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The Role of High-Income Households and Tourism in Advancing Energy Affordability and Financial Inclusion for Small Islands

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***Abstract*— Energy affordability and financial inclusion remain critical challenges for small island communities, where reliance on imported fossil fuels and high energy costs disproportionately impact low-income households. At the same time, high-income households and the growing tourism sector on these islands hold significant financial capacity to drive equitable energy transitions. This perspective explores the role of high-income stakeholders and tourism operators in promoting energy affordability through retribution mechanisms, adaptive service assets, and flexible organizational models. By leveraging financial resources and investing in clean energy solutions, high-income households and tourism businesses can contribute to a sustainable energy future that benefits all members of the community, bridging the gap between economic growth, energy equity, and environmental sustainability.**

Keywords—energy affordability; financial inclusion; low-income households; retribution mechanisms; small islands

I. INTRODUCTION

Energy affordability and access remain significant challenges for many small islands [1], [2], [3], particularly in countries like Indonesia, where the geographic isolation of these islands often results in high energy costs and limited infrastructure [4]. These islands frequently depend on imported fossil fuels like diesel for electricity generation [5], which is not only costly but also environmentally unsustainable. The lack of affordable, reliable energy disproportionately affects low-income households [6], leaving many without access to clean energy solutions and contributing to energy poverty. At the same time, small islands in Indonesia are seeing rapid growth in tourism [7], [8], [9], [10], [11], a sector that has become a key driver of economic development. High-income households, along with tourism businesses such as hotels, resorts, and restaurants, consume a substantial share of the islands' energy, which puts additional strain on local energy systems. To address these challenges, the principles of Industrial Ecology and Industrial Symbiosis provide a framework for systematic thinking [12]. These approaches encourage companies to integrate environmental sustainability into their supply chains. By adopting these practices, businesses can help mitigate the environmental impact of increased energy consumption and support the development of more sustainable energy solutions on small islands.

In many cases, government energy subsidies have been used to offset high energy costs for vulnerable populations [13], [14]. While these subsidies offer short-term relief, they are often inefficient, unsustainable, and sometimes fail to reach the most vulnerable [15]. There is a growing recognition that more targeted, innovative approaches are needed to bridge the gap between energy affordability, financial inclusion, and long-term sustainability [16]. High-income households and tourism operators are in a unique position to contribute to energy equity through retribution mechanisms that help subsidize the cost of energy for lower-income households. By investing in clean energy technologies such as solar power systems, hybrid energy solutions, and energy storage, these stakeholders can help lower the overall cost of energy while also advancing sustainability goals [17], [18].

Consequentialist theories in behavioral science advocate for satisfying self-interest through policies that utilize choice architecture to encourage rational decision-making [11], [19], [20], [21], [22]. Additionally, adaptive service assets, flexible organizational structures, and collaborative community-based management systems provide a robust evaluation framework. This allows high-income stakeholders to actively engage in and support local energy transitions. Insights from successful models demonstrate how tourism-driven retribution mechanisms can promote financial inclusion on small islands, offering a blueprint for a just transition that benefits all community members. By embedding principles of energy and environmental justice throughout all stages of clean energy technology research and development [23], we can facilitate a more equitable energy transition.

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II. Energy Access in Informal Settlements on Small Islands in Indonesia

In Indonesia, where small island communities are scattered across the archipelago, energy access remains a pressing issue [24], particularly for those living in informal settlements. These communities, often located on remote islands, are marginalized and excluded from formal regulatory and infrastructure frameworks. Lacking secure land tenure and formal recognition, they frequently find themselves disconnected from national electricity grids and clean energy infrastructure. Instead, many residents rely on costly and unsustainable energy sources such as kerosene, firewood, or unauthorized electricity connections [25]. These practices not only perpetuate energy poverty but also expose communities to severe health and safety risks, including respiratory illnesses and fire hazards.

On small islands, geographical isolation, limited infrastructure, and high transportation costs make it difficult to extend conventional energy services. Moreover, informal settlements, such as those found in fishing villages and temporary tourist hubs, are often overlooked in national energy planning efforts. As a result, residents struggle with unreliable or non-existent energy services, impeding their access to basic needs, education, healthcare, and economic opportunities. This perpetuates a cycle of poverty and exclusion, making it critical to integrate these communities into the national energy transition agenda. A just energy transition in Indonesia must consider the unique challenges faced by these informal island communities. Large-scale infrastructure projects, such as national grid expansions [26], [27], often bypass these areas due to high costs and logistical difficulties. Instead, more inclusive and locally adapted approaches are needed, emphasizing decentralized energy solutions that cater to the specific needs of these vulnerable populations.

Decentralized renewable energy systems, particularly off-grid solar power systems [28], [29], hold immense potential for improving energy access in small island settlements. These systems can be tailored to the community's needs, providing sustainable energy for lighting, cooking, refrigeration, and other essential services without relying on expensive grid infrastructure. Off-grid solar energy is particularly well-suited for Indonesia's small islands, which experience abundant sunlight year-round, making it a cost-effective and sustainable solution for isolated communities. Decentralized energy projects also offer opportunities for local job creation and community empowerment [30]. For instance, the installation, maintenance, and management of solar energy systems can create employment opportunities for residents, providing them with valuable skills and promoting local economic development. In some Indonesian fishing villages, such projects have empowered local fishermen to improve their livelihoods by using solar-powered cold storage units to preserve their catch [31], [32], [33], reducing food spoilage and increasing income.

In tourism-dependent small islands, decentralized energy systems can also enhance the resilience of the tourism industry. On islands such as Nusa Penida Island, many informal settlements rely on seasonal tourism as a source of income [34]. By adopting decentralized solar-biomass hybrid [35], these communities can reduce their reliance on diesel generators, which are both costly and harmful to the environment, while ensuring a more reliable energy supply for tourist services. Beyond the technical aspects of energy access, the social dimensions of informal settlements must also be addressed to ensure a successful and just energy transition. Understanding the behavioral patterns, consumption habits, and cultural practices of these communities is critical for designing interventions that are not only effective but also socially acceptable and culturally appropriate. For example, energy use patterns in informal fishing villages often revolve around seasonal cycles and the specific needs of fishing activities, while communities that cater to tourism may have fluctuating energy demand throughout the year. To ensure that energy solutions align with local needs, community engagement must be a central component of energy project design and implementation. Participatory approaches that involve residents in decision-making processes can help build trust and ensure that solutions are responsive to community preferences [21], [36], [37], [38], [39]. For instance, in some informal settlements in Indonesia, community members have been actively involved in the co-design of solar energy systems, choosing system sizes and configurations that best suit their daily energy demands.

III. Adaptive Service in a Just Energy Transition for Energy Affordability and Financial Inclusion on Small Islands

Adaptive service assets refer to energy systems and financial tools that are designed to evolve in response to the changing needs of both consumers and the energy market. In small island communities, these assets could include renewable energy infrastructure, such as solar power systems and wind turbines, which are designed to scale and adjust based on demand and community requirements. For high-income households, assets provide the opportunity to invest in advanced energy technologies like rooftop solar photovoltaic (PV) systems and energy storage solutions [40], [41]. These investments not only benefit individual households by reducing long-term energy costs but also enhance the overall resilience of island energy systems. When high-income households adopt these technologies, it increases the likelihood that energy services can be extended to lower-income residents through mechanisms like energy sharing or grid extensions.

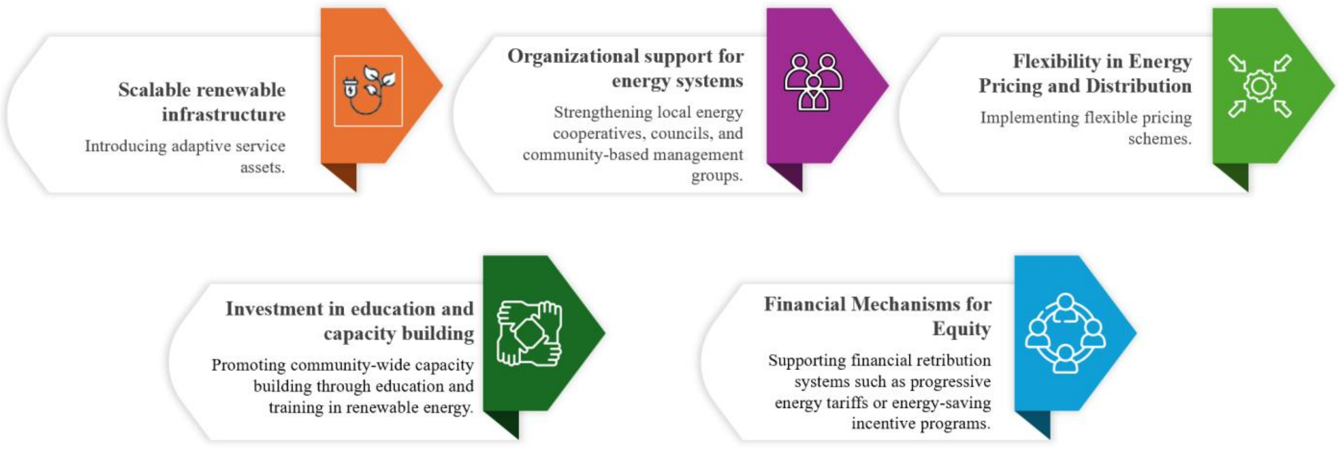

Figure 1. Adaptive service in a just energy transition framework

Flexibility within organizational structures is essential for navigating the complexities of energy transitions on small islands. High-income households, often with greater access to resources, can play a pivotal role in fostering organizational flexibility. By participating in cooperatives, local energy councils, or community-based energy management groups, these households can provide financial and managerial expertise that supports the broader community. Flexibility within these organizations allows for dynamic decision-making, enabling energy systems to adapt to changing financial conditions, technological advancements, and community needs. For example, local energy cooperatives can establish flexible pricing schemes, where high-income households pay a premium for energy access [42], [43], and the surplus funds are reinvested into subsidizing energy costs for low-income families. This kind of cross-subsidization creates a more equitable energy market, where financial retribution is redistributed to ensure affordable access for everyone. In small islands, where centralized energy providers may not be economically viable, flexible organizational structures are particularly important.

The transition to a more just and sustainable energy system requires significant investment in learning and capacity building for all members of society. High-income households, with access to education, training, and financial resources, have the potential to act as early adopters and knowledge leaders in clean energy technologies. Learning is a critical component of fostering a just transition, as it ensures that all residents are equipped with the skills needed to manage and maintain new energy systems. High-income households can fund and participate in local energy workshops, training programs, and skill development initiatives aimed at building community-wide capacity for energy management. These initiatives could focus on areas such as renewable energy installation, energy efficiency practices, and digital payment systems for energy services. In small island settings, where technical expertise may be limited, fostering local knowledge and capacity is essential for the long-term success of decentralized energy systems. By investing in capacity-building programs [44], [45], high-income households can ensure that local residents have the skills and knowledge needed to manage these systems, reducing the reliance on external service providers and enhancing community resilience.

Agency justice refers to ensuring that all individuals and communities have the capacity to actively participate in and shape energy systems that affect their lives. High-income households can support agency justice by using their financial and social capital to advocate for inclusive energy policies that prioritize the needs of low-income households. One way to promote agency justice is through financial retribution mechanisms [46], where high-income households contribute to community energy funds that are used to subsidize energy access for lower-income residents. This could take the form of progressive energy tariffs [47], where those who consume more energy pay higher rates, and the additional revenue is used to fund community-level energy projects [10], [48]. Alternatively, high-income households could participate in energy-saving incentive programs, where part of the savings generated from energy efficiency improvements is redirected into public energy funds. In small island communities, financial retribution systems are especially important because they allow wealthier households to contribute directly to the affordability of energy services for others. These retribution systems could also be tied to environmental goals, such as reducing reliance on diesel generators, lowering carbon emissions, and supporting renewable energy projects. By linking financial contributions to broader community benefits, these systems promote greater equity in energy access while incentivizing high-income households to invest in clean energy technologies.

The just transition framework emphasizes the importance of equity and inclusivity in moving toward a clean energy future. On small islands, where energy systems are fragile and communities often face significant economic challenges, ensuring that energy is both affordable and accessible requires a holistic approach. For high-income households, participation in energy transitions can extend beyond personal investments in clean energy technologies. These households can serve as catalysts for broader financial inclusion by supporting innovative financing models, such as community microfinance initiatives or renewable energy bonds, that enable low-income residents to access clean energy. A successful just energy transition on small islands will require partnerships between high-income households, local governments, and financial institutions. Together, they can design adaptive service assets that evolve with community needs, implement flexible organizational structures that allow for shared decision-making, invest in capacity-building initiatives that empower local residents, and create financial retribution systems that ensure everyone benefits from the transition to clean energy. By aligning the interests of high-income households with the broader goals of energy affordability and inclusion, small islands can not only achieve more sustainable energy systems but also build more resilient and just communities.

IV. CONCLUSION

Tourism retribution, as demonstrated in Nusa Penida, provides a practical and effective mechanism for redistributing energy costs, ensuring that low-income households benefit from the investments and financial resources of wealthier households and tourism operators. Through cross-subsidization, community-managed energy funds, and inclusive decision-making processes, small islands can promote energy equity while reducing their reliance on expensive and environmentally damaging fossil fuels. High-income households and tourism businesses, by leveraging their financial capacity and influence, can lead the way in creating sustainable energy systems that foster agency justice, reduce inequalities, and build resilience.

V. REFERENCE

[1] R. D. Prasad, R. C. Bansal, and A. Raturi, "A review of Fiji's energy situation: Challenges and strategies as a small island developing state," *Renew. Sustain. Energy Rev.*, vol. 75, pp. 278–292, 2017, doi: https://doi.org/10.1016/j.rser.2016.10.070.

[2] M. Dornan, "Access to electricity in Small Island Developing States of the Pacific: Issues and challenges," *Renew. Sustain. Energy Rev.*, vol. 31, pp. 726–735, 2014, doi: https://doi.org/10.1016/j.rser.2013.12.037.

[3] J. P. Praene, D. A. H. Fakra, F. Benard, L. Ayagapin, and M. N. M. Rachadi, "Comoros's energy review for promoting renewable energy sources," *Renew. Energy*, vol. 169, pp. 885–893, 2021, doi: https://doi.org/10.1016/j.renene.2021.01.067.

[4] A. Syauqi, Y. W. Pratama, and W. W. Purwanto, "Sustainable Energy System in the Archipelagic Country: Challenges and Opportunities BT - Energy Systems Evaluation (Volume 1)," J. Ren, Ed., Cham: Springer International Publishing, 2021, pp. 49–69.

[5] A. S. Sánchez, E. P. Junior, B. M. Gontijo, P. de Jong, and I. B. dos Reis Nogueira, "Replacing fossil fuels with renewable energy in islands of high ecological value: The cases of Galápagos, Fernando de Noronha, and Príncipe," *Renew. Sustain. Energy Rev.*, vol. 183, p. 113527, 2023, doi: https://doi.org/10.1016/j.rser.2023.113527.

[6] M. A. Brown, A. Soni, M. V Lapsa, K. Southworth, and M. Cox, "High energy burden and low-income energy affordability: conclusions from a literature review," *Prog. Energy*, vol. 2, no. 4, p. 42003, 2020, doi: 10.1088/2516-1083/abb954.

[7] L. Adrianto *et al.*, "Assessing social-ecological system carrying capacity for urban small island tourism: The case of Tidung Islands, Jakarta Capital Province, Indonesia," *Ocean Coast. Manag.*, vol. 212, p. 105844, 2021, doi: https://doi.org/10.1016/j.ocecoaman.2021.105844.

[8] K. M. Lukman, Y. Uchiyama, J. M. D. Quevedo, and R. Kohsaka, "Tourism impacts on small island ecosystems: public perceptions from Karimunjawa Island, Indonesia," *J. Coast. Conserv.*, vol. 26, no. 3, p. 14, 2022, doi: 10.1007/s11852-022-00852-9.

[9] Y. Hayati, L. Adrianto, M. Krisanti, W. S. Pranowo, and F. Kurniawan, "Magnitudes and tourist perception of marine debris on small tourism island: Assessment of Tidung Island, Jakarta, Indonesia," *Mar. Pollut. Bull.*, vol. 158, p. 111393, 2020, doi: https://doi.org/10.1016/j.marpolbul.2020.111393.

[10] I. W. K. Suryawan, A. Rahman, S. Suhardono, and C.-H. Lee, "Visitor willingness to pay for decarbonizing tourism: Supporting a net-zero transition in Nusa Penida, Indonesia," *Energy Sustain. Dev.*, vol. 85, p. 101628, 2025, doi: https://doi.org/10.1016/j.esd.2024.101628.

[11] I. W. K. Suryawan, V. D. Gunawan, and C.-H. Lee, "The role of local adaptive capacity in marine ecotourism scenarios," *Tour. Manag.*, vol. 107, p. 105039, 2025, doi: https://doi.org/10.1016/j.tourman.2024.105039.

[12] M. Leigh and X. Li, "Industrial ecology, industrial symbiosis and supply chain environmental sustainability: a case study of a large UK distributor," *J. Clean. Prod.*, vol. 106, pp. 632–643, 2015, doi: https://doi.org/10.1016/j.jclepro.2014.09.022.

[13] A. B. Setyowati, "Mitigating inequality with emissions? Exploring energy justice and financing transitions to low carbon energy in Indonesia," *Energy Res. Soc. Sci.*, vol. 71, p. 101817, 2021, doi: https://doi.org/10.1016/j.erss.2020.101817.

[14] R. K. Gobel, B. S. Laksmono, M. Huseini, and M. Siscawati, "Equity and Efficiency: An Examination of Indonesia's Energy Subsidy Policy and Pathways to Inclusive Reform," 2024. doi: 10.3390/su16010407.

[15] A. X. Hearn, D. Mihailova, I. Schubert, and A. Sohre, "Redefining energy vulnerability, considering the future," *Front. Sustain. Cities*, vol. 4, 2022, [Online]. Available: https://www.frontiersin.org/journals/sustainable-cities/articles/10.3389/frsc.2022.952034

[16] Z. Li and M. Qamruzzaman, "Nexus between Environmental Degradation, Clean Energy, Financial Inclusion, and Poverty: Evidence with DSUR, CUP-FM, and CUP-BC Estimation," 2023. doi: 10.3390/su151914161.

[17] M. Jayachandran *et al.*, "Challenges in achieving sustainable development goal 7: Affordable and clean energy in light of nascent technologies," *Sustain. Energy Technol. Assessments*, vol. 53, p. 102692, 2022, doi: https://doi.org/10.1016/j.seta.2022.102692.

[18] R. Wang, S.-C. Hsu, S. Zheng, J.-H. Chen, and X. I. Li, "Renewable energy microgrids: Economic evaluation and decision making for government policies to contribute to affordable and clean energy," *Appl. Energy*, vol. 274, p. 115287, 2020, doi: https://doi.org/10.1016/j.apenergy.2020.115287.

[19] R. Schmidt and K. Stenger, "Frame plurality and 'or/rationality': a dialogic approach to the behavioral state," *Behav. Public Policy*, pp. 1–20, 2023, doi: DOI: 10.1017/bpp.2023.34.

[20] R. Schmidt and K. Stenger, "Behavioral brittleness: the case for strategic behavioral public policy," *Behav. Public Policy*, vol. 8, no. 2, pp. 212–237, 2024, doi: DOI: 10.1017/bpp.2021.16.

[21] I. W. K. Suryawan, S. Suhardono, and C.-H. Lee, "Boosting beach clean-up participation through community resilience hypothetical scenarios," *Mar. Pollut. Bull.*, vol. 207, 2024.

[22] I. W. K. Suryawan, V. D. Gunawan, and C.-H. Lee, "Assessing the importance-performance analysis of adaptive capacity programs for sustainable mangrove conservation in the Taman Nasional Bali Barat conservation area," *Ocean Coast. Manag.*, vol. 257, p. 107345, 2024, doi: https://doi.org/10.1016/j.ocecoaman.2024.107345.

[23] B. K. Arkhurst *et al.*, "Evaluating energy justice metrics in early-stage science and technology research using the JUST-R metrics framework," *Front. Environ. Sci.*, vol. 11, 2023, [Online]. Available: https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2023.1206013

[24] K. Lammers, P. Bertheau, and P. Blechinger, "Exploring requirements for sustainable energy supply planning with regard to climate resilience of Southeast Asian islands," *Energy Policy*, vol. 146, p. 111770, 2020, doi: https://doi.org/10.1016/j.enpol.2020.111770.

[25] E. H. Pangaribowo and D. D. Iskandar, "Exploring socio-economic determinants of energy choices for cooking: the case

of eastern Indonesian households," *Environ. Dev. Sustain.*, vol. 25, no. 7, pp. 7135–7148, 2023, doi: 10.1007/s10668-022-02362-y.

[26] Sarjiya, L. M. Putranto, Tumiran, R. F. S. Budi, D. Novitasari, and Deendarlianto, "Generation expansion planning with a renewable energy target and interconnection option: A case study of the Sulawesi region, Indonesia," *Renew. Sustain. Energy Rev.*, vol. 183, p. 113489, 2023, doi: https://doi.org/10.1016/j.rser.2023.113489.

[27] D. Kassem, "Does electrification cause industrial development? Grid expansion and firm turnover in Indonesia," *J. Dev. Econ.*, vol. 167, p. 103234, 2024, doi: https://doi.org/10.1016/j.jdeveco.2023.103234.

[28] E. I. Come Zebra, H. J. van der Windt, G. Nhumaio, and A. P. C. Faaij, "A review of hybrid renewable energy systems in mini-grids for off-grid electrification in developing countries," *Renew. Sustain. Energy Rev.*, vol. 144, p. 111036, 2021, doi: https://doi.org/10.1016/j.rser.2021.111036.

[29] Y.-H. Ha and S. S. Kumar, "Investigating decentralized renewable energy systems under different governance approaches in Nepal and Indonesia: How does governance fail?," *Energy Res. Soc. Sci.*, vol. 80, p. 102214, 2021, doi: https://doi.org/10.1016/j.erss.2021.102214.

[30] G. W. Braun, "State policies for collaborative local renewable integration," *Electr. J.*, vol. 33, no. 1, p. 106691, 2020, doi: https://doi.org/10.1016/j.tej.2019.106691.

[31] R. J. Setiawan, Y.-T. Chen, and I. D. Suryanto, "Cost-Effective Fish Storage Device for Artisanal Fishing in Indonesia - Utilization of Solar Cool Box," in *2023 IEEE 17th International Conference on Industrial and Information Systems (ICIIS)*, 2023, pp. 471–476. doi: 10.1109/ICIIS58898.2023.10253549.

[32] E. A. Setiawan, H. Thalib, and S. Maarif, "Techno-Economic Analysis of Solar Photovoltaic System for Fishery Cold Storage Based on Ownership Models and Regulatory Boundaries in Indonesia," 2021. doi: 10.3390/pr9111973.

[33] C. Luerssen, C. Sekhar, D. Cheong, and T. Reindl, "Solar-Powered Cooling for the Remote Tropics BT - Sustainable Energy Solutions for Remote Areas in the Tropics," O. Gandhi and D. Srinivasan, Eds., Cham: Springer International Publishing, 2020, pp. 31–62. doi: 10.1007/978-3-030-41952-3_3.

[34] S. N. Tranter *et al.*, "The inclusion of fisheries and tourism in marine protected areas to support conservation in Indonesia," *Mar. Policy*, vol. 146, p. 105301, 2022, doi: https://doi.org/10.1016/j.marpol.2022.105301.

[35] Y. Susilowati *et al.*, "Carbon credit and economic feasibility analysis of biomass-solar PV-battery power plant for application in Indonesia remote area," *Renew. Energy*, vol. 219, p. 119383, 2023, doi: https://doi.org/10.1016/j.renene.2023.119383.

[36] B.-C. Yang, C.-H. Lee, and I. W. Koko Suryawan, "Consumers' willingness to pay and importance-performance gaps for resilient e-waste management in Taiwan," *J. Clean. Prod.*, p. 144313, 2024, doi: https://doi.org/10.1016/j.jclepro.2024.144313.

[37] I. W. K. Suryawan and C.-H. Lee, "Exploring citizens' cluster attitudes and importance-performance policy for adopting sustainable waste management practices," *Waste Manag. Bull.*, vol. 2, no. 3, pp. 204–215, 2024, doi: https://doi.org/10.1016/j.wmb.2024.07.011.

[38] A. D. Sutrisno, C.-H. Lee, and I. W. K. Suryawan, "Examining community desire to change for adaptive transition in post-mining ecological sustainability: Community transition in post-mining sustainability," *Extr. Ind. Soc.*, vol. 20, p. 101537, 2024, doi: https://doi.org/10.1016/j.exis.2024.101537.

[39] B.-C. Yang, C.-H. Lee, and I. W. K. Suryawan, "Resilient socio-technical systems for adaptive consumer e-waste management," *Sustain. Cities Soc.*, p. 106026, 2025, doi: https://doi.org/10.1016/j.scs.2024.106026.

[40] P. Kumar, S. Gupta, and V. Dagar, "Sustainable energy development through non-residential rooftop solar photovoltaic adoption: Empirical evidence from India," *Sustain. Dev.*, vol. 32, no. 1, pp. 795–814, Feb. 2024, doi: https://doi.org/10.1002/sd.2644.

[41] T. Zhu, X. Chang, F. Zhu, Y. Shen, L. Zhu, and C. Xu, "Empirical study on sustainable energy development goals: Analysis of rural roof distributed photovoltaic systems in Jiangsu, China," *Phys. Chem. Earth, Parts A/B/C*, vol. 136, p. 103711, 2024, doi: https://doi.org/10.1016/j.pce.2024.103711.

[42] Y. Zhou, J. Wu, and N. Jenkins, "Peer-to-peer energy trading in microgrids and local energy systems," in *Microgrids and Local Energy Systems*, IntechOpen, 2021.

[43] L. Roth, Ö. Yildiz, and J. Lowitzsch, "An Empirical Approach to Differences in Flexible Electricity Consumption Behaviour of Urban and Rural Populations—Lessons Learned in Germany," 2021. doi: 10.3390/su13169028.

[44] A. Malhotra, A. Mathur, S. Diddi, and A. D. Sagar, "Building institutional capacity for addressing climate and sustainable development goals: achieving energy efficiency in India," *Clim. Policy*, vol. 22, no. 5, pp. 652–670, May 2022, doi: 10.1080/14693062.2021.1984195.

[45] Y. Sokona, "Building capacity for 'energy for development' in Africa: four decades and counting," *Clim. Policy*, vol. 22, no. 5, pp. 671–679, May 2022, doi: 10.1080/14693062.2020.1870915.

[46] J. Parra-Domínguez, E. Sánchez, and Á. Ordóñez, "The Prosumer: A Systematic Review of the New Paradigm in Energy and Sustainable Development," 2023. doi: 10.3390/su151310552.

[47] B. K. Sovacool, M. L. Barnacle, A. Smith, and M. C. Brisbois, "Towards improved solar energy justice: Exploring the complex inequities of household adoption of photovoltaic panels," *Energy Policy*, vol. 164, p. 112868, 2022, doi: https://doi.org/10.1016/j.enpol.2022.112868.

[48] A. Rahman, I. W. K. Suryawan, S. Suhardono, V. V. Nguyen, and C.-H. Lee, "Determinants of electric vehicle adoption in urban and peri-urban areas," *Energy Sustain. Dev.*, vol. 85, p. 101664, 2025, doi: https://doi.org/10.1016/j.esd.2025.101664.