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Collaborative Energy

Global models for electricity imaginaries in Lebanon

Arab Center for Research & Policy Studies - Beirut

Ebla Research Collective

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1. Introduction

Across the world, growing interest in cooperative, community and collaborative energy models reflects broader attempts to rethink how energy systems are organised, governed and controlled. In Lebanon, where residents have long relied on hybrid and decentralised arrangements to secure electricity, these discussions are becoming increasingly relevant. Drawing on a synthesis review of global experiences alongside a scoping review of emerging initiatives in Lebanon, this report explores the potential of collaborative energy arrangements in the region and develops a governance-oriented framework for analysing how energy systems are owned, financed, regulated and collectively managed across different contexts.

This report approaches collaborative energy arrangements as part of the broader politics of energy justice. In addition, it acknowledges the global need for a just energy transition to address rising energy demands and climate change, as well as the need for coordination across multiple actors, sectors, and infrastructures[(1)]. Yet this transition has been unfolding amid the increasing commodification of energy under the neoliberal "green growth" models, prompting growing calls to reclaim energy as a public and collective good. Within this context, community and collaborative forms of energy provision - where local communities participate in owning, developing and operating energy projects - are attracting increasing attention, particularly in relation to questions of participation, democracy, justice and collective control over infrastructure[(2)]. This is what the report refers to as collaborative energy communities: a broad range of collective arrangements in which various actors jointly participate in the production, management, financing, governance, distribution, or consumption of energy. Energy cooperatives, by contrast, are a specific institutional form of collaborative energy community, characterized by cooperative ownership structures and democratic governance principles, typically based on voluntary membership and shared benefits. While all energy cooperatives can be considered collaborative energy communities, not all collaborative energy communities take the form of cooperatives.

Discussions on collaborative energy models often remain dominated by technoeconomic perspectives focused on infrastructure, markets and generation capacity, while giving less attention to the social, political and institutional dimensions shaping these arrangements. Questions of governance, ownership, participation, financing, regulation and collective decision-making are often treated as secondary concerns[(3)], even though they are central to understanding how collaborative models emerge, operate and endure. Research on these forms of energy governance also remains limited in the Arab region, and in the Levant specifically, despite the increasing relevance of decentralised and hybrid arrangements under conditions of infrastructural constraints, crises and fragmented governance.

The Lebanese context brings these questions into sharp focus. For decades, residents have relied on

(1) Silvia Hostettler, "Energy Challenges in the Global South," in *Sustainable Access to Energy in the Global South*, ed. Silvia Hostettler et al. (Springer International Publishing, 2015), https://doi.org/10.1007/978-3-319-20209-9_1

(2) Maria Apergi et al., "An Energy Justice Index for the Energy Transition in the Global South," *Renewable and Sustainable Energy Reviews* 192 (March 2024): 114238, https://doi.org/10.1016/j.rser.2023.114238

(3) Watson, J. et al., *What Are the Major Barriers to Increased Use of Modern Energy Services among the World's Poorest People and Are Interventions to Overcome These Effective?*, CEE protocol 11-004 (Collaboration for Environmental Evidence, 2011).

heterogeneous electricity supply systems that largely emerged in response to the state utility's inability to meet demand[4]. The recent energy crisis and rapid expansion of solar energy have intensified these dynamics, producing a heterogenous landscape of household systems, private generators, donor-supported projects, municipal initiatives and localised arrangements for sharing and managing energy infrastructure. Alongside market-led and individualised responses, the crisis has also created pressures and opportunities for more collaborative forms of organisation to emerge through municipalities, neighbourhoods, building committees and local networks. While many of these arrangements remain partial, informal or uneven, they reveal important dimensions that require further attention and development, particularly around governance structures, participation, collective management, financing and regulatory support.

Researching community-based collaborative models, responds to the needs on the ground articulated in previous engagement and research, including; (i) the burden that managing energy solutions at the household or building level imposes on people and the potential for developing larger ecosystems operating across streets, neighbourhoods or local areas[5], (ii) imaginaries of interdependence seeking collective and integrated energy networks[6], and (iii) calls to build distributed renewable energy systems that draw on existing local assemblages of ownership, management and social relations[7]. The context in urban centres in Lebanon adds another layer of complexity. Community-based approaches to energy have focused mainly on rural areas, and as such, less is understood in relation to urban energy provision.

Rather than treating collaborative energy as a singular model, this review reveals the broad spectrum of arrangements that vary in terms of governance, ownership, financing, regulation and participation.

The search for collaborative community-led models is not an attempt to find solutions outside of the political sphere or bypass the state, nor does it champion the "post-grid imaginary" that Nucho[8] describes. Instead, it highlights emerging arrangements in the fragmented electricity sector, revealing the alternatives to state-centric and market-led energy approaches. The report underscores the argument that energy transitions are not only technical but social and political, and should include concerns about access, participation, and governance (including collective organisation) for justice. The Lebanese cases shown do not substitute national systems but reveal emerging collaborative energy governance in Lebanon, which are under-documented. In doing so, they pinpoint trajectories towards a more equitable and just energy transition.

Globally, numerous established models of community or worker-led energy systems exist, often anchored in broader climate justice, decolonising or anti-capitalist ethos[9]. The Lebanese nascent models emerge out of felt daily need because of state failure and rely heavily on personal, kinship and community networks and not more complex organisational models. The broader political, social, and environmental impact of such models - beyond energy provision at a lower cost - is yet to be articulated. This report seeks to inspire alternative energy imaginaries and collaborative energy arrangements in Lebanon, while also speaking back to a growing literature that the Arab countries are still largely absent from.

(4) Dana Abi Ghanem, "Energy, the City and Everyday Life: Living with Power Outages in Post-War Lebanon," *Energy Research & Social Science* 36 (2018): 36–43, https://doi.org/10.1016/j.erss.2017.11.012; Ali Ahmad et al., "From Dysfunctional to Functional Corruption: The Politics of Decentralized Electricity Provision in Lebanon," *Energy Research & Social Science* 86 (April 2022): 102399, https://doi.org/10.1016/j.erss.2021.102399

(5) Ebla Research Collective, *I Am, as You Can See, the Local Government, the Electricity Company and Much More: Building Committees as Spaces of Social Organizing in Beirut* (Ebla Research Collective, 2024), https://eblaresearch.org/2024/03/read-our-research-report/

(6) Ala'a Shehabi and Muzna Al-Masri, "Foregrounding Citizen Imaginaries: Exploring Just Energy Futures through a Citizens' Assembly in Lebanon," *Futures* 140 (June 2022): 102956, https://doi.org/10.1016/j.futures.2022.102956

(7) Dana Abi Ghanem, "Insights from an Assemblage Perspective for a (Better) Understanding of Energy Transitions: Facing the Challenge of Sustainability in Lebanon's Energy Crisis," in *Dilemmas of Energy Transitions in the Global South: Balancing Urgency and Justice*, 1st ed., ed. Ankit Kumar et al. (Routledge, 2021), https://doi.org/10.4324/9780367486457

(8) Joanne Randa Nucho, "Post-Grid Imaginaries: Electricity, Generators, and the Future of Energy," *Public Culture* 34, no. 2 (2022): 265–90, https://doi.org/10.1215/08992363-9584764

(9) Sean Sweeney, *Towards a New International Energy Order (NIEnO): At COP 30, the South Must Fill the Void in Global Climate Leadership* (TUED, 2025).

2. Methodology

As a scoping study, the research relies mainly on a desk review supported by seven key informant interviews (KIIs) during the first half of 2025.

The review combined targeted database and grey literature searches (non–academic) with snowballing, tracing literature and case studies of relevance to Lebanon, and annotating the most relevant. Insights from the literature indicated that many models of local energy generation exist, and these vary in terms of ownership, governance structure and scale. A more detailed analysis of the relevant case studies was conducted based on the analytical framework developed in this report. This classification serves both as a synthesis of the literature and as an analytical tool to organise the global examples and then situate the Lebanese initiatives within that. The literature does not cover the Arab region, because of the scarcity of energy research and because of the absence of collaborative energy models locally.

To supplement the literature and consider opportunities and challenges that the local context provides, we conducted interviews with local experts and local-based initiatives actors. Accordingly, for the KIIs a purposive sampling approach was adopted based on the following criteria:

- The broader legal and practical context in Lebanon shaping local initiatives. These interviews clarified the energy situation before and during the 2021 crisis, covering legal structures like the Distributed Renewable Energy (DRE) law and its potential impacts
- The informant's proximity to community energy projects - via research, experience, or action - helps reveal the projects' origins, financing, stakeholders, and EDL arrangements
- Exploring the possibility of collective energy communities in the urban context. This meant that cases of current initiatives prioritised those working in urban settings, whether in buildings in Beirut or in residential areas in El-Mina, Tripoli.

Finally, given the state of flux in Lebanon, interviews and meetings were conducted with people working on energy in the context of reconstruction after the war on Lebanon that preceded the preparation of this report (September - October 2024).

3. The Lebanese Context

In Lebanon, the combination of recurring crises and international donor support has led to a growth of various heterogeneous models of energy production, both in terms of energy source and governance. Since the financial crisis in 2019, solar energy adoption has significantly increased. However, there is limited knowledge about the development of energy communities that support this transition; this development has been largely reactive and warrants further analysis in light of the cooperative principles of energy communities. This section outlines the Lebanese landscape, in which initiatives for energy collaboration are emerging, and situates selected Lebanon-specific models within the analytical framework developed above.

The Lebanese case is relevant to the broader regional discussion because very little information was found on collaborative energy models in the Levant and the Arab region. Rather than treating Lebanon as separate from the global literature, this section uses the classification to compare how similar forms of collaboration appear under different conditions: state retreat, fragmented provision, donor-supported initiatives, local authority roles, diaspora financing, and building- or neighbourhood-level social organisation. The aim is not to overstate these arrangements, but to make visible what is emerging between state- and market-centric models of production and distribution.

3.1. Lebanon's electricity crisis and governance

Lebanon's electricity crisis is the result of politics, corruption, long-running governance failure and state retreat rather than a sudden shock. The state utility Electricite du Liban (EDL) could not fully meet national demand even before the financial collapse, forcing households and firms to rely on tens of thousands of private diesel generators, especially outside the capital, Beirut.

The 2021 and 2024 blackouts, caused by EDL's fuel shortages and power plant shutdowns, worsened the collapse. Lebanon's power system has been de facto privatized: a "privately owned generator sector" of about 11,000 operators sells expensive, low-quality power within local patronage networks[10], especially with monopolistic petroleum importers who block reforms threatening their rents. Fiscal strain, governance deadlocks, and market capture led the state to withdraw from providing electricity.

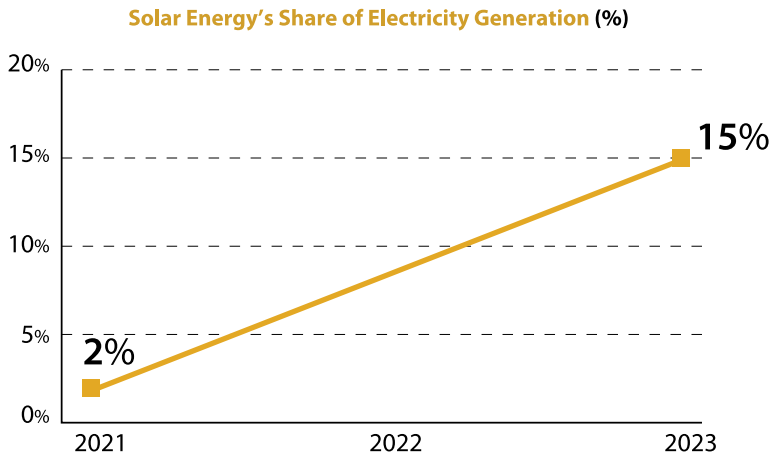
Around **11** Thousand

operators in Lebanon's de-facto privatized generator sector

Lebanon has regulatory frameworks, but their implementation is politicized and selective. Law 462/2002 aimed to restructure the sector, create an independent Electricity Regulatory Authority (ERA), and promote private participation, but successive governments delayed full implementation, keeping licensing discretionary and opaque. The ERA was only appointed by late 2025. The second key law is DRE Law ratified at the end of 2023, which supports small-scale and community renewables, allowing net metering, surplus injection, peer-to-peer trading, and power purchase agreements. The full potential of the DRE is hampered by incomplete regulations, technical challenges with net metering, and the need for grid upgrades. Despite these, there is optimism for solutions. Notably, large solar farm projects under public-private agreements, though licensed, failed due to lack of financing. Lebanon's recent "solar boom" was mostly a result of privately paid household-level installation of PVs or municipality-led projects in rural areas, by individuals and showed a wide but uneven adoption. Solar PV capacity increased sevenfold since the crisis's start, and solar's share in electricity rose from 2% in 2021 to 15% in 2023, with renewables reaching about 20% overall[11].

3.2. A solar boom financed by individuals and donors

The "solar boom" financing mostly comes from private sources (households, firms, and the diaspora), especially in response to the crisis, while donors have generally played a catalytic, sector-targeted role. Donors were mainly providers of concessional capital, technical standards and pilots to resolve infrastructure challenges like water, support refugees (humanitarian response) or small and medium enterprises and cash-strapped municipalities that otherwise couldn't pay up-front.



On the ground, most visible donor funding has gone towards solarising public and humanitarian services. One prominent example is the UNDP Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon (CEDRO), co-funded by the EU, which supplied solar systems to schools, municipal

(10) "مولد كلفة وتلوث 11,000 المولدات حل وأزمة," The Monthly, Information International, August 19, 2024, https://monthlymagazine.com/article/5389/مولد-كلفة-وتلوث-11000--المولدات-حل-وأزمة

(11) Mohammad Al Jajj et al., *The 2023 Solar PV Status Report for Lebanon* (The Lebanese Center for Energy Conservation (LCEC), 2025).

buildings and industrial facilities for more than a decade. The programme offered partial grants and technical assistance for distributed renewable energy projects, in partnership with municipal unions and the Association of Lebanese Industrialists[12]; similarly other UN agencies supported public institutions like UNICEF and bilateral western donors working to secure water access, mainly via solarised pumping stations and wells.

In addition, USAID implemented multiple solar-energy installations across Lebanon. Examples include: 23 solar energy projects in joint efforts, helping generate about 2.7 MW of clean energy for public services as of mid-2024[13]. USAID supported local industry, capacity-building and private-sector links (2022 collaboration with Lebanese American University to establish a local solar energy industry including manufacturing, testing and training)[14]. It also operated at the community level in a project launched in late 2021under the title "Innovation for Affordable and Renewable Energy for All Activity" [15]. Both CEDRO, USAID and other international donors partnered with municipalities and unions of municipalities to co-finance solar PV systems that cover part of the capital costs for these municipalities. This is in line with the global pattern in development financing, where donors and development finance institutions are pivoting from pure grants toward blended finance instruments, such as concessional credit lines and guarantees for microfinance institutions. It is also worth highlighting the $250 million World Bank loan to ease the electricity sector challenges. It was granted in April 2025[16] with conditionalities yet to be met.

Donors rarely covered the full cost of rooftop solar in Lebanon, but they have been central to expanding solar provision in public services, refugee-hosting areas and credit-constrained municipalities. Continued donor support may help de-risk larger distributed and municipal projects, enabling the solar boom to become more than a self-financed, middle-class survival strategy.

Between private and self-funded initiatives and international donor projects aimed at shifting to renewable energy sources, particularly solar, this decentralisation continues to be highly segmented and fragmented: wealthier and urban households meet their energy needs from their own finances, while poorer communities remain dependent on rationed generators or in darkness. In addition, the proliferation of unregulated, often technically weak systems creates new safety and grid-stability risks. Notwithstanding the importance of Law 318/2023, Lebanon's solar boom may entrench a new layer of market capture and energy inequality rather than resolve the underlying governance crisis.

4. Collaborative Energy: From Global Experiences to Lebanon

The research adopts, as previously mentioned, a broad definition of collaborative energy communities, being a form of social organisation built around collective governance, democratic management, shared decision-making, and fair access to benefits, as suggested by Dudka et al.[17] These are often purpose-driven and sometimes become more structured and institutionalised, such as through cooperatives. The legal form varies widely across contexts, from informal neighbourhood initiatives to fully regulated entities; the defining features remain collective agency, local empowerment, and the alignment of energy provision with community needs

(12) UNDP, "CEDRO V," UNDP, accessed November 24, 2025, https://www.undp.org/lebanon/projects/cedro-v

(13) Dana Haffar, "Harnessing Solar Energy in Lebanon with the Support of USAID," LAU News, Lebanese American University, August 25, 2022, https://news.lau.edu.lb/2022/harnessing-solar-energy-in-lebanon-with-the-support-of-usaid.php

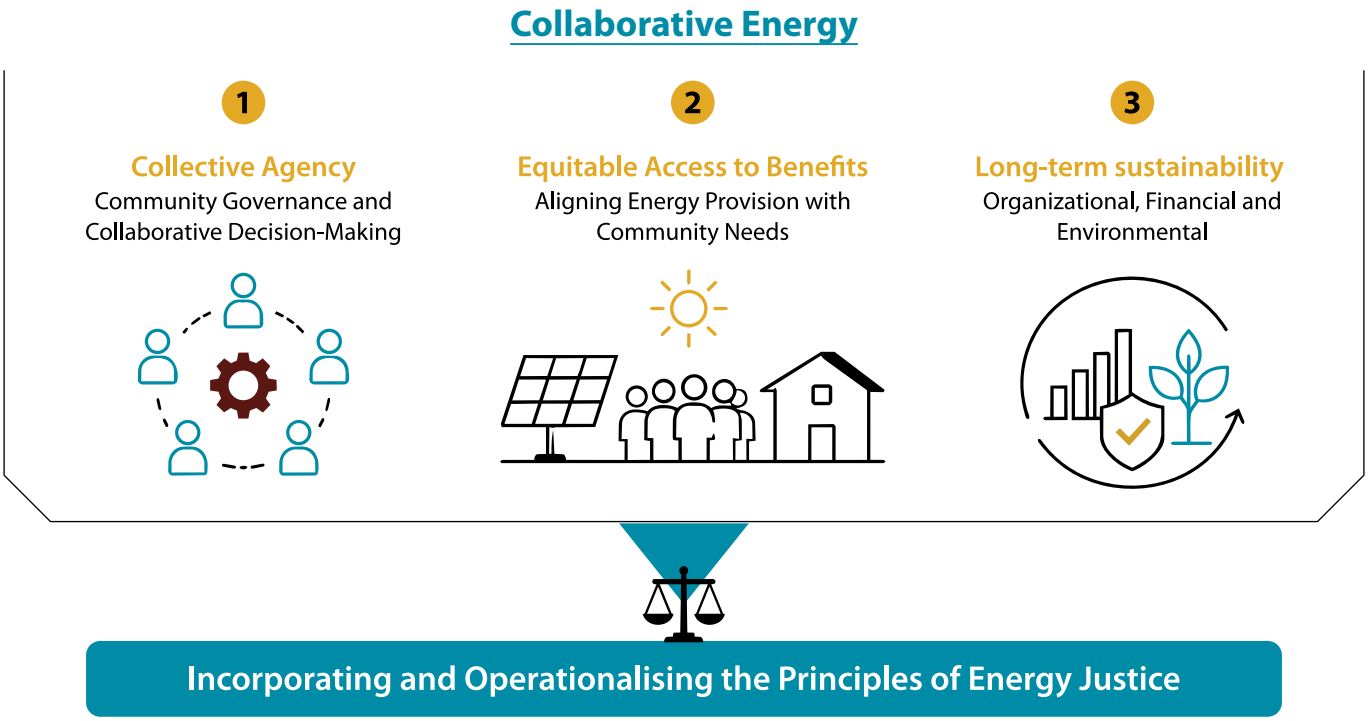
(14) Haffar, "Harnessing Solar Energy in Lebanon with the Support of USAID."

(15) USAID, "USAID Launches $29 Million Project to Deliver Reliable Energy across Lebanon," *U.S. Embassy in Lebanon*, October 6, 2021, https://lb.usembassy.gov/usaid-reliable-energy-lebanon/

(16) Reuters, "Lebanon Receives $250 Million World Bank Loan to Ease Power Problems," *Reuters*, April 24, 2025, https://www.reuters.com/world/middle-east/lebanon-receives-250-million-world-bank-loan-help-with-electricity-problems-2025-04-24/

(17) Aurore Dudka et al., "A Typology of Community-Based Energy Citizenship: An Analysis of the Ownership Structure and Institutional Logics of 164 Energy Communities in France," *Energy Policy* 178 (July 2023): 113588, https://doi.org/10.1016/j.enpol.2023.113588

and long-term sustainability goals[18]. In short, energy communities could essentially operationalise the general principles of energy justice.



Our review of the literature identified multiple collective models for organising energy provision and distribution, revealing the diversity of energy communities worldwide. Based on this review, we group these global models into six broad categories according to their scale and degree of collaboration. All examples shared one common element: some level of collective collaborative engagement with energy systems. Read together, these categories show that collaborative energy is not one model, but a spectrum of arrangements shaped by initiation and leadership, organisational structure and governance, financing, regulation, scale, participation and ownership.

There are different scales of participation and ownership[19] , context and purpose[20] the spectrum of possible social arrangements and outcomes[21], community's relationship to place and it purpose[22] and the types of actors and the degree of centralization of energy production[23]. What we present here is not a new typology, but a summary of different models at various scales and governance and financing considerations that could inspire discussion of what models are best suited for the Lebanese - and regional - local context.

Table 1 below summarises these six models and their governance. The next section provides detailed examples of each model; the following section examines their organisational structures, financing and regulatory frameworks; and the final section presents examples of collaborative energy initiatives in Lebanon.

(18) Thomas Bauwens et al., "The Energy Commons: A Systematic Review, Paradoxes, and Ways Forward," *Energy Research & Social Science* 118 (December 2024): 103776, https://doi.org/10.1016/j.erss.2024.103776

(19) Dudka et al., "A Typology of Community-Based Energy Citizenship."

(20) Nicolò Rossetto et al., "A Taxonomy of Energy Communities in Liberalized Energy Systems," in *Energy Communities* (Elsevier, 2022), https://doi.org/10.1016/B978-0-323-91135-1.00004-3

(21) Gordon Walker and Patrick Devine-Wright, "Community Renewable Energy: What Should It Mean?," *Energy Policy* 36, no. 2 (2008): 497–500, https://doi.org/10.1016/j.enpol.2007.10.019

(22) Stefano Moroni et al., "Energy Communities in the Transition to a Low-Carbon Future: A Taxonomical Approach and Some Policy Dilemmas," *Journal of Environmental Management* 236 (April 2019): 45–53, https://doi.org/10.1016/j.jenvman.2019.01.095

(23) Emi Minghui Gui and Iain MacGill, "Typology of Future Clean Energy Communities: An Exploratory Structure, Opportunities, and Challenges," *Energy Research & Social Science* 35 (January 2018): 94–107, https://doi.org/10.1016/j.erss.2017.10.019

Table 1: Summary of collaborative models' key dimensions

Model	Initiation & Leadership	Organisational structure and decision-making	Capital and financing	Regulatory frameworks
Building-scale resident initiatives	Initiated from the ground up and led by building committees, residents' representatives or housing associations	Use existing housing bodies; PV owned collectively or individually by households; decisions via resident meetings	Small-ticket household investment, strongly leveraged by municipal subsidies	Rely on general housing/building rules plus self-consumption provisions; no specific "community energy" form
Neighbourhood- or community-scale projects	Started by local activists/NGOs concerned with climate, fuel poverty or local regeneration	Coop / community organisation society; democratic; project/ NGO/enterprise owns assets on behalf of members	Community shares, member equity, with external financing	Based on various laws especially energy regulation; often need licensed partners for electricity supply
Larger well-developed cooperatives and community utilities	Historically developed to have elected boards and professional managers	Large member-owned utilities, owning distribution networks and often generation; democratic boards with utility-style management	Core funding from regulated tariffs, with major investment through development banks and rural electrification funds	Recognized in electricity law as licensed distributors plus well-developed coop law; fully integrated into national utility regulation
Hybrid models anchored around local authorities	Initiated by municipalities/ public utilities pursuing climate and local-development agendas, inviting citizen co-investors	Joint ventures with public utilities/ municipalities and citizen co-ops as shareholders; board seats shared	Municipal/public equity + community shares + bank loans + national/ EU grants; revenues from energy and PPAs	Operate at the intersection of municipal law, procurement and energy regulation
Market-oriented crowdfunding model	Project pipeline led by developers/utilities/ intermediaries; citizens invited mainly as investors	Commercial project companies in which citizens hold limited equity and exercise only modest governance rights	Finance from banks and sponsors; crowdfunding from community add a small but visible citizen role	Regulated as standard generators plus securities/ crowdfunding rules; "community" aspect exists mainly in finance/branding
Private-project model with community engagement	Driven by developers, NGOs, social enterprises or state agencies within donor/development finance institutions (DFI) programmes; communities as affected/beneficiary groups	Core assets are developer/utility-owned; communities involved via trusts, associations or small equity stakes and benefit-sharing	Project finance from DFIs/banks/ sponsors, plus grants for social components; communities contribute land/ labour and receive revenue shares	Governed by national energy/land law plus donor safeguard policies; emerging "energy community" frameworks are still nascent

4.1. Global models of collaborative energy

The categorisation above is used as the analytical backbone of the report. In terms of scale, it helps distinguish between models where communities exercise collective control; models where municipalities and public actors anchor collaborative arrangements; and models where community participation is mainly financial, consultative or organised around benefit-sharing. The models of ownership, the rules of decision-making, the structure of financing, and the place of communities within regulation all shape whether energy provision can be more just, democratic and collectively governed.

The scales presented below are based on one or more initiatives documented in the literature. Smaller-scale initiatives were more difficult to identify, possibly because of their limited impact and the nature of smaller-scale communities.

4.1.1. Building-scale resident initiatives

This is a case of several building complexes in Seoul where residents mobilised around mini-photovoltaic (PV) systems for self-consumption. In Complex A, the initiative was proposed and driven by the chairman of the residents' council, who persuaded neighbours and steered approvals from 360 of the 371 units across four buildings, installing 260 W balcony PV panels. In Complex B, the apartment office manager took the lead after council approval, enabling a similar number of units to adopt the same system. Resident households were asked to contribute to the project costs while benefiting from municipal subsidies and income from building assets such as parking, recycling, and advertising. A planned roll-out in Complex C (1110 units) failed after leadership turnover and conflict with new management, underscoring how dependent these initiatives are on a few committed individuals and the building association's internal politics. In this case, the ownership and decision-making typically sit with informal or semi-formal building associations. These projects cover a few hundred apartments and are highly tangible and socially visible[24].

4.1.2. Neighbourhood-scale community projects

In the UK, Nottingham's Meadows, MOZES (Meadows Ozone Energy Services Ltd.) was set up as a community-benefit enterprise to lead local energy projects like solar PVs and storage under a research pilot. Called an "energy community" study, its aim was to shape energy transition policy. A university partner used Meadows for research to test how local energy, governance, and social goals interact. About 60 households joined the pilot, while data collection included the wider neighbourhood. The university provided technical support and used findings to inform regulation, urban law, and energy infrastructure debates. Governance was democratic and community-led, focusing on energy poverty and neighbourhood-level decarbonization[25].

4.1.3. Larger well-developed cooperatives and community utilities

This scale of collaboration is reported mainly in Latin America. They are large rural electricity cooperatives that perform as public utility[26]. In Costa Rica, Coopelesca is a member-owned cooperative, part of a consortium of four rural cooperatives. It owns and operates six hydro plants and a 5 MW solar park, while also purchasing electricity from the state utility and the consortium[27]. Copelec in Chile serves over 82,000 customers across 9050 km of lines in multiple communes, evolving from a small farmers' initiative into a major rural distributor

(24) Seihun Yang et al., "Building Energy Commons: Three Mini-PV Installation Cases in Apartment Complexes in Seoul," *Energies* 14, no. 1 (2021): 249, https://doi.org/10.3390/en14010249

(25) Flora Aubert and Taoufik Souami, "" Communautés Énergétiques " et Fabrique Urbaine. Analyses Croisées Allemagne, France, Royaume-Uni;," *Flux* N° 126, no. 4 (2021): 14–25, https://doi.org/10.3917/flux1.126.0014

(26) Daniel Chavez, "Energy Democracy and Public Ownership," December 10, 2025, https://www.tni.org/en/article/energy-democracy-and-public-ownership

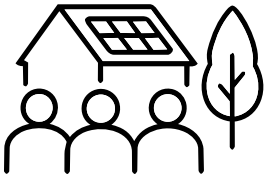
(27) "Cooperativa," *Coopelesca*, n.d., accessed June 3, 2026, https://coopelesca.com/sobre-coopelesca/

under the General Law of Cooperatives and electricity regulation[28]. These cases and Spanish energy coops like Som Energia with over 43,000 members and Goiener with nearly 8,000 members demonstrate that community-based entities can become central infrastructure providers rather than just niche players[29]. The entities operate under classical cooperative principles within national laws, resembling large utilities. Community collaboration is integrated into core national energy infrastructure, not in small pilot projects.

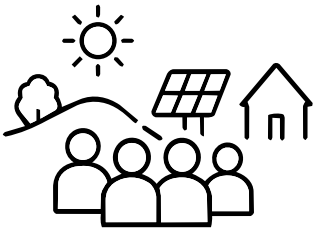
Colombia's "Energy Communities" Initiative Over Two Years
An initiative launched by the Ministry of Energy

Around
17,000
Applications

820
Energy communities in operation



Around
200,000
Beneficiaries



In Colombia, the Ministry of Mines and Energy developed the Energy Communities initiative, engaging agencies and civil-society partners to form groups of users like residents, coops, municipalities, and SMEs. These groups generate, manage, and mainly use renewable energy, often selling surplus to the grid to reduce energy poverty and promote a just energy transition. Within two years, the initiative received about 17,000 applications, with around 820 communities operating, benefiting 200,000 people. In 2023, they were institutionalized to self-consume and sell surplus energy[30].

4.1.4. Hybrid models anchored around the local authority

Such models bring various types of actors into a partnership around the municipality, with broader relations with public-community or public utilities, and/or with citizen groups as co-owners and co-governors.

In Bristol, the municipal actor and its energy company, Bristol Energy, set up with EU funding in 2015 and holding a full energy license, led a project linking the utility and a citizen energy coop to invest in renewables. Returns benefit members via a community fund[31]. These investors are generally the elites and wealthy members of society.

The case of Klimakommune Saerbeck, Germany (around 7300 inhabitants) illustrates a municipality orchestrating multiple wind, solar and biogas projects as part of an integrated climate strategy, with strong ties between political leadership, local associations and citizen groups; the case highlights the need to adapt laws

(28) *Copelec - FENACOPEL*, n.d., accessed June 3, 2026, https://fenacopel.cl/cooperativas/asociadas/copelec-2/

(29) Iñaki Heras-Saizarbitoria et al., "The Emergence of Renewable Energy Cooperatives in Spain: A Review," *Renewable and Sustainable Energy Reviews* 94 (October 2018): 1036–43, https://doi.org/10.1016/j.rser.2018.06.049

(30) Ruth Mayne et al., *Pathways to a Fast and Just Energy Transition: Insights from Clean Energy Case Studies* (Oxfam GB, 2025), https://doi.org/10.21201/2025.000068

(31) Emilia Melville et al., "Equality in local energy commons. A UK case study of community and municipal energy," *Rassegna Italiana di Sociologia*, no. 2 (2018): 315–42, https://doi.org/10.1423/90582

so municipalities can co-own assets with citizens[32]. In France, work by Dudka et al. identifies a "municipal or public utility-led" cluster where cities and public utilities initiate projects to meet climate goals while enabling shared citizen ownership, and a "public-community partnership" cluster where municipalities, citizen co-ops and sometimes private firms establish joint special-purpose vehicles[33]. Examples such as Marmagne's "Smartmagne" project, driven by the mayor and the energy syndicate in partnership with a utility company (VINCI Energies) to promote local PV self-consumption (project discontinued for political reasons) and Les Colibres in Forcalquier illustrate this blending of public authority, community participation and technical expertise[34]. These models operate at the town or small-city scale, embedding community energy in formal local governance structures.

4.1.5. Market-oriented crowdfunding model

Another family of collaborative initiatives is organised around crowdfunding platforms and retail investment, where participation is primarily financial rather than organisational. This also somewhat applies to the previously mentioned Bristol case. The crowdfunding is its most collaborative aspect. In France, the national framework described by Dudka et al. and supported by the Ministry of Ecological Transition promotes a "community participation" cluster in which commercial or mixed public-private developers lead projects and citizens participate via online crowdfunding platforms[35]. The institutional architecture typically includes a non-profit for mobilisation and education, a network of local representatives, and an equity-crowdfunding platform where citizens can buy small shares or bonds. In some variants, citizens "entirely own the project's equity" in financial terms, but they acquire this stake indirectly through the platform rather than through co-operative membership, and they do not exercise day-to-day co-governance. Financing combines crowdfunded capital with public and private investment, and projects are standardised solar or wind farms feeding into the grid under ordinary energy regulation and securities law. These models widen the pool of people who can invest in renewables and align well with project-finance logics, but they thin out the democratic dimension: participation is framed as retail investment and benefit-sharing, not as collective control[36].

4.1.6. Private-project model with community engagement

These are where the collaboration dimension is closer to the corporate social responsibility practices of a corporation, rather than classic cooperative ownership. The Kipeto wind farm in Kenya, for instance, is a privately owned utility-scale project supplying electricity to around 40 thousand households. Local landowners were encouraged to formalise land titles and lease land to the project, and a Community Trust was created to receive 5% of project profits for local development; extensive consultations and legal support were used to address cultural and legal sensitivities. In Pakistan, an NGO-led rural hydro programme financed by international donors, like EU and national partners, combines international and national public finance, private sector participation and community contributions; smaller schemes involve communities in planning, implementation and management, while larger schemes adopt a social enterprise model to cope with coordination challenges, explicitly seeking to address historical land injustices[37]. These cases underscore that, under conditions of energy poverty, weak rural regulation and contested land rights, "community energy" often centres on negotiated benefit-sharing and social licence for developer- or state-led projects rather than on classic cooperative ownership and member voting.

(32) Aubert and Souami, "'Communautés Énergétiques' et Fabrique Urbaine. Analyses Croisées Allemagne, France, Royaume-Uni."

(33) Dudka et al., "A Typology of Community-Based Energy Citizenship."

(34) Aubert and Souami, "" Communautés Énergétiques " et Fabrique Urbaine. Analyses Croisées Allemagne, France, Royaume-Uni."

(35) Dudka et al., "A Typology of Community-Based Energy Citizenship."

(36) Dudka et al., "A Typology of Community-Based Energy Citizenship."

(37) Mayne et al., *Pathways to a Fast and Just Energy Transition*.

4.2. Governance for effective participation

The analysis identifies governance, financing and regulation as the core dimensions shaping collaborative energy models. Together, these dimensions form a governance-oriented framework for understanding how collaborative energy arrangements are initiated, organised, financed and institutionalised, and the extent to which they enable meaningful forms of participation, collective decision-making and community control.

4.2.1. Organisational structure and decision-making

Across the reviewed examples, the initiatives ranged from grassroots-level like residents' councils, housing associations, or local activists that connect energy activities to existing organisational structures or formalizing them as cooperatives or community benefit societies. Governance is strongly shaped by the level of informality and person-dependence, such as in building cases and/or by the codified and democratic (general assemblies, elected boards) in coop cases. Where initiation is municipal and projects are co-developed and co-owned with citizen co-ops and other local actors through joint entities, governance is explicitly negotiated, with municipal representatives and coop delegates sharing board seats and decision rights in project companies, while coops maintain their own internal democratic structures. By contrast, community-participation/market-driven models are private actor/developer or utility-initiated, with citizens invited into pre-structured arrangements mainly as investors. Organizationally, they resemble conventional project finance, and governance is more likely to be with the private commercial actors.

Energy coops, especially the rural ones in Brazil and Colombia, represent the most institutionalised forms of community organisation and governance. They have a well-developed democratic governance but operate as full utilities with large memberships, professional staff, and formalized in the country's energy system. Their operational logic is based on national frameworks that historically recognised collective entities (coops, associations, community organisations) as energy actors in generation and supply. Organisation, initiation and governance are explicitly codified in law and policy, turning community energy from a series of projects into a recognised institutional form.

4.2.2. Capital and financing

Financial models mirror the organisational logics. Resident- and neighbourhood-led initiatives rely on micro-investment and local subsidies: households in the Seoul apartment cases, for instance, invest modest sums in mini-PV, with municipal programmes reducing upfront costs; benefits are felt as bill savings rather than direct financial returns. Residents' co-ops and social enterprises use member equity and community shares as their financial backbone, complemented by ethical bank loans and grants; returns could remain deliberately modest and aligned with cooperative principles.

Municipal-community hybrid models employ blended public–community capital but also resort to private financing. Municipalities and public utilities could provide equity, guarantees and in-kind contributions, co-ops and residents add community capital (shares, bonds, crowdfunding) and banks, plus national or international donors or funding programmes supply debt and grants. This structure enables larger, more complex projects while preserving a real, if minority, financial role for communities. In these community-participation/market-driven models, citizens contribute via crowdfunding or local bond schemes, but their capital is a small share of the overall stack and does not translate into control.

The Brazilian and Colombian programs rely on utility-style or programme-layered finance. They fund operations and reinvestment from tariff revenues and long-term loans from public and commercial lenders. Brazilian energy coops combine member equity with access to credit and regulatory arrangements like net

metering that monetise shared generation over time. Colombian energy communities draw on multi-source finance: national funds, local government contributions, private partners and limited community resources to anchor projects locally without overburdening low-income households. In all three, there is an established system for community entities to access financing.

4.2.3 Regulatory frameworks

Regulation determines whether these organisational and financial arrangements remain marginal or become structurally embedded in bigger systems. At one end, the building-scale self-consumption projects operate within generic housing, safety and micro-generation rules, with no special status for "community energy"; even though the case of Seoul had some policy support.

At the other end, citizen coops and community-benefit entities are underpinned by cooperative law. Still, their ability to act as generators or suppliers is contingent on energy market regulation: licensing regimes, grid access, tariff structures and renewable support schemes. Where these are restrictive, as in Spain, coops are forced into complex workarounds and limited market roles.

Energy regulation sets standard requirements for all actors. Experimental smart-grid and storage projects often rely on pilot or the development of the national utility entity and the national grids to test new arrangements. Municipal-community hybrid models navigate between local regulation, national laws and energy policy, and in the latter case also financial regulation.

Well-established co-ops and the Brazilian and Colombian frameworks show the strongest regulatory institutionalisation of community collaboration. Rural coops are recognised in national electricity laws as distribution concessionaires or licensees with defined territories and obligations, integrating community ownership into mainstream utility regulation. In Brazil, cooperative and energy regulations jointly define energy co-operatives and their rights to develop shared generation and allocate benefits. In Colombia, Decree 2236 (2023) creates a formal category of energy communities with specific roles and access to public support in non-interconnected zones. In these settings, community initiatives are not exceptions operating in regulatory grey zones; they are explicitly defined actors in the legal architecture of the energy system.

To sum up, the organizational and governance structures of various energy community models revealed the extent to which communities exercise meaningful control over energy systems. For example, the financial arrangement either reinforces or weakens that potential, depending on whether capital comes in forms that link contribution to formal decision-making or merely invite citizens to add a small share of funding without influence. The regulatory frameworks decide whether these arrangements remain local, fragile experiments or become normalised, systemic actors in the energy landscape, by either explicitly recognising community entities in energy law and policy (as in coops, rural utilities, Brazilian and Colombian energy communities) or keeping them in generic, marginal or purely financial roles.

4.3. Collaborative energy initiatives in Lebanon

Amid Lebanon's complex setting and protracted crises, especially in the electricity sector, a few collective energy initiatives have emerged that are somewhat similar to those reported in the global literature. These exhibit, to a certain extent, a level of the normative principles associated with cooperative organisation from democratic decision-making, shared economic participation, community benefit, to mutual learning.

Across municipal, neighbourhood, and building levels, actors have developed hybrid, improvised, and often informal modes of cooperation, referred to as energy communities (Table 2). This subsection explores these empirical examples from municipalities (Qabrikha, Baaloul, Hasbaya, Bint Jbeil, Nabatiyeh), urban neighbourhoods (El-Mina in Tripoli and the southern suburb of Beirut), and a building committee in Beirut.

The municipal initiatives demonstrate partial adherence to cooperative principles. In most cases, there is some community participation, but this does not ensure justice and equality, or inclusivity. In Qabrikha, participation was limited to households able to install meters. In Baaloul, the funding came from the diaspora with external grants and consequently, decision-making ensured a level of participation through a multi-stakeholder committee, yet this arrangement also reproduced inequalities between those able to invest and those who could not. The same logic applies in the energy arrangements adopted in Hasbaya, Bin Jbeil and Nabatieh, where diverse stakeholders enter onto a partnership with the municipality.

In contrast, in the urban neighbourhood case of Tripoli's El-Mina, dimensions of cooperation, solidarity and mutual aid are more prominent, while participatory governance is almost non-existent. The model catalysed new forms of collective action: buildings negotiated installations collectively, rooftop space was shared between neighbours and with church land, and around ninety households formed micro collectives with shared inverters, some pooled maintenance funds, and they had to adopt consensus-based decision-making.

The building-level model most closely approximates a formal cooperative organisation[38]. The case of the Hamra building consists of an elected building committee that implemented equal cost-sharing for shared infrastructure, collectively evaluated suppliers, and established transparent governance procedures, including voting, minutes, and conflict resolution. A resident "champion" facilitated education, technical learning, and the creation of shared basis for a technical system, approaching the cooperative principles of democratic control, member economic participation, and ongoing capacity-building. This model is, however, not without its faults, as it remains limited to a small, homogeneous upper-middle-income community.

Lebanese initiatives show emerging collaborative energy arrangements, mostly as hybrid, informal models. Municipal efforts centre on local authorities but rely on donors, networks, diaspora funding, legal ambiguity, and EDL relations. El-Mina's neighbourhoods exhibit cooperation and mutual aid but lack strong participatory governance. The Hamra building example reflects a resident-led initiative with voting, minutes, supplier evaluation, shared costs, and conflict resolution, yet it is limited to a small, homogeneous community.

These cases show that the Lebanese energy transition is more than a case of technology adoption, grids, or tariffs. It also concerns social relations and politics: residents negotiate rooftop space, building committees handle conflicts, municipalities coordinate with donors and communities, diaspora financing influences participation, generator owners and local power dynamics affect implementation, and legal frameworks recognize or overlook collective entities. Essentially, the transition revolves around governance, participation, ownership, and social organizing as much as generation, production, and distribution.

These cases challenge the binary view of energy reform as either restoring state provision or shifting to private solutions. The initiatives are limited and uneven, and should not be romanticised, but reveal emerging alternatives within existing systems. These arrangements aren't replacements for a national system but demonstrate how collaborative energy governance is underway and where legal, financial, and regulatory support may be needed.

This energy transition is not only about generation and distribution, but also about governance, participation, ownership, and social organization.

(38) Ebla Research Collective, *I Am, as You Can See, the Local Government, the Electricity Company and Much More: Building Committees as Spaces of Social Organizing in Beirut*.

Table 2: Selected initiatives of collaborative energy models in Lebanon

	Hybrid models anchored around the local authority (Mostly rural or small cities municipalities)	Neighbourhood scale community project – El-Mina area in Tripoli	Building scale resident initiative – Hamra building case
Examples	Qabrikha, Baaloul, Deir el Ahmar, Hasbaya, Bint Jbeil, Nabatiyeh–Najdeh Hospital.	Neighbourhood solarization in Tripoli.	Beirut 21-apartment/8-shop building.
Initiation	Municipality-led with donors and/or diaspora.	Led by local informal leaders, diaspora, and occasionally municipal deputies.	Initiated by one resident champion; implemented via building committees.
Governance/ ownership	Semi-formal committees: Qabrikha Energy Committee; Baaloul mixed governance (municipality + charity reps); EDL-municipality in Deir el Ahmar; Hasbaya committees; Nabatiyeh municipal partnership.	Informal governance via local leader, church, technicians; small group coordination; WhatsApp groups. No formal entities.	Voting-based building committees; shared financial burden; conflict management; standardized procurement; clear rules for common services.
Capital and Financing	Primarily donor-funded (EU, USAID, Caritas, UNDP); diaspora crowdfunding (Baaloul); municipal land provision (Qabrikha).	Fully diaspora-funded; households contribute to shared maintenance pots; some independent household investments.	Fully resident-funded: shared chassis + individual systems; equal cost-sharing negotiated for shops/apartments.
Regulatory Framework	Works around the formal regulation and EDL monopoly; exceptional net-metering approvals (Qabrikha); takes form of a pilot project without any legal cooperatives.	Mostly extra-legal/informal; did not attempt EDL meter access; used max spaces of rooftops.	Fully within private property law; parallel to generators; no access to collective net-metering; legal clarity limited to building-level ownership.
Technical Model	Solar farms or clustered systems on municipal/ public land: Qabrikha hybrid grid; Baaloul PV + generator; Deir el Ahmar MV system; Nabatiyeh hospital PV + solar car park; Bint Jbeil urban-green plan.	Patchwork of rooftop PVs; use of church land (440 panels); independent 3–5 amp systems; shared inverter-battery systems/household for 90 households.	Shared rooftop chassis; common-services PV system; individual PV allocations per apartment; standardized suppliers; heavy-duty batteries for elevators; incremental upgrades.
Challenges	Political dynamics and tensions; weak EDL; legal ambiguity; dependence on donors, municipal council members' network and community; sustainability issues (what to do with these systems in connection to EDL and national grid).	Rooftop scarcity; intimidation by generator owners; slow installations; unequal access; governance fragmentation and absence of participatory governance system.	Conflicts among owners; committee delays; technical sizing; uneven adoption; water pump and seasonal energy gaps.
Independence/ Sustainability/ replicability	Needs legal reforms + EDL strengthening; scalable on case-by-case.	Highly replicable informally in dense low/ mid-income areas in terms of maximizing space use and can benefit from DRE law if well designed; only scalable through diaspora funding.	Very replicable building-by-building; strong dependence on leadership and committee functionality.

5. Conclusion: Just energy imaginaries for alternative political imaginaries

Despite advances in renewable energy, research on collaborative and community energy in Lebanon is minimal, and globally, social, political, and governance aspects are often overlooked. The case studies show diverse models - from resident initiatives and neighbourhood projects to municipal partnerships, cooperatives, and financing arrangements. Instead of viewing these as isolated cases, they are categorized based on organization, governance, financing, and regulation, thus offering a framework to understand how these arrangements are created, maintained, and institutionalized across contexts.

The report highlights how energy transitions are shaped by ownership, participation, financing, legal recognition and social relations around the production and distribution of energy. In Lebanon, where discussions of the electricity sector are often framed under a state and/or private sector model, the cases examined reveal emerging collaborative and hybrid arrangements that attempt to respond to fragmented energy provision in different ways. While these face many challenges, they also point to alternative forms of coordination, shared infrastructure and collective management that remain insufficiently documented. This is particularly relevant for the Arab region, where little information was found on collaborative energy models and where energy transition debates remain largely centred on technical deployment, state utility reform, private investment and public-private arrangements.

Hence, research frameworks should explore, in addition to the policy focus and a top-down approach, the socio-technical dimensions with a focus on people's aspirations and energy needs, including ways to accelerate participation and democratic governance. This is particularly relevant for the Arab region, where little information was found on such models and where discussions on energy transition remain often centred on technical deployment, state utility reform, private investment and public-private arrangements. The Lebanese cases can therefore contribute modestly to a regional discussion by making visible collaborative and hybrid forms of energy governance that remain insufficiently documented.

Legal studies are needed to establish laws and institutional frameworks that encourage collaboration, rather than solely prioritizing technical aspects of generation, production, and distribution. While the DRE law is one step in the right direction, it does not address cooperative principles and democratic governance. Hence, it is timely to consider the regulatory requirements for energy decentralization and the shift to renewables as a facilitator and part of the post-2024 reconstruction planning.

Other legal areas that require scrutiny in relation to the energy transition include laws for the establishment of cooperatives, originally concerned with agricultural cooperatives and that do not allow for the complexity of an energy cooperative. Another set of laws that need reconsideration are those in relation to property management, namely the building committees, particularly in relation to the co-ownership of energy systems and use of shared space for solar PVs, and the new renewable energy framework law (DRE) especially to ensure the latter's application and effectiveness. At the highest level, the whole country needs to consider social and solidarity economy frameworks, along with the approach that was adopted in Seoul more than ten years ago. This includes innovative energy financing schemes that foster community energy aligned with principles of justice, rather than models that accentuate inequalities and lead to exclusion. Finally, and most importantly, more real-life case studies are needed to help us better understand the challenges of embedding energy justice in efforts towards a local energy community.

Collaborative energy solutions offer more than a practical response to an urgent need. The energy-justice literature has long argued that technological and technocratic interventions alone cannot produce just energy outcomes; new political approaches are also required. In Lebanon, could new energy arrangements create opportunities for new forms of political and community engagement centred on collaboration, stronger local resilience, and greater independence from political patronage?

References

Abi Ghanem, Dana. "Energy, the City and Everyday Life: Living with Power Outages in Post-War Lebanon." *Energy Research & Social Science* 36 (2018): 36–43. https://doi.org/10.1016/j.erss.2017.11.012

Ahmad, Ali, Neil McCulloch, Muzna Al-Masri, and Marc Ayoub. "From Dysfunctional to Functional Corruption: The Politics of Decentralized Electricity Provision in Lebanon." *Energy Research & Social Science* 86 (April 2022): 102399. https://doi.org/10.1016/j.erss.2021.102399

Apergi, Maria, Laima Eicke, Andreas Goldthau, et al. "An Energy Justice Index for the Energy Transition in the Global South." *Renewable and Sustainable Energy Reviews* 192 (March 2024): 114238. https://doi.org/10.1016/j.rser.2023.114238

Aubert, Flora, and Taoufik Souami. "'Communautés Énergétiques' et Fabrique Urbaine. Analyses Croisées Allemagne, France, Royaume-Uni:" *Flux* N° 126, no. 4 (2021): 14–25. https://doi.org/10.3917/flux1.126.0014

Bauwens, Thomas, Robert Wade, and Matthew Burke. "The Energy Commons: A Systematic Review, Paradoxes, and Ways Forward." *Energy Research & Social Science* 118 (December 2024): 103776. https://doi.org/10.1016/j.erss.2024.103776

Chavez, Daniel. "Energy Democracy and Public Ownership." December 10, 2025. https://www.tni.org/en/article/energy-democracy-and-public-ownership

"Cooperativa." *Coopelesca*, n.d. Accessed June 3, 2026. https://coopelesca.com/sobre-coopelesca/

Copelec - FENACOPEL. n.d. Accessed June 3, 2026. https://fenacopel.cl/cooperativas/asociadas/copelec-2/

Dudka, Aurore, Nuria Moratal, and Thomas Bauwens. "A Typology of Community-Based Energy Citizenship: An Analysis of the Ownership Structure and Institutional Logics of 164 Energy Communities in France." *Energy Policy* 178 (July 2023): 113588. https://doi.org/10.1016/j.enpol.2023.113588

Ebla Research Collective. *I Am, as You Can See, the Local Government, the Electricity Company and Much More: Building Committees as Spaces of Social Organizing in Beirut*. Ebla Research Collective, 2024. https://eblaresearch.org/2024/03/read-our-research-report/

Emilia Melville, Kate Burningham, Ian Christie, and Ben Smallwood. "Equality in local energy commons. A UK case study of community and municipal energy." *Rassegna Italiana di Sociologia*, no. 2 (2018): 315–42. https://doi.org/10.1423/90582

Gui, Emi Minghui, and Iain MacGill. "Typology of Future Clean Energy Communities: An Exploratory Structure, Opportunities, and Challenges." *Energy Research & Social Science* 35 (January 2018): 94–107. https://doi.org/10.1016/j.erss.2017.10.019

Haffar, Dana. "Harnessing Solar Energy in Lebanon with the Support of USAID." LAU News, Lebanese American University, August 25, 2022. https://news.lau.edu.lb/2022/harnessing-solar-energy-in-lebanon-with-the-support-of-usaid.php

Heras-Saizarbitoria, Iñaki, Lucía Sáez, Erlantz Allur, and Jon Morandeira. "The Emergence of Renewable Energy Cooperatives in Spain: A Review." *Renewable and Sustainable Energy Reviews* 94 (October 2018): 1036–43. https://doi.org/10.1016/j.rser.2018.06.049

Hostettler, Silvia. "Energy Challenges in the Global South." In *Sustainable Access to Energy in the Global South*, edited by Silvia Hostettler, Ashok Gadgil, and Eileen Hazboun. Springer International Publishing, 2015. https://doi.org/10.1007/978-3-319-20209-9_1

Information International. " مولد كلفة وتلوث11,000المولدات حل وأزمة ." The Monthly, August 19, 2024. https://monthlymagazine.com/article/5389/--مولد-كلفة-وتلوث11000المولدات-حل-وأزمة-

Mayne, Ruth, Dante Dalabjan, and Mateo Zuluaga. *Pathways to a Fast and Just Energy Transition: Insights from Clean Energy Case Studies*. Oxfam GB, 2025. https://doi.org/10.21201/2025.000068

Mohammad Al Jajj, Hadi Abou Moussa, and Grace Mikhael. *The 2023 Solar PV Status Report for Lebanon*. The Lebanese Center for Energy Conservation (LCEC), 2025.

Moroni, Stefano, Valentina Alberti, Valentina Antoniucci, and Adriano Bisello. "Energy Communities in the Transition to a Low-Carbon Future: A Taxonomical Approach and Some Policy Dilemmas." *Journal of Environmental Management* 236 (April 2019): 45–53. https://doi.org/10.1016/j.jenvman.2019.01.095

Nucho, Joanne Randa. "Post-Grid Imaginaries: Electricity, Generators, and the Future of Energy." *Public Culture* 34, no. 2 (2022): 265–90. https://doi.org/10.1215/08992363-9584764

Reuters. "Lebanon Receives $250 Million World Bank Loan to Ease Power Problems." *Reuters*, April 24, 2025. https://www.reuters.com/world/middle-east/lebanon-receives-250-million-world-bank-loan-help-with-electricity-problems-2025-04-24/

Rossetto, Nicolò, Stefano F. Verde, and Thomas Bauwens. "A Taxonomy of Energy Communities in Liberalized Energy Systems." In *Energy Communities*. Elsevier, 2022. https://doi.org/10.1016/B978-0-323-91135-1.00004-3

Shehabi, Ala'a, and Muzna Al-Masri. "Foregrounding Citizen Imaginaries: Exploring Just Energy Futures through a Citizens' Assembly in Lebanon." *Futures* 140 (June 2022): 102956. https://doi.org/10.1016/j.futures.2022.102956

Sweeney, Sean. *Towards a New International Energy Order (NIEnO): At COP 30, the South Must Fill the Void in Global Climate Leadership*. TUED, 2025.

UNDP. "CEDRO V." UNDP. Accessed November 24, 2025. https://www.undp.org/lebanon/projects/cedro-v

USAID. "USAID Launches $29 Million Project to Deliver Reliable Energy across Lebanon." *U.S. Embassy in Lebanon*, October 6, 2021. https://lb.usembassy.gov/usaid-reliable-energy-lebanon/

Walker, Gordon, and Patrick Devine-Wright. "Community Renewable Energy: What Should It Mean?" *Energy Policy* 36, no. 2 (2008): 497–500. https://doi.org/10.1016/j.enpol.2007.10.019

Watson, J., BYRNE, R., OPAZO, J, TSANG, F, MORGAN JONES, M., and DIEPEVEEN, S. *What Are the Major Barriers to Increased Use of Modern Energy Services among the World's Poorest People and Are Interventions to Overcome These Effective?* CEE protocol 11-004. Collaboration for Environmental Evidence, 2011.

Yang, Seihun, Weiming Chen, and Hana Kim. "Building Energy Commons: Three Mini-PV Installation Cases in Apartment Complexes in Seoul." *Energies* 14, no. 1 (2021): 249. https://doi.org/10.3390/en14010249

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