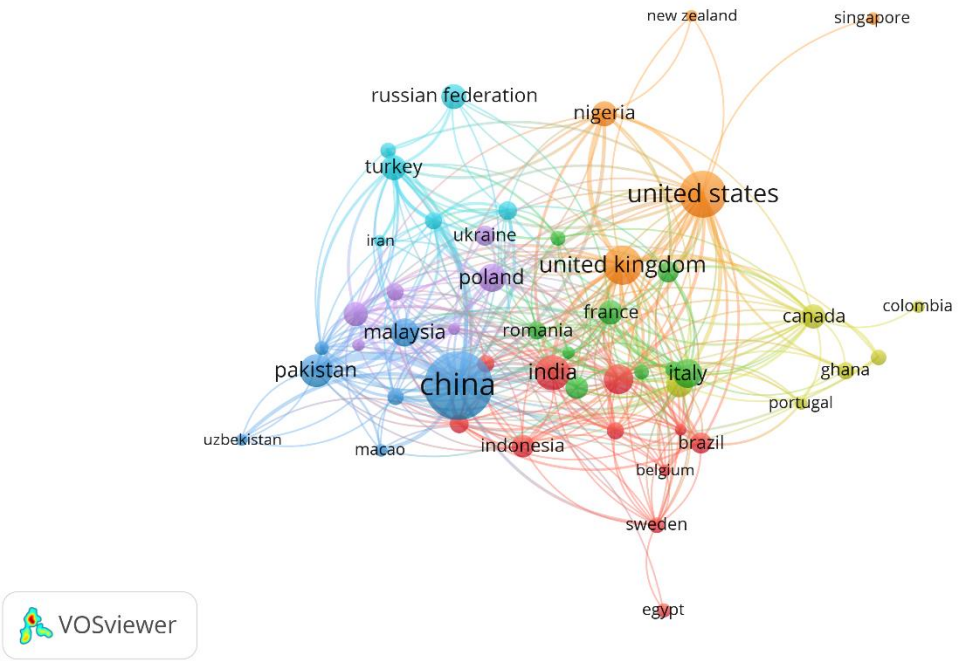

Figure 5. Country Collaboration Visualization
Source: Data Analysis, 2025

The country collaboration map visualizes the geographic distribution and international research cooperation in the field of renewable energy financing and sustainable development. China stands out as the most prominent node, indicating both a high volume of publications and strong collaboration links, particularly with countries like Pakistan, Malaysia, and India. The United States also emerges as a major hub, closely connected to the United Kingdom, Canada, and Nigeria, reflecting its central role in global scholarly networks. European countries such as Italy, France, and Poland exhibit dense interconnections, forming a cohesive research bloc. Notably, emerging economies like Indonesia, Brazil, and Egypt appear in distinct clusters, suggesting regionally focused contributions.

4.3 Citation Analysis

Table 1. Top Cited Research

Citations	Authors and year	Title
381	[16]	Does green finance development goals affects renewable energy in China
357	[17]	Quantifying rooftop solar photovoltaic potential for regional renewable energy policy
356	[18]	Sustainable solutions for green financing and investment in renewable energy projects
356	[19]	Renewable energy markets in developing countries
349	[20]	Mitigation of global greenhouse gas emissions from waste: Conclusions and strategies from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. Working Group III (Mitigation)
345	[21]	The green advantage: Exploring the convenience of issuing green bonds

Citations	Authors and year	Title
286	[22]	Opportunities and challenges for renewable energy policy in China
249	[23]	The role of electricity consumption, globalization and economic growth in carbon dioxide emissions and its implications for environmental sustainability targets
208	[24]	Examining the interconnectedness of green finance: an analysis of dynamic spillover effects among green bonds, renewable energy, and carbon markets
205	[25]	Investment in renewable energy and electricity output: Role of green finance, environmental tax, and geopolitical risk: Empirical evidence from China

Source: Publish or Perish Output, 2025

Discussion

1. Central Themes and Conceptual Intersections

The keyword co-occurrence network reveals that "sustainable development" is the central pillar of the discourse, underscoring its integrative role in unifying studies across economic, environmental, and technological domains. Closely linked concepts such as "energy efficiency," "climate change," "green finance," and "energy policy" form a dense core around sustainable development, signifying their centrality in scholarly discussions. The proximity of "finance" and "green finance" to these clusters reflects the growing recognition that financial instruments are not just enablers but essential components of the transition toward clean energy systems. These terms collectively signal an emerging paradigm in which sustainability goals are tightly interwoven with financial and policy innovation [26], [27]. Moreover, thematic clusters exhibit internal coherence. The green cluster focuses on sustainability economics and innovation, while the red cluster leans toward technical aspects like renewable technologies—solar, wind, biomass—and energy usage patterns. The blue cluster orients itself around climate imperatives and mitigation frameworks, indicating an environmental science perspective. These clusters, though distinct, are deeply interconnected, reinforcing the need for interdisciplinary approaches that transcend traditional academic silos [28].

2. Temporal Shifts in Research Focus

The overlay visualization introduces a valuable temporal dimension, revealing how the field has evolved over time. Earlier research—depicted in blue and green hues—centered largely on energy technologies (e.g., solar energy, wind power) and geographic concerns (e.g., developing countries, technological development). These studies emphasized deployment challenges, cost barriers, and the feasibility of renewable energy in various contexts. However, more recent studies—shaded in yellow—show a shift toward systemic financial mechanisms and macroeconomic policy. Terms such as "green bonds," "green finance," "financial development," and "energy transition" have emerged strongly after 2020. This reflects the growing policy emphasis on sustainable finance and the broader shift toward ESG-oriented investing frameworks [17]. The COVID-19 pandemic and global recovery plans, which emphasized green recovery and climate-resilient infrastructure, may have further accelerated this thematic shift. This transition suggests a maturing field that has moved from proof-of-concept technology studies to institutional and financial strategies aimed at scaling sustainable solutions.

3. Intellectual and Collaborative Structures

The co-authorship network unveils key contributors and knowledge hubs within the field. Notable scholars such as Shahbaz M., Wang Y., Ozturk I., and Taghizadeh-

Hesary F. form densely connected clusters, suggesting high productivity and strong collaborative tendencies. The clustering indicates that some researchers are driving regional or thematic subfields, often publishing together and reinforcing intellectual coherence within their networks. For instance, the red cluster around Wang Y. likely emphasizes Chinese perspectives and policies, whereas the green cluster around Shahbaz M. and Ozturk I. appears to focus on cross-country comparative studies and empirical modeling. Interestingly, the yellow cluster—led by Raihan A.—shows relatively isolated yet coherent collaboration, suggesting a niche research agenda with limited but focused international engagement. These collaborative networks highlight both the concentration of knowledge production and the potential for future cross-cluster integration. Increasing collaboration across clusters could generate synergies between empirical finance models, policy evaluations, and clean technology assessments.

4. Geographic Distribution of Research Activity

The country collaboration map further reinforces the global nature of this research field. China and the United States are the two most prominent contributors, indicating their substantial investment in both renewable energy research and academic infrastructure. China's leading position aligns with its national strategies such as the Belt and Road Initiative and its commitment to carbon neutrality by 2060. The U.S., with its vast academic network and policy experiments such as the Inflation Reduction Act, also maintains a central role. European countries like the United Kingdom, Italy, and Poland demonstrate strong intra-regional and transatlantic collaboration. Meanwhile, emerging economies including India, Pakistan, Malaysia, and Nigeria contribute to a diverse and decentralized research base. Such geographic spread is crucial because sustainable energy transitions require localized solutions that are sensitive to regional contexts—be it regulatory capacity, market maturity, or energy demand structures. It is also noteworthy that South–South collaborations are increasingly visible, particularly between countries in Asia and Africa. These partnerships could prove critical in fostering shared learning and mobilizing resources for joint renewable energy projects, especially where conventional North–South flows have limitations.

5. Research Gaps and Future Directions

While the field is robust and expanding, several gaps remain. First, despite the emphasis on finance, few studies integrate detailed modeling of risk mitigation mechanisms such as credit guarantees, blended finance, or insurance structures for renewable investments in high-risk contexts. Second, while bibliometric analysis reveals strong technical and financial literature, the social dimension, including equity in energy access, gender implications, and participatory governance. Moreover, developing country contexts are often treated in aggregate or as case studies, with limited theoretical innovation arising from these regions. Future research could prioritize context-specific financing models, especially for small-scale, decentralized energy systems. There is also room to expand the empirical scope to include new financial actors whose role in shaping renewable energy markets is still emergent. The convergence of climate finance, digital innovation, and sustainability reporting also opens new avenues for interdisciplinary inquiry. How digital financial technologies (e.g., blockchain, AI-driven risk assessment) can be leveraged to improve transparency and access in green finance remains a pertinent question. Similarly, linking bibliometric data with policy impact studies could help assess whether academic insights are translating into effective on-ground interventions.

5. CONCLUSION

This bibliometric review has illuminated the evolving intellectual

landscape of renewable energy financing and its critical role in advancing sustainable development. The analysis revealed a strong thematic convergence around sustainability, finance, and climate policy, supported by growing academic interest in innovative funding mechanisms such as green finance and energy transition frameworks. The study also uncovered robust international collaboration networks, with China, the United States, and several emerging economies contributing significantly to the discourse. Temporal trends indicate a shift from technical and deployment-focused studies toward more systemic, policy-oriented, and financial investigations. Despite this progress, gaps remain in addressing social equity, context-specific financial models, and the integration of emerging digital financial tools. This review highlights the interdisciplinary and collaborative nature of the field, emphasizing the need for research that bridges technological, financial, and socio-political dimensions to support an equitable and effective global energy transition.

REFERENCES

[1] G. Schwerhoff and M. Sy, "Financing renewable energy in Africa–Key challenge of the sustainable development goals," *Renew. Sustain. Energy Rev.*, vol. 75, pp. 393–401, 2017.

[2] J. Bei and C. Wang, "Renewable energy resources and sustainable development goals: Evidence based on green finance, clean energy and environmentally friendly investment," *Resour. Policy*, vol. 80, p. 103194, 2023.

[3] M. Zhou and X. Li, "Influence of green finance and renewable energy resources over the sustainable development goal of clean energy in China," *Resour. Policy*, vol. 78, p. 102816, 2022.

[4] J. He, W. Iqbal, and F. Su, "Nexus between renewable energy investment, green finance, and sustainable development: Role of industrial structure and technical innovations," *Renew. Energy*, vol. 210, pp. 715–724, 2023.

[5] L. Zhang, H. B. Saydaliev, and X. Ma, "Does green finance investment and technological innovation improve renewable energy efficiency and sustainable development goals," *Renew. Energy*, vol. 193, pp. 991–1000, 2022.

[6] N. I. Chaudhry and M. Hussain, "Nexus of renewable energy, green financing, and sustainable development goals: an empirical investigation," *Environ. Sci. Pollut. Res.*, vol. 30, no. 20, pp. 58480–58492, 2023.

[7] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines," *J. Bus. Res.*, vol. 133, pp. 285–296, 2021.

[8] Y. Xiong and L. Dai, "Does green finance investment impact on sustainable development: Role of technological innovation and renewable energy," *Renew. Energy*, vol. 214, pp. 342–349, 2023.

[9] A. Sinha, V. Ghosh, N. Hussain, D. K. Nguyen, and N. Das, "Green financing of renewable energy generation: Capturing the role of exogenous moderation for ensuring sustainable development," *Energy Econ.*, vol. 126, p. 107021, 2023.

[10] T.-H. Le, C. P. Nguyen, and D. Park, "Financing renewable energy development: Insights from 55 countries," *Energy Res. Soc. Sci.*, vol. 68, p. 101537, 2020.

[11] A. R. Al Sayed and S. K. Sek, "Environmental Kuznets curve: evidences from," *Appl. Math. Sci.*, vol. 7, no. 22, pp. 1081–1092, 2013.

[12] H. Mahmood, M. Furqan, M. S. Hassan, and S. Rej, "The environmental Kuznets Curve (EKC) hypothesis in China: A review," *Sustainability*, vol. 15, no. 7, p. 6110, 2023.

[13] K. Uchiyama and K. Uchiyama, *Environmental Kuznets curve hypothesis*. Springer, 2016.

[14] D. C. North, "A transaction cost theory of politics," *J. Theor. Polit.*, vol. 2, no. 4, pp. 355–367, 1990.

[15] S. Gyamfi, N. S. A. Derkyi, E. Y. Asuamah, and I. J. A. Aduako, "Renewable energy and sustainable development," in *Sustainable Hydropower in West Africa*, Elsevier, 2018, pp. 75–94.

[16] C. Li and M. Umair, "Does green finance development goals affects renewable energy in China," *Renew. Energy*, vol. 203, pp. 898–905, 2023.

[17] L. K. Wiginton, H. T. Nguyen, and J. M. Pearce, "Quantifying rooftop solar photovoltaic potential for regional renewable energy policy," *Comput. Environ. Urban Syst.*, vol. 34, no. 4, pp. 345–357, 2010.

[18] F. Taghizadeh-Hesary and N. Yoshino, "Sustainable solutions for green financing and investment in renewable energy projects," *Energies*, vol. 13, no. 4, p. 788, 2020.

[19] E. Martinot, A. Chaurey, D. Lew, J. R. Moreira, and N. Wamukonya, "Renewable energy markets in developing countries," *Annu. Rev. energy Environ.*, vol. 27, no. 1, pp. 309–348, 2002.

[20] J. Bogner *et al.*, "Mitigation of global greenhouse gas emissions from waste: conclusions and strategies from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. Working Group III (Mitigation)," *Waste Manag. Res.*, vol. 26, no. 1, pp. 11–32, 2008.

[21] G. Gianfrate and M. Peri, "The green advantage: Exploring the convenience of issuing green bonds," *J. Clean. Prod.*, vol. 219, pp. 127–135, 2019.

[22] Z. Peidong, Y. Yanli, S. Jin, Z. Yonghong, W. Lisheng, and L. Xinrong, "Opportunities and challenges for renewable

energy policy in China," *Renew. Energy*, p. Vol4_486-Vol4_503, 2018.

[23] S. Saint Akadiri, A. A. Alola, G. Olasehinde-Williams, and M. U. Etokakpan, "The role of electricity consumption, globalization and economic growth in carbon dioxide emissions and its implications for environmental sustainability targets," *Sci. Total Environ.*, vol. 708, p. 134653, 2020.

[24] Y. Zhang and M. Umair, "Examining the interconnectedness of green finance: an analysis of dynamic spillover effects among green bonds, renewable energy, and carbon markets," *Environ. Sci. Pollut. Res.*, vol. 30, no. 31, pp. 77605–77621, 2023.

[25] J. Abbas, L. Wang, S. Ben Belgacem, P. S. Pawar, H. Najam, and J. Abbas, "Investment in renewable energy and electricity output: Role of green finance, environmental tax, and geopolitical risk: Empirical evidence from China," *Energy*, vol. 269, p. 126683, 2023.

[26] S. Wang, L. Sun, and S. Iqbal, "Green financing role on renewable energy dependence and energy transition in E7 economies," *Renew. Energy*, vol. 200, pp. 1561–1572, 2022.

[27] A. Donastorg, S. Renukappa, and S. Suresh, "Financing renewable energy projects in developing countries: a critical review," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 2017, p. 12012.

[28] R. L. Ibrahim, U. Al-mulali, I. Ozturk, A. K. Bello, and L. Raimi, "On the criticality of renewable energy to sustainable development: do green financial development, technological innovation, and economic complexity matter for China?," *Renew. Energy*, vol. 199, pp. 262–277, 2022.