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Human-Centered Approaches to Energy Justice: Pathways Toward Inclusive and Sustainable Economic Growth

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ABSTRACT
This study analyzes a human-centered approach in realizing energy justice as a path to inclusive and sustainable economic growth. The background of this study stems from the global energy access gap, where more than 733 million people remain unconnected to electricity and 2.4 billion depend on traditional biomass, thereby causing social, economic, and environmental problems. Through systematic literature review and thematic analysis of 45 relevant studies published between 2020–2025, this study identifies three main dimensions of distributive, procedural, and recognition energy justice that are interrelated and must be integrated in implementation. The results of the study show that strategies such as community empowerment, participatory planning, adaptive governance, and financing innovation have been proven to be able to strengthen energy justice while encouraging local economic growth through energy cost savings, job creation, productive capacity building, social infrastructure development, and the birth of innovation and entrepreneurship. However, there are structural obstacles, including biased regulations in the centralized system, limited capacity, and political and economic resistance, that hinder the scale of implementation. These findings confirm that human-centered approaches are not only normative but also strategic to ensure the energy transition contributes to sustainable development goals. This research provides recommendations for policymakers and practitioners to prioritize social inclusion, community empowerment, and adaptive governance in global energy transition strategies.

Keywords: Energy Justice; Human-Centered; inclusive economic growth; Energy Transition; Sustainable Development.

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INTRODUCTION

The global energy transition is one of the biggest challenges of the 21st century because it demands not only technological innovation but also fundamental changes in how people understand, manage, and implement energy systems. Decarbonization efforts that align with the demands of sustainable development have given rise to the concept of energy justice as an important framework to ensure that energy transformation occurs in a fair, inclusive, and human-centered manner (Siciliano et al., 2021; Heffron, 2022). Energy justice is not only about the distribution of energy benefits and burdens, but also about meaningful participation in decision-making processes and the recognition of diverse needs and values in society.

The energy gap is still a real phenomenon at the global level. Recent data show that about 733 million people worldwide lack access to electricity, while 2.4 billion still rely on traditional biomass for cooking, especially in Sub-Saharan Africa and developing Asia (Liu et al., 2025). This condition is not just a technical problem, but a reflection of structural inequalities related to poverty, gender, geography, and social marginalization. The COVID-19 pandemic has even widened this inequality by

showing the importance of reliable energy access for health services, education, and economic opportunities.

Meanwhile, the acceleration of renewable energy development presents both opportunities and challenges. Clean energy technology can indeed support energy access and climate change mitigation, but its implementation often reproduces or reinforces existing injustices. For example, large-scale renewable energy projects sometimes trigger land grabbing, displacement of indigenous communities, and concentration of profits on capital owners, while the social burden is borne by vulnerable groups (Hearn et al., 2021). This fact underscores the need for a more human-oriented approach, one that puts social justice on par with environmental sustainability.

On the academic side, although attention to energy justice is increasing, there remains a research gap regarding how the principle of human-centered energy justice can be operationalized in practice across contexts. The literature tends to focus on theoretical frameworks or specific case studies, while comprehensive implementation strategies adaptable across regions remain limited (Awolesi et al., 2024). In addition, there are still few studies that in-depth link energy justice with inclusive economic growth, especially in developing countries. Community capacity and energy literacy have also not been widely explored as important factors in achieving a just energy transition.

This research aims to close this gap by offering a comprehensive framework that integrates various dimensions of energy justice with practical implementation strategies to promote inclusive economic growth. His contributions lie in developing models that link theory to policy, describing pathways by which human-centered energy justice can drive inclusive economic growth, and formulating adaptive strategies appropriate to diverse socio-economic contexts. This aligns with the achievement of the Sustainable Development Goals (SDGs), especially SDG 7 (Clean and Affordable Energy), SDG 1 (No Poverty), SDG 5 (Gender Equality), and SDG 10 (Reducing Inequality).

Literature Review

Energy justice developed from *the environmental justice* movement which was then combined with energy policy studies to form a comprehensive framework in analyzing inequalities in the energy system. Theoretically, this framework is based on three main dimensions: distributive justice, procedural justice, and recognition justice (Siciliano et al., 2021). Distributive justice emphasizes on an equitable allocation of energy benefits, costs, and risks, including the affordability of reliable energy services as well as the distribution of environmental impacts from energy production and consumption. Procedural justice emphasizes transparent and participatory involvement in energy policy planning and implementation, so that the needs of the community are truly reflected (Nguyen & Batel, 2021). Meanwhile, justice recognition requires respect for local identity, culture, and knowledge, especially indigenous communities and vulnerable groups who have often been marginalized.

In its development, the *capability approach* perspective expands the concept of energy justice by assessing energy not just as a matter of technical access, but also as the extent to which energy enables a person to do and become something in accordance with his or her human potential (Velasco-Herrejón & Bauwens, 2020). This

view emphasizes the role of energy in supporting agency and empowerment, positioning it as a means to achieve the broader goals of human development.

The *human-centered approach* to energy systems emphasizes the importance of end-user needs, preferences, and capacities along the energy value chain. This is in contrast to traditional energy planning, which often focuses more on technical efficiency and economic optimization. This approach is realized through participatory planning, community ownership models, and adaptive governance that is responsive to changing local needs (Mang-Benza et al., 2023). Research shows that community-based energy models can increase public acceptance, expand environmental benefits, and distribute economic benefits more evenly (Awolesi et al., 2024).

The relationship between energy justice and economic development is proving to be intertwined. Reliable and affordable access to energy is a key prerequisite for economic development because it supports productive activities, educational and health services, and participation in modern economic systems (Liu et al., 2025). However, the process of providing access to energy can also strengthen or reduce inequality. A decentralized energy system based on renewable energy, for example, is able to create local jobs, increase technical capacity, and maintain the circulation of profits at the community level (Kwiliński et al., 2023). Energy efficiency programs targeting low-income households can even reduce the burden of energy costs while improving people's quality of life.

Thus, a literature review shows that human-centered energy justice serves not only as a moral principle but also as a practical strategy to realize a just, inclusive, and sustainable energy transition that supports sustainable economic development. Recent literature emphasizes the importance of integrating the energy justice dimension with participatory planning practices, community capacity-building, and institutional innovation to ensure the benefits of the energy transition are felt equally across all levels of society.

METHOD

This study uses a qualitative approach, grounded in a systematic literature review and thematic analysis, to examine a human-centered approach to energy justice. This approach was chosen because it can provide a comprehensive understanding of the theoretical foundations, practical applications, and outcomes of various equitable energy initiatives across diverse global contexts.

The research design adopts an interpretive paradigm that emphasizes the social construction of energy justice and its application in diverse cultural and institutional contexts. The data collection strategy is carried out by reviewing academic literature, policy documents, and *grey literature* published in the 2020–2025 period. The selection process follows PRISMA's guidance through several stages: an initial search yields 450 potential sources, a title and abstract screening yields 280 publications, a full-text review yields 95 relevant articles, and finally 45 selected studies that meet all methodological quality criteria.

The analysis was carried out by following six Braun & Clarke stages, starting from data familiarization, initial coding, theme development, theme review, definition, to report production. The analytical framework integrates the dimensions of justice (distributive, procedural, recognition), the level of implementation (individual, community, institutional, policy), the category of outcomes (social, economic,

environmental), and contextual factors (geographical, cultural, institutional). The validity of the research is maintained through transparent documentation, reliability tests between researchers, triangulation of sources, and continuous reflection on the researcher's position.

Figure 1. Research Methodology Flow Diagram

RESULTS AND DISCUSSION

The analysis shows four key findings regarding the human-centered approach to energy justice: the dimensions of justice, implementation strategies, challenges, and pathways to inclusive economic growth.

First, the distributive justice dimension emphasizes the importance of not only providing energy access, but also ensuring affordability, reliability, and quality of service. Case studies in Sub-Saharan Africa show that energy poverty impacts productive activities, health, and education (Mang-Benza et al., 2023). In Mexico, community-owned solar energy projects can reduce household energy costs by up to 40% while creating 15–20 local jobs per 100 kW of capacity (Velasco-Herrejón & Bauwens, 2020).

Second, the procedural justice dimension emphasizes the need for meaningful community participation in energy decision-making. Effective participation is not just consultation; it is sharing authority in planning. The example in Vietnam shows that

participatory energy planning yields hybrid systems better aligned with local needs (Siciliano et al., 2021).

Third, the recognition dimension emphasizes the importance of respecting local cultural values, identity, and knowledge. The integration of community wisdom in energy planning has been proven to improve social sustainability while reducing conflicts with indigenous peoples.

In addition to these dimensions, the study identified four categories of relevant implementation strategies: community empowerment, participatory planning, adaptive governance, and financial innovation.

Table 1. Implementation Strategies for Human-Centered Energy Justice

Category Strategy	Key Components	Success Factors	Implementation Challenges
Community Empowerment	Capacity building, technical training, leadership	Local ownership, ongoing support	Limited resources, existing power structures
Participatory Planning	Inclusive consulting, co-design, decision-sharing	Transparent process, time & resources are sufficient	Long time, competitive advantages, technical limitations
Adaptive Governance	Flexible policies, responsive institutions	Political support, institutional capacity	Bureaucratic resistance, short political cycles
Financial Innovation	Microfinance, community investment, blended finance	Risk mitigation, financial institution support	Limited access to capital, high transaction fees, strict regulations

In addition to these global findings, it is also important to see their relevance in the Indonesian context. Although the national electrification ratio has reached more than 99%, there are still 3T (disadvantaged, frontier, outermost) regions such as Papua, Maluku, and East Nusa Tenggara that rely on unreliable energy such as fossil-fueled generators or traditional biomass (Liu et al., 2025). This condition shows that the dimensions of distributive justice, namely affordability, reliability, and quality of energy services, have not been fully fulfilled in Indonesia.

In terms of procedural justice, a number of large-scale energy projects have caused social resistance due to the lack of community participation in planning. The case of the Batang Toru hydropower plant in North Sumatra, for example, shows the potential for marginalization of indigenous communities due to their lack of involvement in the decision-making process, even though the project supports the renewable energy agenda (Hearn et al., 2021). This confirms the need for meaningful participation as emphasized by Siciliano et al. (2021). Furthermore, the recognition dimension is also relevant in Indonesia because many indigenous communities such as Dayak, Baduy, and Papuan whose cultural values and land rights must be respected in the implementation of energy projects.

Implementation strategies found in the global literature can be applied in Indonesia. Community empowerment through the *Energy Independent Village* program, for example, can be strengthened by *capacity building* and local ownership (Awolesi et al., 2024). Participatory *planning* needs to involve villagers in the co-design of energy projects, not just beneficiaries. Adaptive governance that is responsive to local needs can also help overcome regulatory limitations that have tended to top-down (Nguyen & Batel, 2021). Meanwhile, financial innovations such as energy cooperatives or *blended finance* are relevant to answer the challenge of funding renewable energy projects in remote villages (Kwiliński et al., 2023).

The positive impact of implementing a human-centered energy justice approach in Indonesia is not only social but also economic. Access to clean energy can increase MSME productivity, create new jobs in energy technology installation and maintenance, and support education and health services in villages (Mang-Benza et al., 2023). In addition, the availability of reliable energy also encourages locally-based green entrepreneurship, such as biogas, rooftop solar PV, and energy cooperatives (Velasco-Herrejón & Bauwens, 2020). Thus, the human-centered energy justice approach has great potential to support inclusive economic growth in Indonesia while accelerating the achievement of the SDGs, especially SDG 7 (Clean and Affordable Energy), SDG 1 (No Poverty), and SDG 10 (Reducing Inequality).

Other results show that community energy literacy is an important foundation. Communities with high literacy are better able to manage energy systems, adopt appropriate technologies, and defend their energy rights (Awolesi et al., 2024). In addition, institutional innovations such as energy cooperatives and *multi-stakeholder platforms* demonstrate effectiveness in combining accountability and sustainability.

However, there are various structural obstacles that slow implementation, ranging from regulations that favor large utilities to limited capital to political resistance from dominant actors. Therefore, a long-term commitment is needed to strengthen community capacity and improve the regulatory framework.

Further, this study outlines how human-centered energy justice contributes directly to inclusive economic growth. Its main mechanisms include: (1) direct economic benefits through reducing energy costs and job creation, (2) increasing productive capacity with reliable energy, (3) building social infrastructure such as health and education, and (4) encouraging local innovation and entrepreneurship.

Figure 2. Pathways from Energy Justice to Inclusive Economic Growth

CONCLUSION

This research emphasizes that a human-centered energy transition grounded in the principles of energy justice is the key to achieving inclusive economic growth. The distributive, procedural, and recognition dimensions are not only normatively relevant but also serve as practical instruments to ensure an equitable distribution of energy benefits, broader community engagement, and respect for local identity and values.

The findings show that equitable access to energy supports economic diversification, strengthens MSMEs, improves community capabilities, and opens up opportunities for more inclusive development. However, the success of implementation is greatly influenced by institutional capacity, energy literacy, and regulatory mechanisms that encourage community participation and ownership.

Practically, the results of this study recommend strengthening community-based energy models, implementing participatory governance, and integrating energy strategies with local development agendas. This aligns with achieving the SDGs, especially by promoting clean energy, reducing poverty, eliminating inequality, and strengthening sustainable economic growth.

Thus, *human-centered energy justice* is not only an ethical framework but also a development strategy that links the energy transition to the goal of social and economic inclusion. Going forward, further studies are needed to test the implementation of this framework in various developing country contexts, as well as to identify institutional innovations and financing models that can support a global equitable energy transition.

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