Beyond Technology and Capital: A Socio-technical and Moral Economy Analysis of Clean Energy Transitions

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ABSTRACT

Clean energy interventions in the Global South have produced uneven outcomes. Despite some investment in infrastructure and assets, many communities report slow adoption, sustained non-use and in some cases, enterprise failure. This article argues that such failures cannot be adequately explained by reference to capital shortfalls, technological inadequacy, or weak institutions alone. It examines the social factors that shape clean energy adoption and analyses how commercial enterprises and development actors can respond strategically to these dynamics. We draw on Sociotechnical Systems Theory and Geels multi-level perspective, Social Role Theory, and moral economy frameworks.

This article applies an analytical approach that operates across macro-structural regime dynamics, meso-level community logics of fairness and legitimacy, and micro-level household and individual decision-making. We argue that clean energy adoption is a socially negotiated process shaped by structural inequalities, cultural logics, and gendered power relations not merely a function of technological availability or cost. Drawing on a structured narrative review of peer-reviewed and grey literature and a comparative analysis of enterprise cases, the article finds that enterprises which build social insight into core business strategy are associated with stronger uptake and more sustained use. The article concludes with recommendations for commercial enterprises, programmatic actors, and policymakers, structured around what each level of intervention can uniquely contribute to equitable clean energy transition.

Keywords: Clean energy adoption, energy transition, Global South, gender, moral economy, inclusion, enterprises, markets, sustainable development.

1. INTRODUCTION

Transitions to clean energy in the Global South unfold in a context of complex social dynamics and are never adopted in a vacuum. This has been long argued in Science and Technology Studies (Bijker et al., 1987; Latour, 1992) and the sociology of scientific knowledge (Bloor, 1976) that technologies are never adopted in isolation. This idea has major implications for clean energy policy and enterprise strategy in the Global South. Clean energy technologies function as sociotechnical objects embedded in everyday practices and cultural expectations not purely as technical interventions (Jasanoff, 2004). In other words, clean energy technologies are not neutral tools whose adoption is determined by their technical properties or costs alone. Whether they are adopted or partially accepted depends on the degree to which they align with, or disrupt, existing social norms, power relations, and community logics of fairness and legitimacy. The sociology of technology has documented this insight across contexts ranging from industrial machinery (Trist & Bamforth, 1951) to mobile telephony (Ling, 2004) to agricultural innovation (Scott, 1998). Yet clean energy policy and enterprise strategy in the Global South continue to be organised, around supply-side logics that treat adoption as a downstream consequence of technology availability and price reduction. This logic is due to absence of social science frameworks embedded at the core of clean energy strategy not merely appended to it as contextual description.

In this article, we propose such a framework, drawing on three complementary theoretical traditions. Geels' multilevel perspective (MLP) from Sociotechnical Systems Theory provides a structural account of how technologies are embedded within institutions, norms, and user practices across multiple scales of social

organisation (Geels, 2002, 2004, 2014). Social Role Theory illuminates how gendered and socially differentiated expectations and divisions of labour determine who participates in energy decision-making, who adopts new technologies, and whose needs are prioritised in household and community choices (Eagly, 1987; Raman et al., 2025). Moral economy frameworks, developed by Thompson (1971) and Scott (1976) and advanced into development contexts by Palomino-Schalscha (2015), illuminate the community-level reasons of fairness, legitimacy, and reciprocity that govern whether new interventions are accepted or resisted.

The article is structured as follows: Section 2 develops the theoretical framework, foregrounding both the contributions and the limitations of each framework. Section 3 analyses four key social dynamics, gendered power relations, social networks and peer influence, cultural trust and moral economy, and socioeconomic inequality and market fragmentation. We draw on recent case evidence while maintaining an eye on what the evidence can and cannot support. Section 1.1 sets out the review approach, Section 2.4 brings the three frameworks together into a single conceptual model, and Section 3.5 compares the enterprise cases on common dimensions. Section 4 sets out implications for commercial enterprises and programmes, followed by policy recommendations, and Section 7 concludes.

1.1 Analytical Approach and Evidence Base

This is a conceptual article supported by a structured narrative review of literature. An integrative design was chosen over a systematic review because the aim is theory-building: the article brings together evidence from the sociology of technology, gender studies, energy studies and business studies, which use different methods and outcome measures that cannot meaningfully be pooled statistically (Snyder, 2019).

Literature search was run using scholarly search engines including Directory of Open Access Journals (DOAJ) and Google Scholar. These were supplemented by targeted searches of grey literature, including enterprise impact reports, development finance briefs and programme platforms (for example, African Clean Energy reports, GET.invest and the Global Energy Alliance for People and Planet). Several search strings combined three groups of terms: technology terms, adoption terms and social-dynamics terms. Backward and forward citation tracking from key sources identified further studies. The empirical sources were limited to work published between 2017-2026, the period in which pay-as-you-go financing and women-led distribution models expanded at scale. Foundational theoretical works (for example, Thompson, 1971; Scott, 1976; Eagly, 1987; Geels, 2002) were included regardless of date. Sources were included if they (a) examined adoption, uptake or sustained use of household or small-enterprise clean energy technologies in low- and middle-income countries; and (b) addressed at least one social dimension of adoption, namely gender and social roles, networks and peer influence, trust and community legitimacy, or socioeconomic inequality. Studies concerned only with technical performance or with high-income contexts were excluded, while studies of grid-scale transitions were retained only where they illuminated regime-level dynamics.

2. THEORETICAL FRAMEWORK

2.1 Sociotechnical Systems Theory and the Multi-Level Perspective

Sociotechnical Systems Theory holds that technologies are adopted or rejected on the basis of their alignment with the social structures, routines, and identities that organise daily life and not on technical properties alone (Geels, 2002; Trist & Bamforth, 1951). This theoretical position challenges linear, supply-side models and directs analytical attention toward the social conditions of adoption. Geels' multi-level perspective (MLP) operationalises this insight by conceptualising sociotechnical transitions as emerging from interactions across three interconnected levels: Niche level, regime level and landscape level. At the niche level, radical innovations are born and incubated and are supported by eager early adopters. At this level, the niche is protected from market pressures via subsidies, incubator programmes or grants which allows the innovation to survive. The regime level includes the existing systems where the innovation is situated including technological infrastructure, legal frameworks, professional knowledges, and established user habits. At this level, there is tendency of resistance by existing actors where existing sociotechnical arrangements are defended (Geels, 2014). For instance, in Global South energy contexts, this resistance may manifest in fossil

fuel subsidies maintained through political connections, technical standards written to favour incumbent technologies, and slowed regulatory approvals of new technologies. These barriers reflect accumulated power distributions, cultural norms around energy consumption, and institutional relationships developed over decades. The landscape level refers to macro factors which the niche or regime actors have no control over

such as climate change, cultural values, demographic changes, and geopolitical environment (Geels, 2014; Schot & Geels, 2008). Recent research examining clean energy transitions has shown that despite strong potential, progress is constrained by governance failures, coordination gaps, and weak financing systems. Social participation and women-led enterprises have been identified as key enablers across all three MLP levels (Sovacool et al., 2023).

It is worth noting, as Lawhon and Murphy (2012) argued that Geels' MLP framework was developed primarily in advanced industrial economies, and its application to the Global South requires caution: the assumption of relatively stable regime structures may not hold where state capacity is limited, informal markets are extensive, and institutional frameworks remain contested. The framework is however, useful for understanding dynamics of technological adoption so long as its claims are tested against local contextual realities. Indonesia's energy transition illustrates this dynamic: despite the commitment embodied in the Just Energy Transition Partnership (JETP), actual renewable energy installed capacity remains below 1%, with structural barriers including fossil fuel subsidies and bureaucratic inertia persisting as dominant constraints (Nugroho, 2025). Effective policy should therefore subsidy removal, institutional reform, professional retraining, and cultural reframing not technological deployment alone.

2.2 Social Role Theory, Gender and Intersectionality

Social Role Theory holds that socially assigned roles determine who is perceived as a legitimate decision-maker, who interacts with new technologies, and whose needs are prioritised in household and community choices (Eagly, 1987). In many parts of the Global South, energy decisions are deeply gendered: women are the primary managers of household energy use yet remain excluded from policy, financial and technological decision-making Raman et al., 2025). A structural disconnect thus emerges between those who manage day-to-day energy use and those who control decisions about changing it. Gendered constraints on mobility, information access, and formal participation shape user trust and willingness to engage with new technologies which further limit women's capacity to evaluate or advocate for new technologies (Raman et al., 2025). Social Role Theory also reveals the significant role of gendered social positioning when it comes to adoption (Musango & Chicombo, 2025; Clancy & Feenstra, 2019). For instance, as trusted community intermediaries and household energy managers, women’s social network position them favourably to catalyse technology adoption. When women are intentionally included as entrepreneurs, distributors, or community educators, adoption rates rise because they reshape the social meanings, trust networks, and everyday practices surrounding clean energy technologies.

Social Role Theory should be applied with critical self awareness, particularly because it risks positioning gender as the primary axis of social differentiation. This limitation risks blurring the ways in which class, ethnicity, caste, age, geography, disability, and race intersect with gender to produce differentiated adoption experiences. Kimberlé Crenshaw's (1989) intersectionality framework and Patricia Hill Collins' (2000) matrix of domination therefore become necessary: a Quechua woman farmer in rural Peru, a Somali woman living in Kenya’s Dadaab settlement, and a Dalit woman tailor in Maharashtra India occupy structurally distinct social positions that cannot be collapsed into a single category. Interventions designed on the basis of gender alone without attention to how gender is constituted through and by other characteristics of inequality risks reproducing the exclusions they seek to address.

Another limitation is that Social Role Theory operates primarily at the individual and household level. This risks missing the meso-level institutional dynamics such as community organisations, cooperatives, local government, informal market structures, and customary authority that mediate between macro-structural conditions and household-level decisions.

2.3 Moral Economy and the Logic of Community Acceptance

Neither the MLP nor Social Role Theory adequately addresses what we identify as the meso-level governance of adoption. This includes the community-level factors of fairness, legitimacy, and reciprocity that determine whether external interventions are accepted, accommodated, or collectively resisted. Moral economy frameworks provide the analytical clarity for this dimension. E.P. Thompson's (1971) study of the English crowd showed that popular resistance to market forces was organised by shared norms about fair distribution

and legitimate authority. Markets are always embedded in moral frameworks and when those frameworks are violated, collective resistance follows. James Scott (1976) extended this insight to the agrarian Global South, showing that communities evaluate external interventions including development programmes according to moral criteria of risk, reciprocity, and perceived equity.

Applied to clean energy adoption, moral economy frameworks illuminate why communities may resist technologies that are technically superior and economically rational by conventional measures. This may happen if those technologies are introduced in ways that violate community norms about consultation, fairness, and equitable benefit-sharing. They equally illuminate why technologies introduced through trusted local actors, with transparent benefit distribution and demonstrated reciprocity, achieve higher and more sustained adoption.

The moral economy framework also raises a critical analytical question that runs through this entire article: to what extent do commercially mediated clean energy interventions satisfy or violate community moral economy logics? Enterprises that leverage existing social trust and community networks to achieve commercial objectives without making commensurate contributions to those communities' risk what Polanyi (1944) refers as market encroachment. This occurs when social relationships and obligations are converted into commercial transactions. The result is the erosion of the very social functions that make those relationships valuable.

Together, these three frameworks constitute a multi-dimensional analytical toolkit. The MLP attends to macro-structural conditions and regime dynamics. Social Role Theory, supplemented by intersectionality, illuminates the differentiated realities of household and individual decision-making. Moral economy frameworks address the meso-level community logics of fairness and legitimacy that mediate between macro structures and micro decisions.

2.4 Integrating the Frameworks: A Unified Conceptual Model

Each framework, used alone, explains part of the adoption problem but not the whole. The MLP explains whether a technology is available, affordable and institutionally supported, but says little about who within a household or community takes it up. Social Role Theory and intersectionality explain who decides and who adopts, but not why whole communities accept or reject an intervention. Moral economy explains collective acceptance or resistance, but not the structural conditions that bring a technology to market in the first place. The three are therefore complementary rather than competing: each answers a different question at a different level, and each covers a blind spot of the others.

We bring them together in a single model in which adoption is the outcome of three linked filters (Table 1). At the macro level, regime and landscape conditions set the opportunity filter: which technologies reach a market, at what price and with what institutional support. At the meso level, community moral economies act as a legitimacy filter: a technology that enters the market is accepted, accommodated or resisted depending on whether its introduction is judged fair, reciprocal and properly consulted. At the micro level, social roles and intersecting inequalities act as an agency filter: within households that find an intervention legitimate, gendered divisions of labour and decision-making shape who purchases, who uses and whether use is sustained.

The model is not simply additive; its explanatory value lies in the interactions between levels. We state these as three propositions that organise the analysis in Section 3. Proposition 1 (macro–micro): regime-level

conditions such as financing models translate into adoption only when they align with intra-household roles; where the purchaser and the primary user are different people, affordability alone does not secure sustained use (Section 3.1). Proposition 2 (micro–meso): actors whose social roles give them standing in trusted networks, often women, can confer community legitimacy on a technology, so that role-based agency becomes a route to meso-level acceptance (Sections 3.1–3.3). Proposition 3 (meso–macro): interventions that draw on community trust without reciprocity can provoke moral economy resistance that stalls niche technologies before they reach the regime level, whereas reciprocal models help build the protected spaces from which niches scale (Sections 3.3–3.4). Taken together, the model predicts that adoption will be highest and most durable where all three filters are aligned, and that failure at any one level can undermine success at the other two.

Table 1: Integrated conceptual model of clean energy adoption

Level	Framework	Core question	Mechanisms	Illustrative evidence in this article
Macro (opportunity filter)	Sociotechnical Systems Theory / MLP	Is the technology available, affordable and institutionally supported?	Niche protection; regime resistance (subsidies, standards, approvals); landscape pressures	Indonesia JETP (Nugroho, 2025); South African solar inequality (Venter et al., 2025)
Meso (legitimacy filter)	Moral economy	Is the intervention judged fair, reciprocal and legitimate by the community?	Consultation, benefit-sharing and trusted intermediaries; resistance where norms are violated	Biogas in Southern Ethiopia (Sherka et al., 2024); ACE direct service model (African Clean Energy, 2023)
Micro (agency filter)	Social Role Theory and intersectionality	Who decides, who uses and who benefits within the household?	Gendered divisions of labour and decision-making, shaped by class, age, disability and displacement	Solar Sister entrepreneurs (Samantarai & Dutta, 2023); BURN mixed-gender sales teams

3. SOCIAL DYNAMICS SHAPING CLEAN ENERGY ADOPTION

3.1 Gendered Dynamics and Intersecting Inequalities

Gender dynamics shape clean energy adoption through a structural disconnect that Social Role Theory makes visible: men are positioned as financial decision-makers while women manage household energy use, yet women bear the primary costs of energy poverty. Despite the behavioural pattern captured by this assertion, household configurations vary across and within regions, and the intersection of gender with class, ethnicity, disability, and household composition produces significantly different adoption experiences. A female-headed household in rural Nepal occupies a structurally different position than a dual-income household in peri-urban Nigeria, even if both are captured by the category 'women's energy access.'

Women-led distribution models illustrate the transformative potential of gender-responsive approaches. For instance, Solar Sister's model in sub-Saharan Africa demonstrates how women entrepreneurs leverage existing social ties, household relationships, and community credibility. They use these to introduce and normalise clean energy products in ways that male-dominated distribution channels have consistently failed to replicate (Samantarai & Dutta, 2023). The Solar Sister model provides a start-up kit of cookstoves and solar lights and training with which the women can use to demonstrate use of cookstove to other women and to negotiate its value based on shared daily experiences. This is unlike models where salespersons who are not well known by users of cookstoves make attempts to broker adoption. Women's social networks translate technologies into culturally fluent narratives, provide after-sales peer support, and reduce perceived risk, all of which are critical factors for sustained adoption.

A recent meta-analysis corroborates this evidence, finding that women's involvement in clean energy distribution increases adoption by approximately eight percent (Tornel-Vázquez et al., 2024). This effect is attributable to women's role and social positioning as facilitators of trust, information, and behavioural change. Although this 8% figure is suggestive, a more socially nuanced reading acknowledges the substantially different institutional, cultural, and geographic contexts which shape such evidence. What this meta-analysis more reliably supports is a qualitative claim: that the mechanism through which women's involvement matters is social and relational. This distinction has direct implications for programme design: it is not enough to increase numbers of women participating but the design must create the conditions under which women's social roles translate into sustained adoption. Such condition may include peer-led distribution networks or public recognition of women as role models to legitimise their participation in adoption networks.

Like Solar Sister, BURN Manufacturing has adopted a door-to-door sales model recognizing that those intra-household dynamics are determined by broader social norms governing household access, interactions with outsiders and gendered expectations of behaviour beyond purchase and adoption. Those social norms introduce both practical and symbolic barriers to engagement, while simultaneously raising safety considerations for both agents and household members (e.g. a male agent entering a household where only a female is present or a female agent entering a household where only a male is present). To navigate those constraints, BURN deploys a primarily male-female teams (duos) to reduce social friction associated with household entry and interaction, and to enable simultaneous engagement with both domains (men and women) of influence within the households. Based on prevailing cultural norms, female agents are better positioned to engage primary users on questions of usability, cooking practices and day-to-day benefits, while male agents could more effectively engage with the financial decision-makers on issues of cost, legitimacy and approval. The outcome is a more effective translation of the technology across social boundaries within the household, resulting in higher initial acceptance, improved communication across user and decision-maker roles, and reduced norm-based resistance.

In addition to male-female duos deployment, BURN recognizes that in the context of the popular pay-as-you-go (PAYGO) financing models continued payment is dependent on perceived value based on use. The role distinction of men as decision makers on financial matters (including repayments) and women responsible for cooking is critical because non-use or partial use can undermine repayments and vice versa. Limited use directly threatens both user outcomes and business model viability. To tackle this gender dynamics around purchasing authority and usage authority, BURN pivoted towards a women-centred sales strategy in an effort to realign adoption dynamics by targeting those actors who have the greatest influence on everyday use. This strategy engages directly with the lived experience of the primary user, by tailoring sales messages to emphasize convenience, time savings and cost efficiency. This approach creates internal advocacy within the household, whereby women actively promote the technology adoption during intra-household decision-making processes. Purchasing and adoption therefore become negotiated outcomes, rather than top-down impositions. Bringing women into the conversation at a sales point result in a higher likelihood of adoption as the primary user becomes the primary advocate for the technology in cases where financial contributions are either shared or externally controlled.

African Clean Energy (ACE) offers a concrete multi-market illustration of these dynamics. In Lesotho, 84% of ACE's customers are women, a demographic pattern that reflects a deliberate product design: the ACE stove reduces firewood-gathering time by 50–70%, directly alleviating the gendered labour burden that Social Role Theory identifies as a primary adoption barrier (African Clean Energy, 2023). ACE further reinforces gender-responsive enterprise structure through a workforce policy requiring a 50% gender split and 20% employment for people with disabilities, embedding equity as an operational commitment (GET.invest, 2022).

3.2 Networks, Peer Influence and Social-Technical Mediation

Adoption decisions and sustained utilisation practices are strongly shaped by social networks. Research on clean cooking fuel adoption in rural India demonstrates that gendered social networks significantly influence whether households transition to cleaner energy systems (Kumar et al., 2017). Word-of-mouth among women functions as a primary persuasive mechanism, though negative peer experiences can equally suppress adoption

within communities (Thakur et al., 2019). Studies of solar-charged electric moped (scooters) adoption in Pakistan further demonstrate that perceived social expectations of peers rank alongside attitude and perceived behavioural control as significant predictors of adoption intention (Baig et al., 2025). These findings have a direct commercial implication that is still underappreciated in enterprise strategy: the geography and velocity of market expansion are determined by the social networks through which information, trust, and norms circulate. Enterprises whose expansion strategies are aligned with community participation and peer influence outperform those relying on conventional market penetration approaches (Ko & Liu, 2024). Combining socially aligned expansion approaches with price and product quality produces significant penetration outcomes.

Similar pattern is noted in in East Africa's BURN manufacturing case where electric induction stoves do not constitute a "plug-and-play" intervention. Noting that adopting electric cooking requires alignment with cooking practices, trust in electricity reliability, and trust in cost-savings claims, BURN introduced a cluster-based agent deployment model. In this model local actors are recruited for sales and distribution and concentrate their activities geographically. This model allows the sales and distribution to become embedded within existing social networks, thus shifting the role of the agent from that of a 'transactional salesperson' to the role of a locally accountable intermediary and a social-technical mediator, that can support with long term adoption.

ACE's User Recommendation Bonus (URB) model, piloted in the Kyangwali refugee settlement in Uganda, provides a further illustration of peer influence formalised as commercial infrastructure (African Clean Energy, 2021). Under the URB scheme, every successful customer referral reduced the referrer's outstanding loan repayment by one month, converting existing social trust into a measurable commercial incentive. ACE additionally recruited refugees as local sales representatives, extending the model so that community members become both nodes in the trust network and participants in the enterprise's distribution capacity (African Clean Energy, 2021).

3.3 Cultural Trust and Moral Economy

Cultural values, institutional trust, and community identity constitute additional critical determinants of adoption outcomes. Communities evaluate clean energy interventions not only according to economic or technical criteria but according to implicit standards of fairness, reciprocity, and legitimate authority. Where those standards are met, adoption is facilitated; where they are violated, resistance follows (Nurudeen, 2025; Akil et al., 2025; Sovacool, B.K.et al., 2023). Conversely, technologies introduced through trusted local actors, and whose benefits are perceived as equitably distributed, achieve significantly higher and more sustained adoption rates (Akil et al., 2025; Raman et al., 2025). This dynamic has been observed in varied contexts, particularly in sub-Saharan Africa. For instance, Solar Sister's success relative to conventional distribution models can be attributed in significant part to the cultural embeddedness of its entrepreneur network (Samantarai & Dutta, 2024). Similarly, biogas adoption decisions in Southern Ethiopia were substantially shaped by community perceptions of fairness and social meaning alongside economic considerations (Sherka et al., 2024). We argue that building community trust should be a prerequisite to technology deployment because it is a core strategic variable that must be earned through sustained relational engagement not imposed through marketing.

ACE's operational model enacts this principle through two structural choices. First, ACE eliminates intermediaries entirely, with the same organisation managing sales, maintenance, and customer support, a configuration that removes the trust deficit that arises when customers must navigate unfamiliar third parties. Second, the ACE Connect App enables named, real-time communication between each customer and ACE's service team, replacing anonymous transactional relationships with accountable ones. In its 2022 Social Impact Report, one customer noted that using the ACE one stove "has increased her joy in spending time in the kitchen" a wellbeing signal that reflects both product performance and relational confidence in the enterprise (African Clean Energy, 2023). These design choices demonstrate that cultural trust is built through operational structure, not communications strategy alone.

The moral economy framework also cautions against an instrumentalised view of community engagement. Building trust to lower customer acquisition costs is structurally different from building genuine community accountability into enterprise governance. The former may satisfy short-term commercial objectives while exhausting the social goodwill it draws upon; the latter creates the conditions for sustained adoption and genuine value redistribution. The practical distinction lies in whether community members have meaningful authority in enterprise decision-making and whether the benefits of enterprise success flow back to the communities that made them possible.

3.4 Socioeconomic Inequality and Limits of Enterprise Strategy

Socioeconomic conditions shape the geography of clean energy adoption in ways that simultaneously reflect and reinforce existing structural privilege and disadvantage. In South Africa's high-income areas, high adoption rates approaching two panels per household were recorded, while adoption was near-zero in areas at or below the poverty line. Solar adoption was 73 times higher in majority-white census tracts compared to those with majority previously disadvantaged populations (Venter et al., 2025). This adoption pattern reveals how historical inequities are reproduced, and in some respects deepened through energy transitions that present themselves as universally beneficial. For commercial enterprises and development programs, this fragmentation should be viewed as both social concern and a commercial constraint. Success in high-income zones does not tell the whole story behind adoption given the structural advantages those zones already enjoy.

Marketing and outreach strategies that serve only high-income segments therefore forgo the untapped majority of potential customers in low and middle-income communities. Affordability is thus a structural dimension of market design and therefore enterprises that integrate financial inclusion mechanisms such as pay-as-you-go (PAYG) models, microfinance, mobile banking into their core offerings address this constraint while expanding addressable markets and reaching populations that are already marginalised (Chukwuma-Eke et al., 2024; Chukwuma-Eke et al., 2025). While acknowledging that financial inclusion or incentives can drive commercial strategy or development intervention, there is a risk of simplifying a structural problem. The question of why clean energy markets are so unequal in the first place and who bears the cost of that inequality cannot be fully resolved using enterprise level strategies such as financial inclusion. It requires policy responses that the commercial enterprise logic alone cannot produce.

ACE’s financing model illustrates both the potential and the limits of enterprise-level responses to this structural problem. ACE makes it’s ACE One stove available through a 6 - 18-month interest-free PAYG micro-loan scheme, designed so that customers pay for the stove using the energy cost savings it generates, reported at up to 83% compared to charcoal and paraffin. ACE’s 2022 Social Impact Report documents that 59% of customers reported no longer needing to allocate household funds for energy, signalling tangible financial relief for low-income households (African Clean Energy, 2023). Notably, for many customers the scheme represents their first experience with formal credit, creating a credit history that extends beyond the ACE One transaction. This bundling of energy access with financial inclusion directly addresses the structural barrier identified above.

At the same time, ACE’s model does not resolve the deeper question of why markets remain structurally unequal: it mitigates affordability constraints for those it reaches, but its geographic footprint i.e. Lesotho, Uganda, Kenya, and Cambodia is determined in part by the same infrastructure and institutional conditions that produce market fragmentation in the first place (African Clean Energy, 2022). Enterprise-level financial inclusion is therefore a necessary but insufficient response to the inequality documented in this section. Rather, structural inequality that inhibits clean energy adoption may be more appropriately addressed through contextual financial inclusion efforts. Community-led financial and mutual aid ecosystems such as Rotating Savings and Credit Associations (RoSCAs) and self-help groups (SHGs) in the Global South are one possibility. Instead of focusing solely on individual finance, EMujer leverages women’s existing social networks to build community buy-in and manage the maintenance of solar systems in Peru (Global Energy Alliance for People and Planet, 2025). In Cameroon, participation in RoSCAs was found to positively influence both initial adoption and sustained use of clean cooking energy by lowering household liquidity constraints (Mounmemi & Kouandou, 2026). In Peru, EMujer leverages women's existing social networks to

build community buy-in and manage solar system maintenance, demonstrating the potential of community-centred approaches as complements to enterprise-level financing (Global Energy Alliance for People and Planet, 2025).

These examples demonstrate the potential of community-centered approaches in facilitating low-income households' transition to clean energy, as an alternative or complementary mechanism to enterprise-level financing models. However, RoSCAs and SHGs function through existing social capital and where households are extremely poor or socially fragmented, those networks maybe overburdened. The question of who bears the cost of structural inequality, and who is responsible for addressing its root causes, cannot be answered by community finance mechanisms alone. This is a fundamentally a macro-level question that requires policy recommendations which we propose in Section 6.

4. STRATEGIC IMPLICATIONS

4.1 Implications for Commercial Enterprises

The social dynamics highlighted in Section 3 have direct and concrete implications for commercial strategy. The evidence reviewed suggests that enterprises which treat social dynamics as strategic levers, rather than only as risks to be mitigated, are better placed to secure adoption and sustained use, although comparative

performance data remain limited (Section 3.5). Four strategic insights emerge from the evidence: First, business models that integrate commercial sustainability with social impact appear to support stronger market penetration and resilience (Ko & Liu, 2024), although the case evidence demonstrates the mechanism rather than a tested comparative advantage. This integration necessitates the business to use models that reduce inequality, improve trust, utilise networks and peer influence, and consider economic status. For instance, integration of PAYG financing, community benefit-sharing, and complementary service revenue streams allows enterprises to serve low-income markets profitably while building the trust and loyalty that drive adoption as well as sustained utilisation of innovations (Prado et al., 2022; Battilana & Lee, 2014).

Second, gender-centred business design functions as a facilitator of product adoption and consequently a commercial multiplier. Involving women across the value chain from product design and distribution to after-sales service expands market reach, creates more resilient supply chains, and builds the peer networks through which adoption spreads. This effect reflects women's structural positioning as trusted community intermediaries and members of socially influential networks (Ti & Khanna, 2025).

Third, community engagement is a core organisational capability that needs deliberate and strategic investment and should not be viewed as a simple communications function. Enterprises that establish community advisory structures, conduct participatory needs assessments, and engage community members in product design achieve significantly better cultural fit and customer retention (Bocken & Geradts, 2019; Willys et al., 2025). Measuring and communicating both financial and social returns strengthens investor relationships and competitive differentiation (Emerson, 2003) These positive outcomes: customer retention, cultural alignment, informed customers, and customer centred design lead to better adoption and sustain utilisation of products such as clean energy technologies.

Fourth, cross-sector partnership is a prerequisite for scaling clean energy adoption. Operating in a context of structural inequality, regulatory complexity, and limited public infrastructure needs multi-stakeholder collaboration. Linking enterprises with government, civil society, financial institutions, and industry associations enables policy alignment, shared infrastructure, and the mobilisation of blended capital (Otokiti et al., 2024).

Table 3 below provides illustrative recommendations based on the with a set of strategic insights. The five strategic insights are framed not only as commercial recommendations but as analyses of the conditions under which commercial strategy can be both effective and equitable. Each insight is accompanied by an identification of the structural tension it carries and the design choices through which that tension can be managed.

Table 2: Strategic Insights and Recommendations for Commercial Enterprises

Strategic Insight / Rationale	**Structural Tension**	**Recommended Actions**
1. Gender-centred design as commercial multiplier	*Mobilising women's social capital without investing in women's economic advancement depletes the social asset being leveraged and reproduces extractive dynamics.*	• Create explicit, fairly compensated roles for women as distributors, technicians, agents
Women's structural positioning as trusted community intermediaries makes gender-responsive design a commercial multiplier. Adoption rates, customer retention, and peer referral all improve when women are active across the value chain (Tornel-Vázquez et al., 2024; Musango & Chicombo, 2025).		• Invest in training, financial literacy, and leadership pathways
		• Ensure revenue-sharing is equitable not merely participatory
		• Design for intersecting constraints: geography, disability, household configuration
2. Social networks as market infrastructure	*Formalising community relationships into commercial incentive structures risks substituting transactional for relational logic, eroding the trust that generates value.*	• Design cluster-based deployment models embedded in existing networks
Adoption spreads through social networks. Commercial scale depends on aligning expansion strategy with the peer structures through which trust and norms circulate, not only on price or product quality (Ko & Liu, 2024; Baig et al., 2025).		• Build long-term agent relationships with accountability to communities
		• Formalise peer referral with fair and transparent incentive structures
		• Contribute to not only draw from the networks being leveraged
3. Cultural trust as core operational capability	*Superficial consultation that does not translate into product adaptation, equitable governance, or genuine benefit*	• Establish community advisory structures with substantive (not consultative) authority
Cultural trust is built through operational		• Pilot products with

structure and demonstrated reciprocity, not through marketing. Enterprises whose model embeds accountability achieve higher and more sustained adoption (Akil et al., 2025; African Clean Energy, 2023).	*redistribution produces backlash and erodes legitimacy.*	end-users before scale-up
		• Embed human rights due diligence into operations
		• Implement community benefit-sharing mechanisms
		• Establish community advisory boards and conduct participatory needs assessments
4. Socioeconomic inequality and market fragmentation		• Integrate microfinance and mobile banking; align PAYG schedules with irregular income cycles
Affordability is a structural design constraint, not a post-design adjustment. Enterprises that ignore inequality forfeit the majority of the addressable market.		• Use digital payment platforms to reduce transaction costs for low-income customers
		• Design tiered and cross-subsidised pricing models to serve multiple income segments
		• Track financial and social metrics simultaneously using community-defined indicators
		• Disaggregate data by gender, income, and geography to monitor equity outcomes
5. Cross-Sector partnership as structural prerequisite	*Partnerships with government or donors may constrain enterprise independence, tie commercial strategy to donor cycles, or create perverse incentives incompatible with community benefit.*	• Partner with government for regulatory support and shared infrastructure
Structural inequality and regulatory complexity exceed individual enterprise capacity. Cross-sector collaboration enables policy alignment, shared infrastructure, and blended capital mobilisation necessary for equitable scale		• Collaborate with NGOs for community engagement, not just outreach

(Otokiti et al., 2024).		
		• Build industry coalitions for shared standards and collective market development
		• Structure blended capital to protect commercial independence
		• Conduct regular social impact assessments to strengthen investor relationships

4.2 Programmatic Recommendations

Programmatic interventions must be designed within the lived realities of communities, where adoption is influenced by social networks, gendered roles, economic status and culturally embedded practices. Programmatic interventions can and should do things that commercial enterprises, operating under competitive pressures cannot. First, programmes can invest in ecosystem infrastructure such as shared services, learning networks, peer exchange systems whose benefits are widely-shared and long-term. Second, programmes can target the most structurally marginalised communities that commercial models cannot reach profitably at scale. This includes communities where the intersection of poverty, geographic remoteness, ethnic marginalisation, conflict and displacement compounds the adoption barrier. Third, programmes can build community-level capacities such as financial literacy, digital skills, participatory impact measurement. These capacities enable communities to engage with enterprise and policy actors on more equal terms.

On the other hand, programmatic design should ensure community consultations with corresponding responsiveness not top-down engagement that are not responsive. For example, training women entrepreneurs without addressing the structural constraints that limit market access; or deploying digital tools without ensuring the literacy required to use them, risk instrumentalising participation without transforming power. The programmatic design should be aware of exit effects in cases where programmes build community trust then withdraw at the end of a funding cycle. This can leave communities more exposed than before, having raised expectations and disrupted existing coping arrangements without creating the institutional conditions for their sustained fulfilment. Moral economy analysis suggests that such exits are experienced as betrayals of the reciprocity that adoption was reliant upon.

The programmatic recommendations presented in Table 3 proposes targeted capacity-building, inclusive financing mechanisms, sustainability planning, integrated planning and community-centred support structures designed to strengthen local agency and enable socially grounded pathways to clean energy adoption.

Table 3: Programmatic Recommendations

Recommendation / Rationale and Design Principles	**Key Actions**
1. Social enterprise ecosystem hubs	• Shared workspace, equipment, advisory services
Individual entrepreneurs face structural barriers limited networks, capital, technical support that collective infrastructure addresses. Ecosystem support increases enterprise survival and builds sector-wide trust (Otokiti et al., 2024). Priority must be given to underserved regions and intersectionally marginalised people	• Connection to investors, policymakers, technical partners

	• Explicit priority criteria: geographic, intersectional
	• Rural satellite offices to reduce geographic access barriers
	• Exit planning built into hub design from inception
2. Intersectionally targeted capacity-building	• Financial literacy tailored to irregular incomes and informal markets
Generic training reproduces exclusion by failing to address the compounding constraints that arise from intersecting inequalities. Programmes must disaggregate target populations and design differentiated support. Assessment of intersecting barriers should precede training design (Nguyen et al., 2025; Malakar, 2018).	• Digital skills for mobile banking, e-commerce, analytics
	• Community-based monitoring using low-literacy social impact tools
	• Peer cohort structures that leverage and strengthen existing networks
	• • Family and community engagement strategies that address norm-based resistance
3. Community-centred financing with sustainability planning	• Support and formalise RoSCA and SHG networks for clean energy finance
Enterprise PAYG and microfinance reach those with sufficient social stability to engage formal credit. Community-based mutual finance reaches further into structural poverty, but requires programmatic support and explicit sustainability planning. Exit risk is acute: programmes must build institutional resilience before withdrawal (Mounmemi & Kouandou, 2026).	• Design blended structures combining community and formal capital
	• Technical assistance for community finance groups on impact measurement
	• Explicit exit planning: institutional sustainability before programme withdrawal
4. South-South knowledge exchange prioritising counter-evidence	• Regional practitioner networks with dedicated facilitation
The evidence base on clean energy adoption is fragmented and skewed toward positive outcomes. South-South exchange is most valuable when it includes honest accounts of failure, underperformance, and unintended consequences not only showcase cases. Publication bias in the current literature must be actively countered (Sovacool et al., 2019).	• Case studies produced with communities, not only about them
	• Explicit inclusion of failure cases and unintended consequence documentation
	• Online platforms for real-time peer problem-solving

3. *Innovative Financing Mechanisms*	• Impact Investment Funds: flexible terms with embedded technical assistance
Lack of patient, affordable capital is the primary constraint for clean-energy enterprises. Diverse financing instruments reduce risk and expand inclusion (Otokiti et al., 2024).	• Blended Finance: first-loss capital and risk-sharing structures
	• Microfinance and Community Finance: group lending and mobile-enabled microloans
	• Social Impact Bonds: outcomes-based financing tied to measurable social results
5. Integrated sectoral programming	• Agriculture: solar irrigation and processing with women farmers
Clean energy access amplifies outcomes across agriculture, health, education, and financial inclusion. Programmatic integration leverages clean energy as a systems intervention. Integration must be designed around community priorities	• Health: energy access for clinics; health worker training
	• Education: solar for schools; vocational clean energy pathways
	• Finance: integrate clean energy credit into community microfinance platforms

6. POLICY RECOMMENDATIONS

Clean energy adoption depends not only on the availability of technologies but on the broader systems social, institutional, financial, and cultural into which those technologies are introduced. The MLP reveals that effective policy must simultaneously support niche innovation, delegitimise incumbent regime arrangements, and mobilise landscape-level pressures toward sustainability. Social Role Theory and moral economy frameworks further underscore that equitable transitions require policies that address gendered and intersecting inequalities structurally and that satisfy community moral economy standards of fairness, consultation, and benefit-sharing.

Current policy frameworks in many Global South contexts suffer three forms of misalignment. First, is vertical misalignment referring to national climate targets that are established without corresponding local implementation capacity, creating an 'ambition gap' in which policy commitment at the top produces little change at the bottom. Second is distributional misalignment where financial mechanisms are designed without attention to who bears the cost of transition, systematically disadvantaging the communities most affected by energy poverty. Third, is institutional misalignment where gender-responsive, informed consent and community participation are written into policy without adequate implementation mechanisms, funding, or enforcement functioning as rhetorical commitment rather than operational constraint each of these misalignments. The recommendations in Table 4 below address each of these misalignments through policy reforms.

Table 4: Policy Recommendations

Recommendation - What Only Policy Can Do	Key Actions
1. Gender-responsive and intersectionally aware energy policy	• Mandate ≥40% gender participation in national energy

	strategies binding, not advisory
Only the state can set binding (not aspirational) gender targets, fund implementation mechanisms, mandate disaggregated data collection, and require gender impact assessments as conditions of approval. No enterprise or programme can compel government agencies to collect intersectionally disaggregated data across income, ethnicity, disability, and geography (Mweha, 2025; Raman et al., 2025).	• Create dedicated financing windows for women-led enterprises
	• Require gender and intersectionality impact assessments in renewable energy approvals
	• Mandate disaggregated data collection across gender, income, ethnicity, geography
2. Financial inclusion as energy infrastructure policy	• Enable PAYG and mobile money through proportionate, pro-poor regulatory reform
Regulatory reform, government guarantee schemes, and tax incentives are instruments unavailable to enterprises and programmes. Only policy can create the regulatory environment in which PAYG, mobile money, and community finance can operate legally, at scale, and equitably and can actively redirect fossil fuel subsidy savings into clean energy financing (Chukwuma-Eke et al., 2025).	• Establish government guarantee schemes for clean energy lending to low-income households
	• Create legal pathways for cooperative and community-based financing instruments
	• Provide tax incentives for impact investment and blended finance structures
3. Consent, community participation mandates, and genuine accountability	• Mandate FPIC in domestic law for all large-scale renewable energy projects
Only the state can make Free, Prior and Informed Consent legally binding, create grievance mechanisms with genuine enforcement capacity, and require community representation with meaningful authority in project governance (Chavula et al., 2025). Moral economy analysis establishes that FPIC, properly implemented, is not a constraint on development but a structural precondition for the community trust that makes adoption sustainable.	• Require community representation with genuine decision-making authority on project boards
	• Implement social impact assessments using community-defined indicators
	• Fund independent grievance mechanisms

	with community oversight
4. Skills development and digital literacy as public infrastructure	• Integrate digital and technical energy skills into national education curricula
National curricula, extension services, and community learning infrastructure require sustained public investment that no enterprise or programme can provide. Skills gaps particularly at the intersection of gender, poverty, and geography reproduce structural inequality across generations. Public investment in skills is a prerequisite for communities to participate in clean energy markets as agents rather than recipients (Ibodullayeva, 2024).	• Establish community digital literacy centres in structurally underserved areas
	• Create apprenticeship programmes linking youth to clean energy enterprises
	• Fund extension services providing ongoing technical and business support
5. Regime destabilisation: Fossil fuel subsidy reform	• Develop time-bound fossil fuel subsidy phase-out plans with social protection provisions
The MLP establishes that niche innovations cannot achieve transition at scale without active regime destabilisation. Fossil fuel subsidy reform the most consequential single lever for clean energy transition is a political act that only governments can undertake. Its absence, as the Indonesia case demonstrates, is the primary structural constraint on transition (Nugroho, 2025). Social protection provisions must accompany reform to satisfy moral economy standards of distributional fairness.	• Redirect subsidy savings into clean energy financing and community equity funds
	• Establish regional coalitions for coordinated subsidy reform to reduce competitive pressure
	• Create regulatory sandboxes for innovative clean energy models and community finance

7. CONCLUSION

This article has argued that clean energy adoption in the Global South is fundamentally shaped by social dynamics: gendered and intersecting power relations, community trust, peer networks, community moral economies and structural inequality. It has argued that effective responses require enterprises, programmes, and policymakers to treat these dynamics as constitutive of strategy and operations.

The path to equitable clean energy access is not primarily constrained by technology or capital but by business models insufficiently adapted to local social contexts, policies that fail to recognise social dynamics as core strategy, and inadequate investment in community-centred solutions. Scaling proven models requires

coordinated action across three domains. Governments must create enabling environments through gender-responsive policy frameworks, financial inclusion infrastructure, and community participation mandates. Enterprises must move beyond treating social dynamics as constraints and recognise them as the primary terrain on which competitive advantage is won or lost. Development partners must invest in ecosystem support hubs, networks, financing facilities, and technical assistance that enables emerging entrepreneurs to survive and scale.

The sociotechnical Systems Theory, Social Role Theory, and moral economy frameworks, the article has developed a multi-scalar analytical approach that attends simultaneously to macro-structural regime conditions, meso-level community logics of fairness and legitimacy, and micro-level household dynamics. The relationship between commercial incentive and social equity is not inherently harmonious: enterprises that successfully monetise trust networks may, in some contexts, extract value from communities rather than redistribute it. This is not an argument against market-based approaches but a demand for analytical precision about when, under what conditions, and for whom they work. The three-level differentiation of recommendations structured around what enterprises, programmes, and policies can uniquely contribute represents an attempt to move beyond the bundling of intervention levels that weakens much current policy and practice guidance. Cross-sector collaboration is essential, but its effectiveness depends on each actor doing what they are uniquely positioned to do. Enterprises must build community-embedded, gender-responsive, intersectionally aware business models with genuine reciprocity. Programmes must invest in ecosystem infrastructure, target the most structurally marginalised. Governments must create the structural conditions through subsidy reform, financial regulation, community participation mandates, and skills investment that neither enterprises nor programmes can produce.

Important questions remain open and require an empirical study beyond the scope of this analysis. We need longitudinal research to understand how community trust evolves as enterprises scale, since it is unclear whether trust established in early engagements is sustained, eroded, or reshaped under commercial pressure. Further intersectional research is also essential to illuminate how class, ethnicity, disability, and displacement interact with gender to shape adoption pathways.

REFERENCES

1. African Clean Energy. (2021). PROSPERS presentation: Promoting solar powered energy efficient stoves in Kyangwali refugee settlement. Retrieved April 8, 2026, from
2. https://energypedia.info/images/1/17/PROSPERS_Presentation_Webinar_Cooking_Energy_in_Displacement_Settings.pdf
3. African Clean Energy. (2022). Operations. Retrieved April 8, 2026, from https://africancleanenergy.com/operations/
4. African Clean Energy. (2023). ACE Social Impact Report 2022. Available at: https://africancleanenergy.com/wp-content/uploads/2023/11/ACE-Social-Impact-Report-2022-3_compressed.pdf (accessed 8 April 2026). Archived at: https://web.archive.org/web/20240222063345/
5. Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of Business Research, 104, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039
6. Sovacool, B. K. et al. (2023). Social innovation supports inclusive and accelerated energy transitions with appropriate governance. Communications Earth & Environment, 4(1), 1–11. https://doi.org/10.1038/s43247-023-00952-w
7. Akil, M., Senyapar, H. N.D., & Bayindir, R.. (2025). Culturally driven renewable energy adoption: Cross-regional insights and strategies for inclusive energy transitions', 13th International Conference on Smart Grid (icSmartGrid).
8. Baig, F. et al.. (2025). Behavioural determinants of public intentions to adopt e-mopeds charged by rooftop solar power in Lahore, Pakistan. Transportation Safety and Environment.
9. Battilana, J., & Lee, M.. (2014). Advancing research on hybrid organizing: Insights from the study of social enterprises. Academy of Management Annals, 8(1), 397–441.
10. Bijker, W. E., Hughes, T. P., & Pinch, T. (Eds.), (1987). The social construction of technological systems: New directions in the sociology and history of technology. MIT Press.

11. Bloor, D. (1976). Knowledge and social imagery. Routledge.
12. Bocken, N., & Geradts, T. (2019). Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities. Long Range Planning, 52(6), p. 101950.
13. Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), Handbook of theory and research for the sociology of education. Greenwood, 241–258.
14. Callon, M.. (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), Power, action and belief: A new sociology of knowledge? Routledge, 196–233.
15. Chavula, P. et al. (2025). Promoting a human-rights-centred just energy transition for communities in Zambia's mineral resource areas. Asian Basic and Applied Research Journal.
16. Chukwuma-Eke, E. C. et al. (2024). Promoting financial inclusion through energy financing for underserved communities: A sustainable business model. International Journal of Multidisciplinary Research and Growth Evaluation.
17. Chukwuma-Eke, E. C., Ogunsola, O. Y., & Isibor, N. J. (2025). Developing financial inclusion strategies through technology and policy to improve energy access for underserved communities. International Journal of Scientific Research in Science Engineering and Technology.
18. Clancy, J., & Feenstra, M. (2019). Women, Gender Equality and the Energy Transition in the EU. Study for the FEMM Committee of the European Parliament, PE 608.867. Publications Office of the European Union, Brussels. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608867/IPOL_STU(2019)608867_EN.pdf (accessed July 2026).
19. Collins, P. H. (2000). Black feminist thought: Knowledge, consciousness, and the politics of empowerment (2nd ed.). Routledge.
20. Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. University of Chicago Legal Forum, 1989(1), 139–167.
21. Eagly, A. H. (1987). Sex differences in social behavior: A social-role interpretation. Lawrence Erlbaum Associates.
22. Emerson, J. (2003). The blended value proposition: Integrating social and financial returns. California Management Review, 45(4), 35–51.
23. Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. Research Policy, 31(8–9), 1257–1274.
24. Geels, F. W. (2004). From sectoral systems of innovation to sociotechnical systems: Insights about dynamics and change from sociology and institutional theory. Research Policy, 33(6–7), 897–920.
25. Geels, F. W. (2014). Regime resistance against low-carbon transitions: Introducing politics and power into the multi-level perspective. Theory, Culture & Society, 31(5), 21–40.
26. GET.invest. (2022). Enabling clean energy access with smart cooking and solar electricity. Retrieved April 8, 2026, from https://www.get-invest.eu/story/enabling-clean-energy-access-with-smart-cooking-and-solar-electricity/
27. Global Energy Alliance for People and Planet. (2025). Achieving universal energy access in Latin America and the Caribbean. Retrieved April 8, 2026, from https://energyalliance.org/wp-content/uploads/2025/03/Universal-Access-Coalition-for-LAC-January-2025-Report.pdf
28. Haigh, N., & Hoffman, A. J. (2012). Hybrid organisations: The next chapter of sustainable business. Organizational Dynamics, 41(2), 126–134.
29. Ibodullayeva, M. (2024). Women's business development in Uzbekistan's digital economy: The role of digital skills and support. American Journal of Economics and Business Management.
30. Jasanoff, S. (Ed.), (2004). States of knowledge: The co-production of science and social order. Routledge.
31. Ko, W., & Liu, G. (2024). Bricolage strategies, stakeholder engagement, and the geographic expansion of social enterprises. Nonprofit and Voluntary Sector Quarterly.
32. Kumar, P. et al. (2017). Adoption and sustained use of cleaner cooking fuels in rural India: A case control study protocol. Archives of Public Health.
33. Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. In: Bijker, W. E., & Law, J. (Eds.), Shaping technology/building society. MIT Press, 225–258.

34. Lawhon, M., & Murphy, J. T.. (2012). Sociotechnical regimes and sustainability transitions: Insights and ambiguities from a technical fix in Kenya's matatu sector. Environment and Planning A, 44(6), 1514–1531.
35. Ling, R. (2004). The mobile connection: The cell phone's impact on society. Morgan Kaufmann.
36. Luhmann, N. (1979). Trust and power. Wiley.
37. Malakar, Y. (2018). Understanding the role of gender in energy access: Evidence from South Asia. Energy Research & Social Science, 40, 194–202.
38. Mounmemi, M., & Kouandou, A.. (2026). Participation in ROSCAs as a driver of the household energy transition in Cameroon. Journal of International Development. Advance online publication. https://doi.org/10.1002/jid.70081
39. Musango, J. K., & Chicombo, A. F.F.. (2025). Facilitating gendered and socially inclusive energy transitions in sub-Saharan Africa. Energy Research & Social Science, 127, 104278. https://doi.org/10.1016/j.erss.2025.104278
40. Mweha, M. (2025). Digital transformation and strategic resilience: A framework for sustainable women entrepreneurship in Zimbabwe's post-COVID economy. International Journal of Research and Innovation in Social Science.
41. Nguyen, T. B. et al. (2025). Mapping the landscape of women entrepreneurs in micro and small enterprises: Trends, themes, and insights. F1000Research.
42. Nugroho, S.. (2025). Indonesia's energy transition under JETP: Policy ambition and structural barriers. Energy for Sustainable Development, 84, 1–12.
43. Nurudeen, O. M. (2025). Social perceptions and behavioral change: Promoting renewable energy adoption in underserved communities in Nigeria. International Journal of Research and Innovation in Social Science.
44. Otokiti, B. et al. (2024). A framework for scaling social entrepreneurship in Nigeria: Strategies for creating sustainable social impact. International Journal of Management and Organizational Research.
45. Palomino-Schalscha, M. (2015). Unsettling the neoliberal commons: Diverse economies and the cultural politics of (not-)commoning. In Community economies in the Global South: Case studies of rotating savings credit associations and economic cooperation. African Minds.
46. Polanyi, K. (1944). The great transformation: The political and economic origins of our time. Beacon Press.
47. Putnam, R. D. (1993). Making democracy work: Civic traditions in modern Italy. Princeton University Press.
48. Prado, A. M., Robinson, J. A., & Shapira, Z. (2022). Serving rural low-income markets through a social entrepreneurship approach: Venture creation and growth. Strategic Entrepreneurship Journal, 16(4), 826–852.
49. Raman, S., Ustenko, O., Leal Filho, W., & Nedungadi, P. (2025). Energy justice and gender: Bridging equity, access, and policy for sustainable development. Discover Sustainability, 6, 558. https://doi.org/10.1007/s43621-025-01375-7
50. Samantarai, M., & Dutta, S. (2023). Katherine Lucey and Solar Sister: Empowering women in sub-Saharan Africa to create clean energy businesses. The CASE Journal.
51. Schot, J., & Geels, F. W. (2008). Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy. Technology Analysis & Strategic Management, 20(5), 537–554.
52. Scott, J. C. (1976). The moral economy of the peasant: Rebellion and subsistence in Southeast Asia. Yale University Press.
53. Scott, J. C. (1985). Weapons of the weak: Everyday forms of peasant resistance. Yale University Press.
54. Scott, J. C. (1998). Seeing like a state: How certain schemes to improve the human condition have failed. Yale University Press.
55. Sherka, T. D., Berta, A., & Abirdew, S. (2024). Biogas utilisation and its socioeconomic implications: Exploring the drivers of energy selection in southern Ethiopia's Gurage zone. International Journal of Energy Sector Management.
56. Sovacool, B. K. et al. (2019). Pluralism and mixed methods in energy research. Nature Energy, 4(12), 1034–1041.

57. Thakur, M., Schayck, C. V., & Boudewijns, E. A. (2019). Improved cookstoves in low-resource settings: A spur to successful implementation strategies', npj Primary Care Respiratory Medicine.
58. Thompson, E. P. (1971). The moral economy of the English crowd in the eighteenth century. Past & Present, 50, 76–136.
59. Ti, J., & Khanna, M. (2025). Innovation and business strategy among women entrepreneurs: A study of socio-economic impact in rural areas. International Journal for Multidisciplinary Research, 7(3). Available at: https://www.ijfmr.com/research-paper.php?id=55501 (Accessed March 2026)
60. Tornel-Vázquez, R., Iglesias, E., & Loureiro, M. L. (2024). Adoption of clean energy cooking technologies in rural households: The role of women. Environment and Development Economics.
61. Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting. Human Relations, 4(1), 3–38.
62. Venter, Z. et al. (2025). Darkening nights and rooftop solar adoption under South Africa's electricity crisis: Geographies of the energy apartheid. Environmental Research: Energy.
63. Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? Energy Policy, 36(2), 497–500.
64. Willys, N. et al. (2025). Mapping the social value creation of renewable energy enterprises in a social open innovation milieu. Kybernetes, 54(4), 2494–2519. https://doi.org/10.1108/K-09-2023-1884