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The Energy Commons and Commoning: Collective Action in Energy Transitions

EDITORIAL

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ABSTRACT

This editorial introduces the Collection on "Energy Commons: Collective Action for Sustainable Energy" examining energy commons as alternatives to market-based energy systems. Through three empirical contributions, it explores how energy commoning practices navigate five fundamental paradoxes: inclusion versus exclusion, Western frameworks versus pluriversal approaches, local autonomy versus global coordination, narrow focus versus whole value chains, and anti-capitalist ideals versus market realities. The Collection demonstrates these tensions as productive forces driving innovation in energy governance.

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INTRODUCTION

Energy systems all around the world are going through a transformation, where renewable energy technologies (RETs), energy efficiency and energy demand reduction are seen as the main pillars of energy transition (Loorback & Verbong, 2012). Beyond mere technological changes contributing to these pillars, the transformation of energy systems has the potential to both trigger and be driven by substantial socio-political transformations (Bauwens et al., 2024). Various mechanisms and processes, from the system's level (e.g., taxes and subsidies) to the individual level (e.g., willingness to pay and participate in the energy transition), have emerged and been promoted (Stern, 2017; Rohracher, 2008). However, as such approaches focus on incremental adjustments within the current system (Miller et al., 2013), they partially fail to address fundamental issues such as energy justice, energy security and harmonious human–nature relationship, not only to tackle problems within energy systems but also to advance broader socio-ecological goals (Bauwens et al., 2024).

Therefore, transitioning towards sustainable and just energy systems requires a profound reconsideration of the social dynamics surrounding energy (Bauwens et al., 2022). This reconsideration must move beyond technological fixes to examine how energy is governed, distributed, and valued in society. One promising approach is the concept of energy commons, which necessitates reinterpreting energy as a common good to enable effective and enduring collective action in energy governance (Bauwens et al., 2024; Acosta et al., 2018). Following a recent systematic review by Bauwens et al. (2024), energy commons are defined as "the sets of social relations and governance rules developed by communities of energy producers, users, and prosumers to collectively and democratically co-create and co-manage (bio)physical resources related to material extraction (e.g., minerals for energy technologies or biomass), energy production, distribution, use, and storage, as well as the handling of waste or decommissioning of infrastructure, with the aim of enhancing energy access, efficiency, and sustainability".

Such approaches can be seen in some community energy systems (CESs)—decentralised, local energy initiatives that, when organised as commons, exemplify collective governance of energy resources (Bauwens et al., 2022; Bauwens et al., 2018). While CESs represent collective approaches to energy, they vary in governance structure—from market-based cooperatives to genuine commons with shared resource management. This Collection focuses on those exhibiting common characteristics, which not only challenge the liberalised energy market designs and their mechanisms, but also confront capitalist structures more broadly (Bauwens et al., 2024).

In such a context, commoning—the active process of creating and maintaining these commons through collective decision-making (Linebaugh, 2008; Gibson-Graham, 2006)—is emerging as a critical practice for reclaiming energy governance. This editorial introduces a Collection that demonstrates how energy commons navigate fundamental tensions through diverse empirical cases, building on the five paradoxes identified in the literature (Bauwens et al., 2024).

THE FIVE PARADOXES OF ENERGY COMMONS

Recent analysis reveals five fundamental paradoxes that shape both research and practice (Bauwens et al., 2024):

Paradox 1. Energy commons are both inclusive and exclusive. While they emphasise participatory governance and equitable access, practical challenges (such as the costs and physical connections) can lead to new forms of exclusion that reinforce existing social hierarchies.

Paradox 2. Energy commons research has a Western focus despite addressing universal needs (the pluriverse paradox). The concept of a pluriverse—a world where many worlds coexist, recognising multiple ways of knowing, being, and organising society as equally valid (Kothari et al., 2019)—challenges this Western-centric framing. Most research centres on Western contexts, yet energy commoning also emerges across Asia, among Indigenous communities, and in the Global South with distinct social, spiritual, ecological, and cultural dimensions that challenge Western-centric models.

Paradox 3. Energy commons require both decentralisation and coordinated governance. While focused on local autonomy and community control, as seen in many CESs, addressing global energy challenges, such as supply chain transparency, resource management, and climate action, requires multi-scale governance structures that integrate actions across multiple levels.

Paradox 4. Energy commons focus on local generation, yet must address the whole value. Current practices, particularly in CESs that adopt commons governance, emphasise renewable energy generation, distribution and consumption but often overlook upstream impacts (e.g., mining and material extraction) and downstream processes (waste management, decommissioning).

Paradox 5. Energy exists as alternatives to capitalism while operating within capitalist systems. Although

conceptualised as treating energy as a common good, they remain embedded in a broader market-based energy system where energy is commodified, creating tensions between autonomous commoning and market engagement.

Addressing these paradoxes is essential for fostering energy commons and commoning that can truly transform energy systems. The dynamic nature and evolution of such practices, along with the tools used to study them, add further complexity to navigating these tensions (Fouladvand, 2025). Furthermore, such practices and paradoxes influence and interact with other sectors such as mobility (e.g., electric vehicles and local charging stations) and the built environment (e.g., housing cooperatives and building renovations), further highlighting the need for integrated approaches.

CONTRIBUTIONS TO THE COLLECTION

The three contributions in this Collection engage directly with these paradoxes, offering empirical insights and theoretical advances that demonstrate how energy commons navigate these tensions in practice.

Diaz-valdivia and Poblet-balcell (2025), examine blockchain-based initiatives for managing carbon offsets as a common-pool resource. Their analysis of seven initiatives reveals how technology can enable new forms of commons governance, addressing paradox 3 (local/global governance) and paradox 5 (capitalism/alternatives) by demonstrating how digital infrastructures might bridge scales while maintaining commons principles. They demonstrate that blockchain's transparency and decentralisation features could offer solutions for coordinating across scales without sacrificing local autonomy. However, they also acknowledge the risk of co-optation by market forces, highlighting the ongoing tension in paradox 5.

Wade et al. (2025), investigate surplus-sharing strategies in energy communities, offering empirical insights into how different allocation mechanisms affect community cohesion and participation. Through a comparative analysis of solidarity-based versus market-based distribution approaches, they directly address paradoxes 1 (inclusion/exclusion) and 5 (capitalism/alternatives). Their findings suggest that solidarity strategies can enhance inclusivity while maintaining economic viability. The paper provides practical examples of how energy communities balance equity concerns with operational sustainability, demonstrating that hybrid models combining solidarity principles with market mechanisms may offer pathways through these paradoxes.

Frankowski et al. (2025) employ dramaturgical sociology to analyse how housing cooperatives in Poland responded to energy crises. This innovative theoretical approach reveals how collective action emerges and adapts under stress, speaking to paradox 1 (inclusion/exclusion) and paradox 3 (local/global governance). By examining cooperatives as performative spaces where energy citizenship is enacted, they show how communities navigate between inclusive aspirations and practical constraints. Their analysis of crisis responses demonstrates how local initiatives can maintain autonomy while engaging with broader energy systems and policy frameworks.

Together, these contributions reveal that energy commons do not resolve these paradoxes but rather productively engage with them, creating innovative governance arrangements that work within and against existing constraints. In further detail, several cross-cutting themes emerge: the critical importance of fair financial distribution (Wade et al., 2025; Frankowski et al., 2025), the complex interaction between commons and market systems requires further investigation of whether commons organisations can shape markets while maintaining their core principles (Diaz-valdivia and Poblet-balcell, 2025; Wade et al., 2025), and the urgent need for frameworks to measure and compare commons performance against conventional energy systems (Diaz-valdivia and Poblet-balcell, 2025; Frankowski et al., 2025). All contributions emphasise the need for structured data collection on energy commons governance to facilitate future implementation and scaling.

IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

The contributions in this Collection, along with recent empirical studies (e.g., Baan & Fouladvand, 2025 and Petrovics et al., 2024) and computational modelling studies (e.g., Fouladvand et al., 2024), demonstrate the potential of energy commons in addressing pressing social and climate issues from a governance perspective. However, significant research gaps remain that must be addressed to advance both scholarship and practice.

Addressing Paradox 1: Inclusion and Exclusion. Future research should examine how commoning practices form and evolve, investigating the conditions under which they foster broader social inclusion rather than reinforcing existing divides. Key questions include: How can energy commons avoid becoming 'gated communities' that exclude disadvantaged groups? What mechanisms can ensure that community boundaries necessary for governance don't become barriers to participation?

Addressing Paradox 2: Western Focus and the Pluriverse. Research must incorporate Indigenous, Global South, and non-Western perspectives on energy commoning. This requires developing inclusive methodologies that elevate marginalised voices and challenge Western-centric assumptions about energy and the commons. Studies should explore how Indigenous governance practices, with their emphasis on intergenerational values and spiritual connections to the land, can inform the design of energy commons.

Addressing Paradox 3: Local Autonomy and Multi-scale Governance. Studies should develop and test polycentric governance models that balance local responsiveness with broader coordination. Research should examine how regulatory frameworks can be harmonised across scales and how transnational networks can foster solidarity among energy commons. From a methodological perspective, computational modelling approaches such as agent-based modelling could be useful for understanding multi-scale dynamics, as explained in different studies such as Fouladvand et al. (2024), Fouladvand (2024) and Ghorbani et al. (2013).

Addressing Paradox 4: Whole Value Chain Approaches. Investigations using Material Flow Analysis (MFA) and Life Cycle Assessment (LCA) are needed to understand the full ecological footprint of energy commons. Research should explore how commons principles can be applied to upstream processes (e.g., mining and material extraction processes) and downstream challenges (e.g., recycling and waste management). While literature focuses primarily on carbon footprints, other impacts, such as water footprint and biodiversity losses, remain largely understudied.

Addressing Paradox 5: Autonomy within Capitalism. Research should explore how energy commons maintain autonomy while engaging with market and state structures. The conditions under which CESs evolve into genuine energy commons—rather than remaining market-based cooperatives or community businesses—require further investigation. Not all collective energy initiatives constitute commons, and understanding these distinctions is crucial. Key questions include: How can energy commons be scaled without losing core principles? What strategies prevent co-optation by capitalist interests? Studies should examine partnerships with cooperative banking movements and explore how energy commons can promote broader institutional reforms, such as land redistribution initiatives.

Cross-cutting Research Priorities. Beyond addressing specific paradoxes, several cross-cutting priorities also emerge. In terms of multi-sector integration, the relationship between energy commons and other sectors (e.g., mobility and housing) requires investigation to understand successful implementation across sectors. Regarding methodological innovation, while most literature employs empirical methods such as interviews and surveys, the daily operationalisation, scaling, and systemic impact of energy commons need investigation through diverse approaches, including computational modelling and simulation. Finally, concerning decommodification pathways, academic literature and real-world practices should explore how notions of energy decommodification can shift energy practices globally.

CONCLUSION

This Collection highlights that transitioning towards sustainable and equitable energy systems requires a profound reconsideration of the social dynamics surrounding energy. Beyond mere technological changes, the transformation of energy systems has the potential to trigger and, in turn, can be brought about by substantial socio-political transformations. This process necessitates reinterpreting energy as a common good to enable effective and enduring collective action in energy governance.

By employing different approaches within various contexts, the contributions demonstrate the potential of the energy commons in addressing pressing social and climate issues from a governance lens. The five paradoxes we identify are not problems to be solved but rather productive tensions that drive innovation in energy commons practice. As these paradoxes reveal, energy commons emerge not as perfect solutions but as evolving practices that productively engage with—rather than escape—the contradictions of energy transformation. The path forward lies not in resolving these paradoxes but in developing governance arrangements that work creatively within them.

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COMPETING INTERESTS

The authors have no competing interests to declare.

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