

Community acceptance and renewable energy adoption: a comparative analysis of Niger and Denmark

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ABSTRACT

This study examines the comparative dynamics of renewable energy adoption and community acceptance in Niger and Denmark, two countries representing radically different stages of energy transition. Despite their contrasting contexts, both nations face the fundamental challenge of securing community buy-in for renewable energy projects—a prerequisite for sustainable and just transitions. The research employs a comparative case study methodology, drawing on academic

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literature, project reports, policy documents, and empirical studies from both countries spanning 2020-2026. Denmark, a global leader in renewable energy with a long history of community-owned energy cooperatives, demonstrates how institutionalized participation, benefit-sharing mechanisms, and sustained dialogue can maintain high levels of public support despite emerging tensions around regulatory barriers and equity concerns. The case of Fejø island illustrates how even in mature renewable energy contexts, communities face obstacles related to spatial planning regulations and the need to balance nature conservation with energy development (Clean energy for EU islands, 2025). Niger presents a fundamentally different landscape, where renewable energy adoption is driven by basic access needs rather than decarbonization imperatives. With only 7% of the rural population having access to electricity, adoption focuses on off-grid solar solutions and clean cooking technologies (EnDev, 2025). Research from Sekoukou reveals persistent reliance on firewood despite solar interventions, driven by affordability barriers, cultural familiarity, and gendered power relations that exclude women from energy decision-making despite their role as primary household energy managers (Sarpong, 2025). The Dar-Es-Salaam Energy Village project demonstrates the transformative potential of community-grounded approaches when they address basic needs—solar-powered water systems have reduced women's time burden and enabled children to study after dark (Belemsobgo, 2025). Denmark's strength lies in its sophisticated participatory frameworks, financial participation mechanisms, and political consensus supporting energy transitions, though challenges persist around regulatory flexibility and ensuring that benefits reach local communities (Tornel-Vázquez et al., 2025; Busch et al., 2023). Niger's advantage is the tangible, immediate impact of energy access on daily life, which can generate organic community support, yet adoption is hampered by affordability constraints, weak distribution networks, and exclusionary decision-making structures (Sanusi, 2022). Both countries demonstrate that successful renewable energy adoption requires: (1) meaningful community participation from project inception; (2) equitable benefit-sharing mechanisms; (3) attention to gender dynamics in energy decision-making; (4) adaptive regulatory frameworks; (5) sustained dialogue addressing local concerns; (6) integration of energy projects with broader community development; and (7) recognition that community acceptance is not a binary outcome but an ongoing process requiring continuous engagement.

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KEYWORDS: Renewable energy adoption, community acceptance, energy transition, Niger, Denmark, energy democracy, social acceptance, off-grid solar, energy justice, participatory governance

RÉSUMÉ (French Version)

Cette étude examine les dynamiques comparatives de l'adoption des énergies renouvelables et de l'acceptation communautaire au Niger et au Danemark, deux pays représentant des stades radicalement différents de transition énergétique. Malgré leurs contextes contrastés, les deux nations font face au défi fondamental d'obtenir l'adhésion des communautés aux projets d'énergie renouvelable—une condition préalable à des transitions durables et justes. La recherche emploie une méthodologie d'étude de cas comparative, s'appuyant sur la littérature académique, les rapports de projets, les documents politiques et les études empiriques des deux pays couvrant la période 2020-2026. Le Danemark, leader mondial des énergies renouvelables avec une longue histoire de coopératives énergétiques communautaires, démontre comment la participation institutionnalisée, les mécanismes de partage des bénéfices et le dialogue soutenu peuvent maintenir des niveaux élevés de soutien public malgré les tensions émergentes autour des barrières réglementaires et des préoccupations d'équité. Le cas de l'île de Fejø illustre comment, même dans des contextes matures d'énergie renouvelable, les communautés font face à des obstacles liés aux réglementations d'aménagement du territoire et à la nécessité d'équilibrer conservation de la nature et développement énergétique (Clean energy for EU islands, 2025). Le Niger présente un paysage fondamentalement différent, où l'adoption des énergies renouvelables est motivée par des besoins d'accès de base plutôt que par des impératifs de décarbonation. Avec seulement 7 % de la population rurale ayant accès à l'électricité, l'adoption se concentre sur les solutions solaires hors réseau et les technologies de cuisson propre (EnDev, 2025). La recherche de Sekoukou révèle une dépendance persistante au bois de feu malgré les interventions solaires, due aux barrières d'abordabilité, à la familiarité culturelle et aux relations de pouvoir genrées qui excluent les femmes de la prise de décision énergétique (Sarpong, 2025). Le projet du Village Énergétique de Dar-Es-Salaam démontre le potentiel transformateur des approches ancrées dans la communauté lorsqu'elles répondent aux besoins de base—les systèmes d'eau solaires ont réduit la charge de temps des femmes et permis aux enfants d'étudier après la tombée de la nuit (Belemsobgo, 2025).

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La force du Danemark réside dans ses cadres participatifs sophistiqués, ses mécanismes de participation financière et le consensus politique soutenant les transitions énergétiques, bien que des défis persistent quant à la flexibilité réglementaire et à la garantie que les bénéfices atteignent les communautés locales (Tornel-Vázquez et al., 2025; Busch et al., 2023). L'avantage du Niger est l'impact tangible et immédiat de l'accès à l'énergie sur la vie quotidienne, qui peut générer un soutien communautaire organique, mais l'adoption est entravée par des contraintes d'abordabilité, des réseaux de distribution faibles et des structures décisionnelles excluantes (Sanusi, 2022). Les deux pays démontrent qu'une adoption réussie des énergies renouvelables nécessite : (1) une participation communautaire significative dès la conception du projet ; (2) des mécanismes équitables de partage des bénéfices ; (3) une attention aux dynamiques de genre dans la prise de décision énergétique ; (4) des cadres réglementaires adaptatifs ; (5) un dialogue soutenu traitant les préoccupations locales ; (6) l'intégration des projets énergétiques dans le développement communautaire plus large ; et (7) la reconnaissance que l'acceptation communautaire n'est pas un résultat binaire mais un processus continu nécessitant un engagement permanent.

MOTS-CLÉS : Adoption des énergies renouvelables, acceptation communautaire, transition énergétique, Niger, Danemark, démocratie énergétique, acceptation sociale, solaire hors réseau, justice énergétique, gouvernance participative

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1. INTRODUCTION

The global energy transition represents one of the most profound transformations of the twenty-first century, reshaping not only how societies produce and consume energy but also the relationships between citizens, communities, and the state. Renewable energy technologies—solar, wind, biomass, and others—offer pathways to decarbonization, energy independence, and expanded access. Yet the success of these technologies depends on more than technical feasibility

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or economic viability. It hinges fundamentally on **community acceptance**: the willingness of local populations to host, support, and participate in renewable energy projects.

Community acceptance is not a binary outcome but a complex, dynamic phenomenon shaped by historical experiences, cultural values, institutional trust, perceptions of fairness, and the quality of participatory processes. When communities embrace renewable energy projects, they can become engines of local development, sources of pride, and models for broader transitions. When communities resist, projects stall, investments are lost, and the legitimacy of energy policy is undermined.

Niger and Denmark, two countries occupying vastly different positions in the global energy landscape, offer a compelling comparative lens through which to examine the dynamics of renewable energy adoption and community acceptance. Denmark is a global frontrunner in the energy transition, with a long history of renewable energy development, strong political consensus on climate action, and sophisticated frameworks for community participation. The country aims to reduce greenhouse gas emissions by 70% by 2030 and achieve climate neutrality by 2050 (Green Power Denmark, 2025). Danish citizens have broadly supported this transition, with polls showing that six out of ten Danes accept wind turbines in their vicinity and 63% support solar parks (Green Power Denmark, 2025). This acceptance has been cultivated through decades of institutional learning, including the famous community-owned wind cooperatives that emerged in the 1970s and 1980s.

Yet even in Denmark, community acceptance cannot be taken for granted. The case of Fejø island illustrates how local communities committed to renewable energy can face regulatory barriers that frustrate their ambitions. Despite strong local consensus, Fejø's efforts to repower an existing wind turbine have been blocked by municipal planning restrictions and coastal protection zones (Clean energy for EU islands, 2025). This raises fundamental questions about how national policies and local aspirations align—or fail to align—in practice.

Niger presents a fundamentally different reality. With only 7% of the rural population having access to electricity and just 6% using clean cooking solutions, the country faces an energy access crisis of profound proportions (EnDev, 2025). Renewable energy adoption in Niger is not primarily

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about decarbonization but about meeting basic human needs: lighting homes, powering water pumps, enabling children to study after dark, and reducing the burden on women and girls who spend hours collecting firewood. The market for solar technologies is growing but remains hampered by poor-quality products, weak distribution networks, limited awareness, and affordability constraints (EnDev, 2025).

Research from Sekoukou, Niger, reveals that despite solar interventions, households continue to rely on firewood—a pattern driven not by ignorance but by affordability barriers, cultural familiarity, and gendered power relations that exclude women from energy decision-making despite their role as primary household energy managers (Sarpong, 2025). The Dar-Es-Salaam Energy Village project, however, demonstrates the transformative potential of community-grounded approaches: solar-powered water systems have reduced women's time burden, enabled children to study under electric light, and restored a sense of dignity to the community (Belemsobgo, 2025).

This study examines the comparative dynamics of renewable energy adoption and community acceptance in Niger and Denmark. Drawing on academic research, project reports, policy documents, and empirical studies from both countries, it explores how community acceptance is cultivated, maintained, or undermined in radically different contexts. The analysis is organized around four interconnected themes: (1) the foundational contexts for renewable energy adoption in each country; (2) the role of community participation and engagement in shaping acceptance; (3) the influence of gender and social dynamics on energy decisions; and (4) the lessons each country might offer the other.

The study contributes to scholarship on energy transitions, social acceptance, and energy justice. It argues that community acceptance is not a luxury to be addressed after technical and economic decisions are made but a fundamental precondition for successful transitions—one that requires sustained investment in participatory processes, equitable benefit-sharing, and attention to the specific cultural and social contexts in which energy projects are embedded.

2. LITERATURE REVIEW

2.1 Conceptualizing Community Acceptance

The concept of community acceptance has emerged as a central concern in energy transition scholarship. Wüstenhagen, Wolsink, and Bürer's (2007) foundational framework distinguishes three dimensions of social acceptance: socio-political acceptance (by governments and policymakers), market acceptance (by investors and consumers), and community acceptance (by local stakeholders affected by specific projects). Community acceptance is the most localized and often the most contentious dimension, as it involves the people who will live alongside new energy infrastructure.

Research has consistently shown that community acceptance cannot be assumed even when general public support for renewable energy is high. The well-documented "Not In My Backyard" (NIMBY) phenomenon, while overly simplistic as an explanation, points to the gap between abstract support for renewables and concrete willingness to host projects. More sophisticated analyses emphasize that community resistance often reflects legitimate concerns about distributive justice (who bears costs and who receives benefits) and procedural justice (how decisions are made and whose voices are heard) (Gross, 2007; Devine-Wright, 2011).

Energy justice frameworks have emerged to address these concerns, emphasizing that transitions must be fair and inclusive. Jenkins et al. (2016) articulate three core dimensions: distributional justice (fair allocation of benefits and burdens), procedural justice (meaningful participation in decision-making), and recognition justice (respect for diverse values and identities).

2.2 Denmark's Renewable Energy Transition

Denmark's renewable energy transition is among the most advanced globally, supported by decades of consistent policy and strong public engagement. The country's commitment to reducing emissions by 70% by 2030 and achieving climate neutrality by 2050 provides a clear framework for renewable energy expansion (Green Power Denmark, 2025). Public support remains high: polls indicate that six out of ten Danes accept wind turbines near their homes, and 63% support solar parks (Green Power Denmark, 2025).

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A distinctive feature of Denmark's approach is the tradition of community-owned energy cooperatives. Citizen involvement in local energy projects has been key to increasing and maintaining acceptance of wind, solar, and biomass technologies (Bauwens et al., 2016). Islands such as Samsø, Ærø, and Bornholm have been particularly active, with Samsø achieving fame as the world's first renewable-energy-powered island through a combination of community ownership and innovative financing.

However, recent scholarship reveals tensions within this model. Busch, Radtke, and Islar's (2023) analysis of Samsø and Ærø through an "energy democracy" lens finds that while many features of democratic participation are present, challenges remain around energy justice and the handling of different geographic scales. The authors note that local energy projects can sometimes prioritize the interests of active participants while marginalizing others—a concern echoed in research on community benefits and financial participation mechanisms.

Tornel-Vázquez et al. (2025) review financial participation mechanisms across four European countries, including Denmark, highlighting the growing tension between market-based approaches to wind energy deployment and community participation. As renewable energy auctions prioritize cost efficiency, smaller-scale citizen initiatives struggle to compete, and professional developers increasingly dominate the landscape. This "paradigm shift" narrows the scope for community participation and raises questions about whether financial benefits alone can substitute for genuine engagement.

The Fejø island case illustrates these tensions vividly. A community group initiated dialogue on clean energy with ambitions for a community-owned wind project. Despite local consensus and support from the Clean energy for EU islands secretariat, the project faces regulatory barriers related to coastal protection zones and municipal planning restrictions (Clean energy for EU islands, 2025). The community's experience raises a fundamental question: "Should nature protection laws—designed with good intentions some decades ago—prevent island communities from taking responsibility for their clean energy future?" (Clean energy for EU islands, 2025, para. 8).

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Sønderborg Municipality offers a contrasting model, where local opposition is welcomed as "a sign of democratic health" (ProjectZero, 2024). The municipality's approach involves 4-5 months of citizen dialogue before any position is taken on energy applications. Local representatives meet repeatedly with developers to discuss questions, concerns, and wishes, ensuring that projects are adapted to the unique nature, wildlife, and population of each area (ProjectZero, 2024). This model demonstrates how institutionalized participation can transform opposition into collaboration.

2.3 Niger's Energy Access Challenge

Niger's energy landscape is shaped by fundamentally different imperatives. With only 7% of the rural population having access to electricity and just 6% using clean cooking solutions, the priority is not decarbonization but meeting basic needs (EnDev, 2025). The country faces what researchers term an "energy access gap" of profound proportions.

The market for solar technologies is growing but faces multiple barriers. EnDev's (2025) analysis identifies poor-quality products, weak distribution networks, limited awareness, and affordability constraints as key obstacles. Rural households and small businesses often lack both the means and the information to invest in reliable, productive energy solutions. In response, EnDev adopts a market-driven approach focused on strengthening local companies, expanding last-mile distribution, and building trust through awareness campaigns.

Tornel-Vázquez et al.'s (2025) research in northern Nigeria, while geographically distinct, offers insights relevant to the broader Sahel region. The study found that willingness to adopt biogas is significantly influenced by gender, with women more likely to embrace clean cooking technologies. Concerns about time spent cooking, technology familiarity, and decision-making power all shape adoption rates. The authors conclude that raising men's awareness of benefits and empowering women in decision-making are essential for equitable adoption.

The Dar-Es-Salaam Energy Village project provides a powerful counter-narrative to stories of failed adoption. Funded by the German Federal Ministry of Research, Technology and Space, the RETO-DOSSO project uses solar energy to power water systems, homes, and public lighting. Community testimonies are striking: "Before, getting water was a daily struggle for both our

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families and our animals. Women used to spend hours walking to distant wells. Now, they can fetch clean water quickly, safely, and close to home" (Belemsobgo, 2025, para. 4). Women report that the time saved enables them to work, care for families, or run small businesses. Children can now study under electric light. As one woman expressed, "This project has truly restored dignity to our village" (Belemsobgo, 2025, para. 5).

The success of Dar-Es-Salaam lies in its integration of energy with water, food, and livelihoods—addressing the interconnected needs that define daily life. This echoes findings from Sarpong (2025), who emphasizes that effective energy transitions require solutions embedded in broader development strategies.

However, Sarpong's (2025) study also reveals persistent challenges. Despite solar interventions, households continue to rely on firewood due to affordability barriers, cultural familiarity, and exclusionary decision-making. Women manage household energy yet are excluded from formal decision-making processes. Low education and high unemployment constrain awareness and affordability (Sarpong, 2025).

Sanusi (2022) further contextualizes these challenges, examining the dilemma of energy access in Nigerian urban centers and drawing lessons applicable across the region. The study emphasizes that without deliberate attention to affordability and distribution, renewable energy interventions may fail to reach those most in need.

2.4 The Role of Participation and Governance

Both the Danish and Nigerien cases underscore the centrality of participation and governance in shaping community acceptance. In Denmark, participation is institutionalized through long-standing cooperative traditions, municipal dialogue processes, and national policies that encourage citizen involvement (Busch et al., 2023). Yet even these sophisticated frameworks face challenges, as the Fejø case illustrates (Clean energy for EU islands, 2025).

In Niger, participation is often project-based and donor-driven, with varying degrees of community engagement. The Dar-Es-Salaam project demonstrates what is possible when communities are

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genuinely involved and projects address locally-defined needs (Belemsobgo, 2025). The Sekoukou research, however, highlights the risks when participation is superficial and gender dynamics are ignored (Sarpong, 2025).

The energy democracy literature offers a framework for analyzing these dynamics. Energy democracy emphasizes community control over energy resources, participatory decision-making, and equitable distribution of benefits (Szulecki, 2018). The concept moves beyond narrow notions of acceptance to consider who owns, governs, and benefits from energy systems.

2.5 Gender Dimensions of Energy Adoption

A consistent finding across both contexts is the importance of gender in shaping energy adoption. In Niger, women are primarily responsible for household energy management—collecting firewood, cooking, and managing household budgets for energy expenses. Yet they are systematically excluded from formal decision-making about energy projects (Sarpong, 2025). This disconnect between responsibility and authority undermines adoption and perpetuates inequities.

Tornel-Vázquez et al.'s (2025) research confirms that gender-sensitive approaches are essential. Women's willingness to adopt clean cooking technologies is shaped by time concerns, technology familiarity, and their position within household decision-making structures.

In Denmark, while gender dynamics are less stark, questions of inclusion and exclusion remain. Research on energy democracy notes that community energy projects can sometimes be dominated by already-empowered actors, potentially marginalizing others (Busch et al., 2023). Ensuring that benefits and decision-making power are equitably distributed across gender, age, and socioeconomic lines remains an ongoing challenge.

3. RESEARCH QUESTIONS

This study addresses the following research questions:

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1. How do the foundational contexts for renewable energy adoption differ between Niger and Denmark, and how do these differences shape the nature of community acceptance in each country?
2. What role do participatory mechanisms and community engagement play in shaping acceptance outcomes, and how do these mechanisms differ across the two contexts?
3. How do gender dynamics and social structures influence energy adoption decisions and community acceptance in Niger and Denmark?
4. What lessons can be drawn from comparative analysis for strengthening community acceptance of renewable energy in both developed and developing country contexts?

4. METHODOLOGY

This study employs a comparative case study methodology to examine renewable energy adoption and community acceptance in Niger and Denmark. The research design integrates document analysis of primary sources with synthesis of secondary literature to develop a comprehensive understanding of the dynamics shaping acceptance in both countries.

Primary sources analyzed include: project reports from EnDev (2025) and the Dar-Es-Salaam Energy Village (Belemsobgo, 2025); academic research on community acceptance in Denmark (Busch et al., 2023; Tornel-Vázquez et al., 2025) and Niger (Sarpong, 2025; Sanusi, 2022); policy documents and institutional analyses (Clean energy for EU islands, 2025; Green Power Denmark, 2025; ProjectZero, 2024); and comparative studies of financial participation mechanisms.

The comparative framework examines four dimensions of renewable energy adoption: (1) foundational context and energy landscape; (2) participatory mechanisms and community engagement; (3) gender dynamics and social structures; and (4) outcomes and challenges for community acceptance.

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The analysis covers the period from approximately 2020 to 2026, capturing recent developments including the Fejø island dialogue process, the Dar-Es-Salaam project implementation, and emerging research on energy democracy and justice.

5. RESULTS

5.1 Foundational Contexts for Renewable Energy Adoption

Denmark: Denmark's energy landscape is characterized by high levels of access, sophisticated infrastructure, and strong policy frameworks supporting decarbonization. Key features include:

- Universal electricity access and advanced grid infrastructure.
- Strong political consensus on climate goals, including 70% emissions reduction by 2030 and climate neutrality by 2050 (Green Power Denmark, 2025).
- High public support for renewable energy, with polls showing 60% acceptance of nearby wind turbines and 63% support for solar parks (Green Power Denmark, 2025).
- Mature renewable energy market with substantial installed capacity and continued expansion targets.
- Long history of community energy cooperatives and citizen participation (Busch et al., 2023).
- Sophisticated regulatory frameworks governing spatial planning, environmental protection, and energy development.

Renewable energy adoption in Denmark is driven primarily by decarbonization imperatives, energy independence goals, and economic opportunities in the green technology sector.

Niger: Niger's energy landscape is defined by profound access deficits and infrastructural challenges. Key features include:

- Severe access gap: only 7% of rural population has electricity access; only 6% use clean cooking solutions (EnDev, 2025).
- Weak distribution networks and limited last-mile infrastructure.
- Poor-quality products and limited consumer protection in solar markets (EnDev, 2025).

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- Affordability constraints limiting household investment in clean energy (Sarpong, 2025).
- Low awareness of renewable energy options and benefits.
- Dependence on traditional biomass for cooking, with associated health and environmental impacts.
- Fragile context with security challenges affecting program implementation.

Renewable energy adoption in Niger is driven by basic access needs: lighting, water pumping, productive uses, and improved cooking. The imperative is not decarbonization but meeting fundamental human needs.

Table 1: Comparative Foundational Contexts

Dimension	Denmark	Niger
Electricity access	Universal	7% rural access (EnDev, 2025)
Clean cooking access	Universal	6% (EnDev, 2025)
Primary driver	Decarbonization, climate goals	Basic needs, access
Policy framework	Sophisticated, long-term	Nascent, donor-dependent
Infrastructure	Advanced grid	Weak distribution
Market maturity	Mature, competitive	Emerging, fragile
Public awareness	High (Green Power Denmark, 2025)	Limited (Sarpong, 2025)
Community energy tradition	Strong, decades-long (Busch et al., 2023)	Project-based

5.2 Participatory Mechanisms and Community Engagement

Denmark: Denmark has developed sophisticated participatory mechanisms for renewable energy projects. Key approaches include:

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- Community-owned cooperatives: long tradition of citizen investment and ownership in wind and solar projects (Busch et al., 2023).
- Financial participation mechanisms: community benefit funding, citizen investment opportunities, and compensation for nearby households (Tornel-Vázquez et al., 2025).
- Municipal dialogue processes: Sønderborg Municipality's model involves 4-5 months of citizen dialogue before any position is taken on applications, with local representatives meeting repeatedly with developers (ProjectZero, 2024).
- Public meetings and engagement: the Fejø process involved eight public meetings engaging citizens not just about energy but about the future of the island (Clean energy for EU islands, 2025).
- Institutional support: organizations like the Clean energy for EU islands secretariat and the Danish Small Islands Association provide technical and facilitation support.

However, challenges persist. The Fejø case reveals that even strong community consensus can be frustrated by regulatory frameworks that do not accommodate small-scale, community-led projects. The 300-meter coastal protection zone and Natura 2000 protections leave "little to no room" for renewable energy development on some islands (Clean energy for EU islands, 2025, para. 7).

Tornel-Vázquez et al.'s (2025) review of financial participation mechanisms highlights growing tensions. As renewable energy auctions prioritize cost efficiency, smaller-scale citizen initiatives struggle to compete. The "paradigm shift" toward market-based approaches narrows opportunities for community participation.

Niger: Participatory mechanisms in Niger are typically project-based and donor-driven. Key approaches include:

- Market-driven approach: EnDev (2025) strengthens local solar companies, supports last-mile distribution, and builds trust through awareness campaigns.
- Demand-side subsidies: pilot programs subsidize Tier 1 solar lanterns and home systems for vulnerable households, with results-based incentives for companies.

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- Community dialogue: the Dar-Es-Salaam project involved community engagement, with village dignitaries and women's groups participating in project communications (Belemsobgo, 2025).
- Integration with broader development: RETO-DOSSO links energy with water, food, and livelihoods, addressing interconnected community needs (Belemsobgo, 2025).

However, participatory mechanisms face significant limitations. Sarpong's (2025) research found that women, despite managing household energy, are excluded from formal decision-making processes. Low education and awareness constrain meaningful participation. Affordability barriers mean that even when communities are engaged, adoption may be limited.

Table 2: Comparative Participatory Mechanisms

Dimension	Denmark	Niger
Primary approach	Institutionalized participation	Project-based, donor-driven
Community ownership	Cooperatives, shared benefits (Busch et al., 2023)	Limited; emerging models
Financial mechanisms	Benefit funds, investment opportunities, compensation (Tornel-Vázquez et al., 2025)	Demand-side subsidies, results-based incentives (EnDev, 2025)
Dialogue processes	Municipal-led, multi-month processes (ProjectZero, 2024)	Project-specific, variable quality
Institutional support	Government, EU secretariats, associations	Development partners, NGOs
Key challenges	Regulatory barriers; market pressures narrowing participation	Exclusion of women; affordability; weak distribution

5.3 Gender Dynamics and Social Structures

Denmark: Gender dynamics in Danish renewable energy adoption are less studied than in developing country contexts, but research on energy democracy raises questions about inclusion

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and exclusion. Community energy projects can sometimes be dominated by already-empowered actors, potentially marginalizing others (Busch et al., 2023). Ensuring equitable distribution of benefits and decision-making power remains an ongoing concern.

Niger: Gender dynamics are central to understanding renewable energy adoption in Niger. Key findings from research include:

- Women manage household energy but are excluded from formal decision-making about energy projects (Sarpong, 2025).
- Persistent reliance on firewood despite solar interventions, driven by cultural familiarity and gendered power relations (Sarpong, 2025).
- Time burden: women spend hours collecting firewood and water, time that could be used for income generation or family care (Belemsobgo, 2025).
- Decision-making power: Tornel-Vázquez et al. (2025) found that gender significantly influences adoption, with women more likely to embrace clean cooking when empowered in household decisions.
- Transformative potential: the Dar-Es-Salaam project demonstrates that when women are engaged and benefit directly—through reduced water collection time, enabling income generation—adoption can be rapid and enthusiastic (Belemsobgo, 2025).

Sarpong (2025) concludes that effective energy transitions require affordable, gender-sensitive, and culturally compatible solutions embedded in inclusive governance. Raising men's awareness of benefits and empowering women in decision-making are essential for equitable adoption.

Table 3: Comparative Gender Dynamics

Dimension	Denmark	Niger
Women's role	Participants in community energy	Primary household energy managers (Sarpong, 2025)
Decision-making inclusion	Generally participatory; potential marginalization (Busch et al., 2023)	Systematically excluded (Sarpong, 2025)

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Time burden	Not a primary factor	Significant; reduced by solar water systems (Belemsobgo, 2025)
Adoption drivers	Environmental concerns, economic benefits	Time savings, health, dignity (Belemsobgo, 2025)
Research focus	Limited gender-specific analysis	Growing attention to gender dimensions (Tornel-Vázquez et al., 2025; Sarpong, 2025)

5.4 Outcomes and Challenges for Community Acceptance

Denmark: Outcomes for community acceptance in Denmark are generally positive but nuanced. Key findings include:

- High baseline acceptance: polls consistently show majority support for renewable energy, including among those living near projects (Green Power Denmark, 2025).
- Successful community projects: islands like Samsø and Ærø demonstrate that community ownership can generate sustained support and local economic benefits (Busch et al., 2023).
- Institutionalized participation: Sønderborg's model shows that systematic engagement can transform opposition into collaboration (ProjectZero, 2024).
- Emerging tensions: the Fejø case reveals that even supportive communities can face regulatory barriers that frustrate their ambitions (Clean energy for EU islands, 2025).
- Market pressures: the shift toward competitive auctions and large-scale developers may narrow opportunities for citizen-led projects (Tornel-Vázquez et al., 2025).

Niger: Outcomes for community acceptance in Niger are mixed, with notable successes and persistent challenges. Key findings include:

- Dar-Es-Salaam success: the Energy Village project demonstrates transformative potential when energy is integrated with water and livelihoods. Community testimonies highlight restored dignity, reduced women's burden, and children's education (Belemsobgo, 2025).

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- Market development: EnDev's (2025) market-driven approach has strengthened local companies and expanded last-mile distribution, though challenges remain.
- Persistent firewood reliance: despite solar interventions, households in Sekoukou continue to rely on firewood due to affordability and cultural factors (Sarpong, 2025).
- Exclusion of women: systematic exclusion from decision-making undermines adoption and perpetuates inequities (Sarpong, 2025).
- Affordability gap: even subsidized solutions remain out of reach for many vulnerable households (EnDev, 2025; Sanusi, 2022).

5.5 Summary of Comparative Findings

Table 4: Comprehensive Comparative Analysis

Dimension	Denmark	Niger
Energy context	Universal access; decarbonization focus	Severe access deficit; basic needs focus (EnDev, 2025)
Community acceptance baseline	High (60-75% support) (Green Power Denmark, 2025)	Context-dependent; shaped by project experience
Participatory mechanisms	Institutionalized; cooperatives; municipal dialogue (Busch et al., 2023; ProjectZero, 2024)	Project-based; donor-driven
Community ownership	Strong tradition; cooperative model	Limited; emerging
Financial participation	Benefit funds; investment; compensation (Tornel-Vázquez et al., 2025)	Demand-side subsidies; results-based incentives (EnDev, 2025)
Gender dynamics	Limited research; potential marginalization (Busch et al., 2023)	Central; women excluded despite managing energy (Sarpong, 2025)

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Regulatory framework	Sophisticated but can constrain local projects (Clean energy for EU islands, 2025)	Nascent; implementation challenges
Success factors	Long-term policy; participation culture; social license	Tangible benefits; integration with water/livelihoods (Belemsobgo, 2025)
Key challenges	Regulatory barriers; market pressures	Affordability; exclusion; weak distribution (Sarpong, 2025; EnDev, 2025)
Transformative examples	Samsø, Ærø, Sønderborg model	Dar-Es-Salaam Energy Village (Belemsobgo, 2025)

6. DISCUSSION OF RESULTS

6.1 Explaining Divergent Pathways: Energy Context and Development Trajectories

The dramatic differences between Denmark's and Niger's approaches to renewable energy adoption reflect fundamentally different energy contexts, development trajectories, and societal priorities.

Denmark's sophisticated participatory frameworks and high levels of community acceptance emerged over decades of deliberate policy, institutional learning, and cultural change. The tradition of community-owned energy cooperatives, dating to the 1970s, created a foundation of trust and engagement that subsequent policies have built upon (Busch et al., 2023). Political consensus on climate goals provides a stable framework within which local projects can develop. Public support, cultivated through sustained dialogue and visible benefits, means that renewable energy is broadly seen as a collective good rather than an imposition (Green Power Denmark, 2025).

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Yet even this mature system faces challenges. The Fejø case reveals that regulatory frameworks designed for other purposes—nature protection, coastal management—can inadvertently block community-led projects (Clean energy for EU islands, 2025). The shift toward competitive auctions and large-scale developers, driven by cost-efficiency imperatives, may be eroding opportunities for citizen participation (Tornel-Vázquez et al., 2025). These tensions suggest that maintaining community acceptance is an ongoing process requiring continuous attention to regulatory design and market governance.

Niger's trajectory is fundamentally different. With basic access still unmet for the vast majority of the population, renewable energy adoption is not about transitioning from fossil fuels but about leapfrogging to modern energy services. The imperative is survival and development, not decarbonization. In this context, community acceptance is shaped by tangible, immediate benefits: clean water, lighting for children's studies, reduced drudgery (Belemsobgo, 2025). When projects deliver these benefits, as Dar-Es-Salaam demonstrates, acceptance can be rapid and profound.

However, Niger's challenges are equally profound. Affordability constraints mean that even subsidized solutions remain out of reach for many (Sarpong, 2025). Weak distribution networks limit access, particularly in remote areas (EnDev, 2025). Exclusionary decision-making structures, particularly around gender, mean that those most affected by energy decisions often have the least say (Sarpong, 2025). And the fragility of the Sahel context—security challenges, climate pressures, governance weaknesses—means that progress is never secure.

6.2 The Centrality of Participation and Governance

Despite their different contexts, both countries demonstrate that participation and governance are central to community acceptance. The quality of engagement—who is included, how decisions are made, whether benefits are shared equitably—shapes whether communities embrace or resist renewable energy projects.

Denmark's strength lies in institutionalized participation. Sønderborg's model of 4-5 months of citizen dialogue before any position is taken on applications represents a deep commitment to procedural justice (ProjectZero, 2024). The expectation that local representatives meet repeatedly

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with developers ensures that projects are shaped by community knowledge and concerns. The result is not merely acceptance but enhanced projects that are better adapted to local nature, wildlife, and population.

The Fejø case, however, reveals the limits of participation when regulatory frameworks do not accommodate community preferences. Despite strong local consensus and sustained engagement, the community faces barriers that require national or regional policy changes to address (Clean energy for EU islands, 2025). This highlights that participation at the local level must be complemented by governance frameworks at higher levels that enable local action.

Niger's participation is typically project-based and donor-driven, with varying quality. The Dar-Es-Salaam project demonstrates what is possible when communities are genuinely engaged and projects address locally-defined needs (Belemsobgo, 2025). The Sekoukou research, however, shows the consequences when participation is superficial: women's exclusion from decision-making perpetuates inequities and undermines adoption (Sarpong, 2025).

The energy democracy framework offers a lens for analyzing these dynamics. Energy democracy emphasizes community control over energy resources, participatory decision-making, and equitable distribution of benefits (Szulecki, 2018). Both countries exhibit elements of energy democracy, but both also face challenges in realizing its full promise.

6.3 Gender as a Cross-Cutting Determinant

A striking finding across both contexts is the centrality of gender to energy adoption, though the dynamics differ significantly.

In Niger, gender is fundamental. Women are the primary household energy managers, responsible for collecting firewood, cooking, and managing energy-related household expenses. Yet they are systematically excluded from formal decision-making about energy projects (Sarpong, 2025). This disconnect between responsibility and authority is not merely inequitable—it actively undermines adoption. The Sekoukou research found that women's exclusion contributes to persistent firewood reliance despite solar interventions (Sarpong, 2025). Tornel-Vázquez et al. (2025) confirm that

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empowering women in decision-making and raising men's awareness are essential for equitable adoption.

The Dar-Es-Salaam project demonstrates the transformative potential when women are engaged and benefit directly. Women report that time saved from water collection enables income generation and family care (Belemsobgo, 2025). Children's education improves. Dignity is restored. These outcomes are not merely co-benefits but central to project success.

In Denmark, gender dynamics are less studied but questions of inclusion and exclusion remain. Research on energy democracy notes that community energy projects can sometimes be dominated by already-empowered actors, potentially marginalizing others (Busch et al., 2023). Ensuring that benefits and decision-making power are equitably distributed across gender, age, and socioeconomic lines remains an ongoing challenge.

6.4 Regulatory Frameworks: Enabling and Constraining

Both countries' experiences highlight the dual role of regulatory frameworks in enabling or constraining community acceptance.

Denmark's sophisticated regulatory framework provides stability and predictability for renewable energy development. Spatial planning rules, environmental protections, and grid connection policies create a structured environment within which projects can proceed. However, the Fejø case reveals that regulations designed for other purposes can inadvertently block community-led initiatives. The 300-meter coastal protection zone and Natura 2000 protections, while valuable for conservation, leave little room for renewable energy on small islands (Clean energy for EU islands, 2025). This raises a fundamental governance question: how to balance competing policy objectives—climate action, nature protection, local development—in ways that enable rather than frustrate community aspirations.

Niger's regulatory framework is less developed, which creates both opportunities and challenges. The absence of restrictive regulations can enable rapid deployment of off-grid solutions. However, weak consumer protection allows poor-quality products to flood the market, undermining trust

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(EnDev, 2025). Limited enforcement of quality standards means that households may invest in systems that fail, reinforcing skepticism.

6.5 Implications for Energy Transitions and Community Acceptance

The findings have significant implications for understanding and strengthening community acceptance in renewable energy transitions.

First, community acceptance is context-dependent but universally essential. Whether in Denmark's mature energy system or Niger's access-constrained environment, projects cannot succeed without community support. The drivers of acceptance differ—climate concern in Denmark, tangible daily benefits in Niger—but the need for engagement, fairness, and benefit-sharing is universal.

Second, participation must be meaningful and sustained. Superficial consultation or exclusion of key groups, particularly women, undermines adoption and perpetuates inequities. Sønderborg's multi-month dialogue process (ProjectZero, 2024) and Dar-Es-Salaam's community engagement (Belemsobgo, 2025) offer positive models. Sekoukou's exclusion of women illustrates the costs of failed participation (Sarpong, 2025).

Third, benefit-sharing matters. Denmark's financial participation mechanisms—community benefit funds, investment opportunities, compensation—recognize that communities hosting energy infrastructure deserve tangible returns (Tornel-Vázquez et al., 2025). In Niger, the benefits are more basic but equally powerful: clean water, lighting, reduced drudgery (Belemsobgo, 2025).

Fourth, gender must be central, not peripheral. Women's roles as energy managers and their exclusion from decision-making are not side issues but central determinants of adoption. Gender-sensitive approaches are essential in both developing and developed country contexts.

Fifth, regulatory frameworks must enable local action. Denmark's experience shows that even sophisticated frameworks can inadvertently block community-led projects. Niger's experience shows that weak regulation allows poor-quality products to undermine trust. Getting governance right—at local, national, and regional levels—is essential.

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Sixth, integration matters. Projects that link energy with water, food, and livelihoods—like Dar-Es-Salaam—generate broader community support than energy-only interventions (Belemsobgo, 2025). This suggests that energy transitions should be embedded in broader development strategies.

7. CONCLUSION

This comparative analysis of renewable energy adoption and community acceptance in Niger and Denmark reveals two radically different energy landscapes united by a common challenge: securing the willing participation of communities in energy transitions. Denmark, with its universal access, mature infrastructure, and long history of community energy, demonstrates what is possible when participation is institutionalized, benefits are shared, and policies are sustained over decades. The tradition of community-owned cooperatives, the sophisticated municipal dialogue processes, and the high levels of public support all reflect a society that has learned to navigate the tensions inherent in energy transitions (Busch et al., 2023; Green Power Denmark, 2025; ProjectZero, 2024).

Yet even Denmark's mature system faces challenges. The Fejø island case reveals that regulatory frameworks designed for other purposes can frustrate even communities with strong local consensus. The 300-meter coastal protection zone and Natura 2000 protections leave little room for renewable energy on small islands, raising fundamental questions about how to balance climate action with nature conservation (Clean energy for EU islands, 2025). The shift toward competitive auctions and large-scale developers, driven by cost-efficiency imperatives, may be narrowing opportunities for citizen-led projects (Tornel-Vázquez et al., 2025).

Niger presents a fundamentally different reality. With only 7% of the rural population having access to electricity, the imperative is not decarbonization but meeting basic needs (EnDev, 2025). Renewable energy adoption means solar lanterns for lighting, solar pumps for water, improved cookstoves for health. The Dar-Es-Salaam Energy Village project demonstrates the transformative potential of this approach: solar-powered water systems have reduced women's time burden, enabled children to study after dark, and restored a sense of dignity to the community (Belemsobgo, 2025).

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Yet Niger's challenges are profound. The Sekoukou research reveals that despite solar interventions, households continue to rely on firewood due to affordability barriers, cultural familiarity, and exclusionary decision-making that marginalizes women (Sarpong, 2025). Weak distribution networks, poor-quality products, and limited awareness constrain adoption (EnDev, 2025). And the fragility of the Sahel context means that progress is never secure.

Several cross-cutting conclusions emerge from this analysis.

First, community acceptance is not a luxury but a necessity. In both Denmark and Niger, projects that fail to secure community support stall or fail. The drivers of acceptance differ, but the requirement for engagement, fairness, and benefit-sharing is universal.

Second, participation must be genuine and sustained. Sønderborg's 4-5 month dialogue process before any position is taken on applications represents a deep commitment to procedural justice (ProjectZero, 2024). Sekoukou's exclusion of women from decision-making illustrates the costs of failed participation (Sarpong, 2025). Meaningful participation requires time, resources, and institutional commitment.

Third, benefit-sharing is essential. Denmark's financial participation mechanisms recognize that communities hosting energy infrastructure deserve tangible returns (Tornel-Vázquez et al., 2025). In Niger, the benefits are more basic but equally powerful: clean water, lighting, reduced drudgery (Belemsobgo, 2025). Communities must see and experience the value of energy projects.

Fourth, gender must be central to energy planning. Women's roles as primary energy managers in Niger, and their systematic exclusion from decision-making, is not a side issue but a central determinant of adoption (Sarpong, 2025). Gender-sensitive approaches are essential in all contexts.

Fifth, regulatory frameworks must enable local action. Denmark's experience shows that even sophisticated frameworks can inadvertently block community-led projects (Clean energy for EU islands, 2025). Niger's experience shows that weak regulation allows poor-quality products to undermine trust (EnDev, 2025). Governance matters at all levels.

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Sixth, integration amplifies impact. Projects that link energy with water, food, and livelihoods—like Dar-Es-Salaam—generate broader community support than energy-only interventions (Belemsobgo, 2025). Energy transitions should be embedded in broader development strategies.

For Denmark, the path forward requires attending to the tensions within its mature system. Ensuring that regulatory frameworks accommodate community-led projects, that benefit-sharing mechanisms reach local communities, and that the shift toward market-based approaches does not exclude citizen participation are all urgent priorities.

For Niger, the path forward requires building on successes like Dar-Es-Salaam while addressing persistent barriers. Strengthening distribution networks, improving product quality, addressing affordability constraints, and ensuring women's meaningful participation in decision-making are essential. The demand-side subsidy pilot offers a promising model for bridging the affordability gap (EnDev, 2025).

For the broader community of scholars and policymakers, this comparison underscores that community acceptance is not a technical problem to be solved but a relational achievement to be cultivated. It requires attention to the specific contexts, values, and aspirations of the communities who will host energy infrastructure. It requires sustained investment in participatory processes, equitable benefit-sharing, and gender-inclusive governance. And it requires recognizing that energy transitions are not just about technologies and markets but about people and communities—their dignity, their livelihoods, and their futures.

8. LIMITS OF THE STUDY

This study has several limitations that should be acknowledged. First, the comparative analysis relies primarily on secondary sources and published research rather than primary data collection. Direct fieldwork in Niger comparable to the ethnographic studies available for Denmark would strengthen comparative insights.

Second, data availability differs significantly between the two countries. Denmark benefits from extensive academic research, policy documentation, and public data. Niger-specific research is

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more limited, with some findings drawn from neighboring contexts like northern Nigeria (Tornel-Vázquez et al., 2025).

Third, the analysis of gender dynamics in Denmark is constrained by limited research explicitly addressing gender in Danish renewable energy adoption. The energy democracy literature raises questions about inclusion and exclusion but does not systematically examine gender dimensions.

Fourth, the study covers a period of rapid change; findings may require updating as new policies, projects, and research emerge.

Fifth, the voice of community members—particularly women, marginalized groups, and those who resist renewable energy projects—is mediated through research rather than captured directly.

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10. AUTHOR CONTRIBUTIONS

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The author conceived the study, designed the comparative framework, conducted the literature review and document analysis, synthesized findings across countries, and drafted the complete manuscript. The author takes full responsibility for the accuracy of information presented and interpretations offered.

11. COMPETING INTERESTS

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential competing interest.

12. AUTHORS' CONTRIBUTIONS

As sole author, I performed all roles including conceptualization, methodology development, investigation, formal analysis, writing, review, editing, and project administration.

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14. DATA AVAILABILITY

All sources analyzed in this study are publicly available documents, including project reports, academic articles, policy documents, and media reports. Primary sources are cited in the references and accessible through the referenced publications and organizations.

15. DISCLAIMER

The views expressed in this article are solely those of the author and do not necessarily reflect the views of any institution or organization with which the author may be affiliated. The analysis is

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provided for scholarly purposes and should not be construed as policy guidance or investment advice. Renewable energy adoption and community acceptance patterns are subject to change, and readers should consult current official sources for specific information about Niger, Denmark, and energy policy.

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