Regulatory Innovation for Co-operative Ownership and Governance in Canadian Energy Grids:

A ROADMAP FOR RESILIENCE

INTERNATIONAL SCAN SUMMARY REPORT

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Funding for this research was provided by Natural Resources Canada as part of their the Energy Innovation Program – Smart Grid call for proposals. We are also indebted for the feedback received on the report during the 3rd annual Community and Co-operative Energy Forum held at Royal Roads University in August 2025, and specifically to Roger Peters and Dennis O'Farrell for their detailed suggestions as well as Martin Boucher for his leadership in the CECC.

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Art direction, design and layout by BRONWIN PARKS, Feisty Creative

HOW TO CITE THE STUDY:
Julie MacArthur, Khaoula Bengezi, Dan Curwin, Niels Vilstrup, Karl Janelle, Derya Tarhan, Karen Miner, Chad Walker. 2026. Regulatory innovation for co-operative ownership and governance in Canadian energy grids: A Roadmap for Resilience. Community Energy Co-operative Canada & Royal Roads University. https://www.ceco-operative.ca/.

THIS STUDY WAS PUBLISHED IN PARTNERSHIP WITH

EXECUTIVE SUMMARY

Community and co-operative ownership of energy infrastructure is a growing trend worldwide, as citizens and policymakers seek to ensure energy transitions are both just and resilient. This report investigates how community and co-operative ownership models can accelerate Canada's energy transition while promoting equity, resilience, and democratic participation. Drawing on international case studies of projects and policies from Denmark, Germany, the United Kingdom, the United States, Australia, and Aotearoa New Zealand, it identifies regulatory innovations and policy supports that enable communities to own and manage distributed energy resources (DERs) and smart-grid infrastructure.

Ownership of energy infrastructure directly influences the inclusiveness, pace, and direction of energy transitions. Worldwide, thousands of community and co-operative projects already play pivotal roles in renewable power generation, heating, storage, distribution, and efficiency. Canada, by contrast, has only 82 active energy co-operatives that collectively own or co-own 214 renewable projects (≈184 MW). Scaling this sector requires policies that recognize diverse local contexts and address the persistent imbalance between community and corporate market power.

Five interconnected policy domains underpin successful community and co-operative energy ecosystems:

1. **STRONG LEGAL FRAMEWORKS FOR MUTUAL OWNERSHIP** provide the basis for collective governance and equitable benefit-sharing.
2. **MARKET ACCESS** gives citizens the right to generate, store and share energy by ensuring fair grid interconnection, (virtual) net-metering and ability to engage in credit sharing.
3. **DEMAND GUARANTEES AND INVESTMENT INCENTIVES** stabilize revenue streams through instruments such as feed-in tariffs (FITs), long-term low-interest loans, community carve-outs, and local-ownership requirements.
4. **REGIONAL RESOURCE PLANNING AND ACCESS TO INPUTS** embed participatory planning, fair access to land and interconnection capacity, and recognition of the added social value of projects for community wealth building.
5. **CAPACITY-BUILDING SUPPORTS** include grants, patient capital, advisory services, and community-benefit indices to enable marginalized and low-income groups to participate and recognize their distinct value.

International evidence shows that robust legal recognition and financial tools, including FITs, co-operative-specific finance programs, and dedicated funds, allow communities to anchor energy resilience, disaster response capacity and affordability, particularly in rural and remote regions. Equity-centered design, low-barrier membership, and inclusive subscription or on-bill financing schemes ensure participation of renters, Indigenous communities, and low-income households. Where enabling legislation, export guarantees, dedicated funds, or experimental policy sandboxes are provided, communities leveraged these tools to scale projects, enhance equity and embed long-term resilience.

The report concludes that no single policy model fits all. Effective regulatory innovation must be tailored to jurisdictional contexts, balancing flexibility with targeted support. A coordinated Canadian approach combining enabling legislation, investment incentives, and long-term capacity-building could unlock the transformative potential of community and co-operative energy in delivering just, democratic, and resilient energy transitions.

SOMMAIRE EXÉCUTIF

Alors que les citoyens et les décideurs politiques cherchent à garantir que les transitions énergétiques soient à la fois justes et résilientes, la propriété communautaire et co-operative des infrastructures énergétiques est une tendance mondiale croissante. Ce rapport examine comment ces modèles de propriété collective peuvent accélérer la transition énergétique au Canada tout en favorisant l'équité, la résilience et la participation démocratique. S'appuyant sur des études de cas internationaux de projets et de politiques menés au Danemark, en Allemagne, au Royaume-Uni, aux États-Unis, en Australie et en Nouvelle-Zélande, il identifie les innovations réglementaires et les mesures de soutien politiques qui permettent aux communautés de posséder et de gérer des ressources énergétiques distribuées (RED, en anglais DERs) et des infrastructures de réseaux intelligents.

La propriété des infrastructures énergétiques influence directement le caractère inclusif, le rythme et l'orientation des transitions énergétiques. À l'échelle mondiale, des milliers de projets communautaires et coopératifs jouent déjà un rôle central dans la production, le chauffage, le stockage, la distribution et l'efficacité des énergies renouvelables. Le Canada, en revanche, ne compte que 82 co-operatives énergétiques actives, qui possèdent en totalité ou en partie 214 projets de production d'énergie renouvelable (≈184 MW). Pour développer ce secteur, ce rapport met en lumière la nécessité des politiques publiques qui reconnaissent la diversité des contextes locaux et remédient au déséquilibre persistant entre le pouvoir des communautés et celui des entreprises privées sur le marché.

Cinq domaines de politiques publiques interdépendants contribuent à la réussite des écosystèmes énergétiques communautaires et coopératifs :

1. **DES CADRES JURIDIQUES SOLIDES POUR LA PROPRIÉTÉ MUTUELLE** constituent la base d'une gouvernance collective et d'un partage équitable des bénéfices.
2. **ACCÈS AU MARCHÉ** donne aux citoyens le droit de produire, stocker et partager de l'énergie en garantissant une interconnexion équitable au réseau, un comptage net (virtuel) et la possibilité de participer au partage de crédit.
3. **GARANTIES DE LA DEMANDE ET INCITATIONS À L'INVESTISSEMENT** stabilisent les flux de revenus grâce à des instruments tels que les tarifs de rachat garantis (en anglais Feed-in tariffs, FIT), les prêts à long terme à faible taux d'intérêt, les exemptions communautaires et les exigences en matière de propriété locale.
4. **PLANIFICATION RÉGIONALE DES RESSOURCES ET ACCÈS AUX INTRANTS** intègrent la planification participative, l'accès équitable à la terre et à la capacité d'interconnexion, ainsi que la reconnaissance de la valeur sociale ajoutée des projets pour la création de richesse communautaire.
5. **SUPPORT POUR LE RENFORCEMENT DES CAPACITÉS** comprend des subventions, des capitaux patients, des services de conseil et des indices de bénéfices pour la communauté afin de permettre aux groupes marginalisés et à faibles revenus de participer et de reconnaître leur valeur distinctive.

Des données internationales montrent qu'une reconnaissance juridique solide et des outils financiers, notamment des tarifs d'achat garantis, des programmes de financement spécifiques aux co-operatives et des fonds dédiés, permettent aux communautés d'ancrer la résilience énergétique, la capacité de réponse aux catastrophes et l'accessibilité financière, en particulier dans les régions rurales et isolées. Une conception axée sur l'équité, une adhésion sans obstacle et des systèmes d'abonnement inclusifs ou de financement sur facture garantissent la participation des locataires, des communautés autochtones et des ménages à faible revenu. Lorsque des lois habilitantes, des garanties à l'exportation, des fonds dédiés ou des zones d'expérimentation politique sont mis en place, les communautés ont tiré parti de ces outils pour développer des projets, renforcer l'équité et ancrer la résilience à long terme.

Le rapport conclut qu'il n'existe pas de modèle politique unique qui convienne à tous. Une innovation réglementaire efficace doit être adaptée au contexte juridictionnel, en trouvant un équilibre entre flexibilité et soutien ciblé. Une approche canadienne coordonnée, combinant une législation habilitante, des incitations à l'investissement et un renforcement des capacités à long terme, pourrait libérer le potentiel transformateur de l'énergie communautaire et co-operative pour assurer une transition énergétique juste, démocratique et résiliente.

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ACRONYMS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ACT	Australian Capital Territory
CE	Community & Co-operative Energy
CEDIF	Community Economic Development Investment Fund
CEN	Community Energy Network (New Zealand)
CfD	Contract for Difference
DER	Distributed Energy Resources
DNO	Distribution Network Operator
DSO	Distribution System Operator
EEG	Erneuerbare-Energien-Gesetz (Renewable Energy Sources Act, Germany)
EPA	U.S. Environmental Protection Agency
EU	European Union
FCA	Financial Conduct Authority (U.K.)
FIT	Feed-in Tariff
GBE	Great British Energy
IEA	International Energy Agency
IRA	Inflation Reduction Act (U.S.)
ISO/RTO	Independent System Operator / Regional Transmission Organization
LGC/STC	Large- / Small-Scale Generation Certificate (Australia)
MBIE	Ministry of Business, Innovation and Employment (New Zealand)
MW / kW / kWh	Megawatt / Kilowatt / Kilowatt-hour
NEM	National Electricity Market (Australia)
NESO	National Energy System Operator (U.K.)
NGO	Non-Governmental Organization
PPA	Power Purchase Agreement
PUC	Public Utility Commission (U.S.)
REC	Renewable Energy Community
RET	Renewable Energy Target (Australia)
RPS	Renewable Portfolio Standard
SEG	Smart Export Guarantee (U.K.)
TSO	Transmission System Operator
ToU	Time-of-Use (tariff)
VPP	Virtual Power Plant

1 INTRODUCTION

Globally, thousands of community and co-operative owned energy projects have developed in diverse areas of activity central to the energy transition: renewable power generation, heating, cooling, electricity distribution, storage, retrofits, installation and retail, and peer to peer sharing. These projects illustrate both technical and business model innovation, as locally rooted actors build on established relationships of trust to pilot and test new energy initiatives and make technologies more broadly accessible across societies. This report draws on international experiences of community and co-operative development to inform the scale up and development of this sector across Canadian provinces and territories. It overviews the range and types of enabling policies that exist internationally, and profiles a diversity of projects that illustrate the spectrum of activities, structures and benefits that can arise.

In Europe there are around 3,500 energy co-operatives, rising to nearly 10,000 when the count includes broader 'energy communities' (local benefit companies, non-profits, and other legal forms) (Wierling et al 2023). In the U.S. there are more than 900, which largely reflects distribution and generation co-operatives in a broader utility sense, not necessarily small community generation projects. These community and co-operative energy projects across vastly different resource and developmental contexts around the world, from Canada to South Africa. These projects are driven by policy initiatives aimed at decarbonization, democratization, and lowering the cost of energy, but also in response to a strong need to develop disaster resilience and local energy infrastructure capacities. For example, in Japan, dozens of co-operative projects emerged after the Fukushima nuclear disaster. Or, in Costa Rica starting in the 1960s with the assistance of funding from the U.S. government and the sector association of rural electric co-operatives (NRECA). The total number of community and co-operative projects worldwide (including smaller, informal projects, community groups, micro-projects) is likely much higher, especially when you consider developing countries or decentralized rural areas.

In Canada, recent research to understand the scope of co-operative activity in renewable electricity and grid resilience (supply, distribution and demand services)[1] resulted in just 82 active energy co-operatives in total, with 40 engaged in project development activities, 32 organizations focused on electricity distribution, 4 providing retrofit and installation services, 4 in retail, 1 developing and running a smart grid, and a recently incorporated national association of energy co-ops (MacArthur et al., 2025). These co-operatives own or co-own 214 operational renewable electricity generationprojects, accounting for 184MW of installed capacity. These include 195 solar, 9 wind, 7 biomass, and 3 hydro projects. If Nova Scotia's community investment fund (CEDIF) projects are included these add a further 102MW of capacity, all in wind (MacArthur et al., 2025)[2]. Despite this research we need to know far more about how to maximize the co-benefits of the co-operative model to aid in just energy transitions and understand how policymakers in other jurisdictions internationally are facilitating the development of this innovative and important sectoral niche.

Existing research on community and co-operative energy illustrates that ownership of energy infrastructure shapes the pace, direction and inclusiveness of energy transitions. Community ownership structures (co-operatives, non-profit associations, community benefit companies and trusts) can aggregate households and neighbourhoods into active participants and decisionmakers rather than passive users or individualised prosumers. These local initiatives also mobilize new investment, de-risk innovation through shared ownership and enable access to targeted grants. Importantly, community-based actors also often craft innovations that achieve equity goals (targeting renters, rural communities or low-income communities) leading to a just low-carbon transition. It can play a particularly important role in distributed energy resources (DERs) and smart grid development because the successful both rely on the active engagement of end-users, social acceptance and institutional support that arises from place-based actors across diverse local contexts. This means that DERs can be embedded in communities to address and respond to local priorities more effectively, such as backup power for critical services, or levers of economic and social development.

The preliminary sections of this report define community energy and co-operative energy before presenting a framework for understanding the potential policy supports. It then outlines policy innovations and project designs across the six countries before closing with a summary discussion aimed at helping to translate these findings into the Canadian context[3].

1 https://www.epa.gov/sites/default/files/2016-03/documents/background_paper.pdf
2 Within the broader energy sector, including fossil fuels, Canada also has a network of natural gas distribution co-operatives as well as a co-operative-owned oil refinery (CCRL), as well as a number of fuel additive (biodiesel) co-operatives.
3 Subsequent phases of the broader Natural Resources Canada (NRCan) Funded Roadmap for Regulatory Resilience project led by Community Energy Co-operative Canada will include a provincial and territorial mapping phase, as well as phase of provincial roadmap workshops with practitioners and policymakers through 2025 and 2026.

2 ☼ COMMUNITY AND CO—OPERATIVE ENERGY

Community Energy (CE), broadly defined, is the direct community ownership of and participation in renewable energy and energy transition initiatives. Within this growing field, co-operatives are a key organizational form through which communities develop, operate and benefit from energy infrastructure ownership, such as new generation, storage and microgrid projects. Globally, CE has several different common ownership structures which reflect local regulatory and cultural dynamics. While in the EU (particularly Denmark and Germany) and U.K., co-operatives and community benefit societies are common, whereas in the US, Australia, and New Zealand, a more diverse set of ownership structures including energy trusts are more common, though not exclusive. Figure 1 below illustrates some of the different types of community energy (or energy community - EC- in Europe).

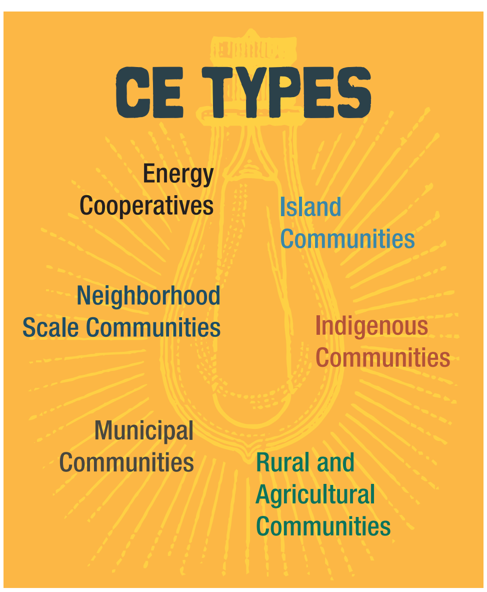

FIGURE 1 - TYPES OF ENERGY COMMUNITIES
SOURCE: AHMED ET AL. (2024)

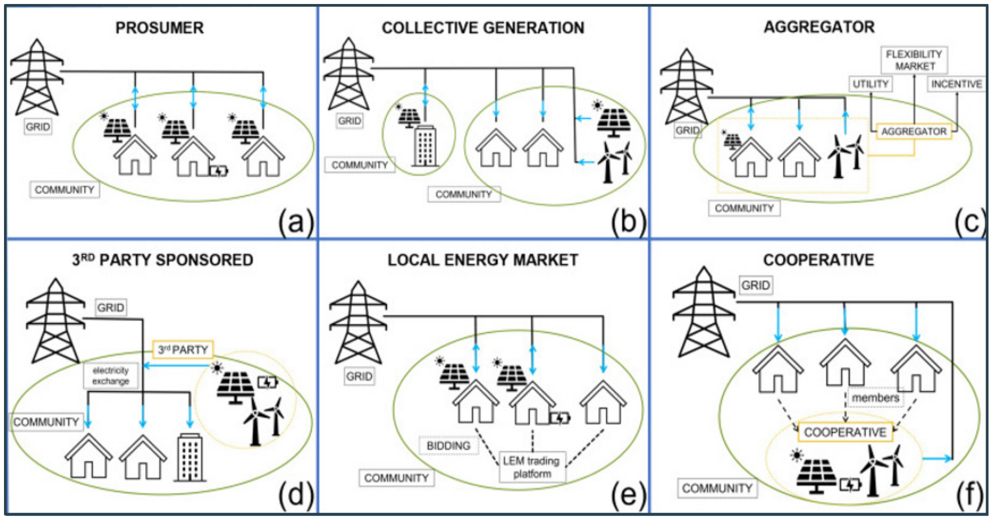

FIGURE 2 - COMMUNITY ENERGY BUSINESS MODELS SOURCE: BARABINO ET AL. (2023)

The focus of this project is regulatory innovation to support co-operative energy initiatives in Canada; it is important to highlight that internationally the policy frameworks that support co-operatives are often targeted at the broader 'community' sector. As a result, this international scan report uses the term community energy (CE) throughout. However, we focus the analysis on the co-operative projects that have emerged from these community energy policies, their benefits, and any specific co-operative policy or legislation where applicable.

Diversity of community energy in practice

1. **INSTITUTIONAL FORM:** As stated earlier in this section, co-operatives are only one institutional form through which community energy initiatives are realized. The breadth of other organizational forms include non-profit organizations, community investment funds, Indigenous nations, community trusts, and even non-incorporated groups. While the focus of this report will be on energy co-operatives, it is important to recognize international diversity in CE and explore potential collaborations within the broader community energy field. Furthermore, as Section 3 will demonstrate, legal and regulatory frameworks can significantly support or hinder the effectiveness of a specific ownership model in a given jurisdiction.

2. **BUSINESS MODEL:** Furthermore, these community energy organizations may deploy various business models, which are presented in Figure 2 above. For instance, some community energy initiatives are established as collective solar panel purchasing groups, whereby community members collectively negotiate with suppliers but install and use energy from household systems individually as prosumers. Meanwhile, others act as aggregators or even local energy markets, as made possible by virtual power plant (VPP) regulations. Community or virtual net metering or community solar regulations - allow for collective generation initiatives that provide participating households and businesses credits on their utility bills, including subscription models that can inclusively benefit low-income consumers and tenants. Finally, as Figure 2 demonstrates, renewable energy co-operatives in Canada act predominantly as collective investment pools that sell electricity to the grid and realize economic returns for their members.

3. **WHO IS THE "COMMUNITY"?:** Prior to delving into the benefits and potential of community and co-operative energy initiatives, it is important to point out their diversity in terms of the social origins of groups developing them. Research by Walker et al (2022) demonstrated variances between initiatives developed by communities of place (COP) and

communities of interest (COI), whereby COP are associated with more participatory processes and shared outcomes within a locality. When assessing benefits and potential of community and co-operative energy, it is important to ask: Who is leading the initiative? Who does it primarily benefit? Who does it include and exclude?

Community energy initiatives represent a localized and democratic form of involvement in energy systems whereas present patterns of ownership, governance, and infrastructure are highly centralized. These initiatives are a path towards simultaneously democratizing, decentralizing, and decarbonizing energy systems, while generating numerous economic and social benefits at the local level. Table 1 summarizes community and co-operative energy's demonstrated benefits and further (at times unrealized) potential.

Benefits and Potential

Finally, the realization of these benefits and potential is context-specific and not guaranteed (Bauwens & Roncancio Marin, 2025). For instance, research shows that community and co-operative energy activity in the global North is mostly led by (and therefore benefits) affluent communities [4]. Furthermore, since most energy co-operative sell electricity or heat to the grid and realize economic returns for their members, the "meaning of co-operative membership" is reduced to return-on-investment instead of usership, limiting the social and associational benefits of co-operative membership. Relatedly, limited member engagement in the governance of energy co-operatives further limit their potential in advancing local control, choice, and democracy. Policy and practice must align to ensure the realization of community and co-operative energy's immense economic, environmental, and social benefits are realized in a just way. We now turn to policy and regulatory frameworks that can make community and co-operative energy not only possible, but also successful and just.

TABLE 1 - BENEFITS AND POTENTIAL OF COMMUNITY AND CO-OPERATIVE ENERGY

NEW SOURCES OF LOCAL ECONOMIC BENEFIT	Community energy contributes to economic development by generating new sources of local income, creating jobs, and fostering skill and capacity development. Community ownership means greater local funds are retained in the community compared to corporate and outside-owned projects.
INCREASED PUBLIC ACCEPTANCE AND TRUST OF RENEWABLE ENERGY	Community ownership can increase public acceptance of renewable energy projects. CE initiatives typically lead to higher levels of local support, trust, pride, and legitimacy among community members. This shift in popular perception of renewable energy can significantly contribute to climate change mitigation.
POPULAR EDUCATION AND CAPACITY-BUILDING	Another key function of CE initiatives is helping to educate and promote pro-environmental attitudes and behavior among participants and the wider community. This is a significant contribution to strengthening individual and collective capacities in enacting positive environmental change.
FOSTERING SOCIAL INNOVATION AND CHANGE	Community energy initiatives have the potential to promote social innovation and transformative change. These efforts often involve encouraging social innovation and challenging the status quo.
ENHANCED GRID INNOVATION AND RESILIENCE	Community energy initiatives highlight contributions to grid innovation and resilience. This includes benefits such as enhanced demand response, the deployment of local energy storage, community aggregation, and the facilitation of local energy markets or trading.
INCREASED SOCIAL CAPITAL AND COHESION	These projects help in bringing people together, increasing social capital, and potentially repairing old divisions within the community. They also support community cohesion, relationship building, and provide avenues for practicing and participating in democracy, contributing to the public good.
ADVANCING JUSTICE WITHIN AND BEYOND ENERGY SYSTEMS	Community energy can provide just benefits for affected communities and facilitates a greater ability to foster energy justice, often by ensuring a balance of risk and benefit. Communities facing energy inequities (including lack of access to heat or electricity) can greatly benefit from community ownership and its associated economic, social, and environmental benefits.
GREATER ENERGY SECURITY AND AUTONOMY	CE initiatives contribute to enhanced energy security and resilience. They also signal greater energy autonomy, sovereignty, or independence for the involved communities.

4 It is also worth noting that there are co-operatives and other community energy initiatives led by economically and racially marginalized communities, on which more research is needed. Furthermore, community solar gardens, which are enabled in Nova Scotia and many U.S. states through virtual net metering policies, specifically aim to remove barriers for low income individuals and tenants to participate in renewable energy generation.

3 ✲ POLICY AND REGULATORY FRAMEWORKS FOR COMMUNITY AND CO-OPERATIVE ENERGY

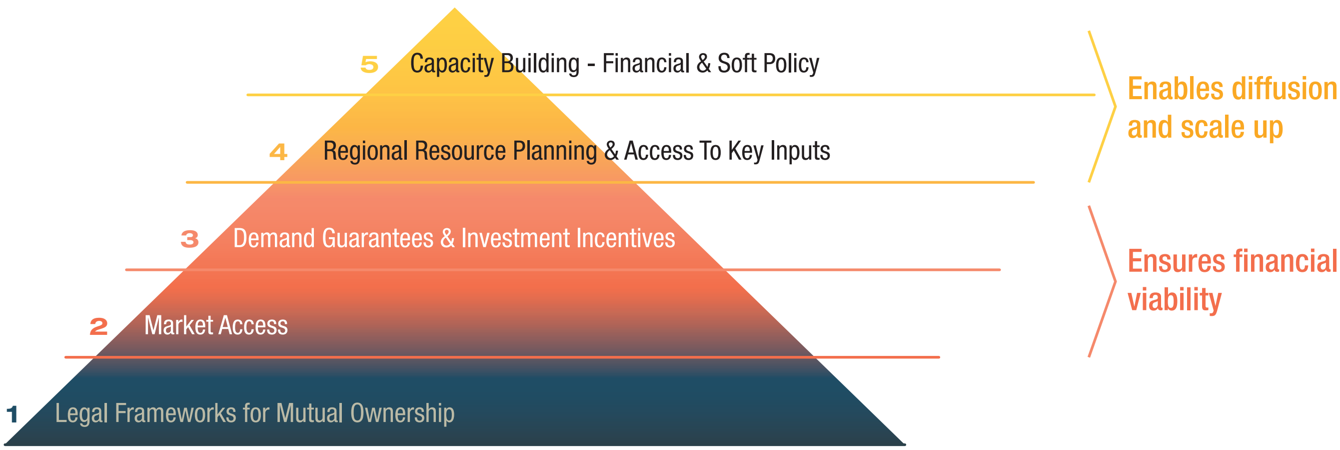

FIGURE 3 - ENABLING INTERVENTION POINTS FOR COMMUNITY-OWNED RENEWABLE ENERGY SOURCE: BERKA, MACARTHUR AND GONELLI (2021)

Community energy projects have significant potential to accelerate just energy transitions while strengthening local economies and communities. They can deliver not only clean power but also broader social, economic, and environmental benefits when they are designed and owned locally.

At the same time, energy markets remain far from equitable. Large corporate actors typically have a clear advantage: they can mobilize substantial financial resources, specialized expertise, and dedicated time to move quickly through regulatory and technical hurdles. Community-led initiatives, by contrast, require more time and effort. Their strength lies in community development, public fundraising, and capacity-building—processes that maximize social and local economic returns but slow down project implementation. This imbalance creates structural barriers for community energy unless deliberate policy supports are in place.

Policy interventions have therefore played an essential role as a "leveler of the playing field," enabling community-owned renewable energy projects to emerge and grow. Based on international experiences and evidence from Canada, five interconnected policy and regulatory domains are particularly important to the flourishing of community energy. These domains are visualized in Figure 3 below.

3.1 Legal frameworks for mutual ownership

Supportive legal structures provide the foundation for community ownership models. Without appropriate legal options, communities struggle to formalize ownership, secure financing, or distribute benefits equitably. Policies that recognize and support co-operative, non-profit, community funds, and/or other community-based ownership models can greatly expand what is possible. Furthermore, legal frameworks can also define the inclusive nature of community ownership, making sure that its benefits are enjoyed by all consumers. Therefore, legal frameworks are at the foundation of the pyramid in Figure 3 above, making other policy and regulatory interventions possible. Beyond these, clear narratives and storytelling of the difference that community and co-operative energy make helps the sector to amplify, deepen and scale projects across contexts.

3.2 Market and grid access

Ensuring community initiatives can fairly access electricity grids, behind-the-meter arrangements, and virtual energy-sharing arrangements is crucial. System and market regulators must explicitly recognize community-owned initiatives, in whichever legal form they take, as actors in energy generation, distribution, storage, sharing, and use.

Increasingly, virtual net metering appears as a critical tool that allows market and grid access to community energy initiatives. Net metering allows residents who generate power at their location to deduct this generation from their overall bill. Virtual net metering allows for individuals without suitable co-located sites for their own power generation to receive credits on their utility bills from a shared system, often built elsewhere. This allows renters who can't install on their own property to benefit from community solar projects.

3.3 Enabling policies and financial incentives

Once legal frameworks and market access factors for community energy projects are established, it then becomes essential to recognize community groups' specific needs in developing successful behind-the-meter and front-of-the-meter DER initiatives. In energy markets, commercial actors navigate regulatory, legal, financial, and tendering processes with their financial and human resources, whereas community-led projects need additional time and support to build community and capacity. Effective regulatory frameworks account for this reality, acknowledging that the very processes that slow community projects—such as engagement, fundraising, and capacity-building—are also what give them their transformative potential.

The following policy tools have proven effective in stabilizing revenues and attracting investment for community groups:

- FITs, which is a procurement policy that provides a guaranteed payment (usually over 20 years) for electricity generated from renewable sources;
- Additional payments (price adders) in FITs and other procurement schemes to further encourage community energy projects (i.e. an additional 2 cents/kw);
- Reserved space (capacity set-asides) in FITs and other procurement schemes for community energy projects;
- Local ownership requirements for commercial projects;
- and virtual net metering, which allows for individuals without suitable buildings for renewables or ability to install (e.g. renters), or those without the financial capacity to invest in collective schemes and receive credits on their utility bills.

3.4 Regional resource planning and access to inputs

Community projects benefit when regional planning processes are participatory and when they have fair access to land, interconnection capacity, and other key resources (e.g. sites for projects). The planning process must also a) fairly and openly compare the cost of DERs with expansion of grid infrastructure, and b) recognize the special value of community ownership in meeting local demand. Without this, policies risk becoming disconnected from social movements and fail to achieve broad uptake. The absence of accessible planning tools also shifts a heavy workload onto volunteers, increasing the risk of burnout.

3.5 Capacity-building

Access to capacity building through financing and soft policy support remains one of the most persistent barriers for community energy. Many groups face challenges in securing both grants and debt financing, often linked to gaps in legal recognition or lack of demand guarantees. In response, projects may be forced to either (a) partner with private developers—an arrangement that can be fruitful but also challenging and capacity-intensive—or (b) rely on self-financing and volunteer "sweat equity," which further marginalizes historically underserved communities and limits uptake to more affluent communities. The following capacity-building supports are therefore critical, particularly to ensure that marginalized and frontline communities—often excluded from mainstream financing—can participate in and benefit from community energy:

- Government-backed loans;
- Project management, technical and legal advisory services;
- Low-or-no-interest funding programs;
- Patient capital;
- Investment options with tax incentives;
- Grant programs;

Publicly available information regarding project development, including the range of community benefits available/being used (see example from "Community Benefits Index · Local Energy Scotland," n.d.)

- And specifically for virtual net metering projects:
    - On-bill financing schemes that allow low-income members to pay back their initial investment loan over time through credits on their utility bills.
    - Subscription schemes in which credits are paid for on a monthly basis and provide immediate savings without requiring the consumer to borrow funds.

In short, without targeted policies in each of these interconnected domains, community energy initiatives face steep barriers that limit their ability to contribute to just transitions. Where these supports are in place, however, community energy has demonstrated its capacity to build resilient local economies and accelerate renewable energy adoption and acceptance.

In the Canadian context, a recent study by Pigeon, Ward, & Boucher (2025) developed the Community Energy Co-operative Policy Index and ranked Canada's ten provinces based on their policy support for community energy initiatives. Their research indicates that as of 2025, co-operative energy initiatives face significant policy and regulatory barriers that hinder their formation and growth across Canada. These challenges are more acute in jurisdictions where state-owned or large corporate actors dominate electricity markets, such as Saskatchewan, Manitoba, Quebec, and Alberta. Even in jurisdictions that have previously been supportive of community energy such as Ontario and Nova Scotia, shifts in the policy environment negatively altered the trajectory of the sector in recent years.

4 DATA SOURCES & METHODS

In order to draw policy and project lessons for Canadian co-operatives in the energy transition, this project employed a literature scan of a wide range of data sources, including: academic books and journal articles, industry publications, websites and reports from national regulatory agencies, national and subnational regulations, policies and legislation, energy project websites, news articles and published datasets related to community-owned energy. Given the diversity of terms for co-operative and community ownership used across jurisdictions we used more than 70 key search terms based on ownership (e.g., electricity co-operative, energy co-operative, rural electric co-operative), project activity (e.g., community solar, co-operative thermal network), geographic location (e.g., Britain, U.K., United States, U.S.A.) and community benefits (e.g., local benefit, employment, just transition).

The geographic scope for this report focuses on six case countries: Denmark, Germany, the U.K., U.S.A., Aotearoa New Zealand and Australia. These are helpful comparative cases for lesson drawing for Canada due to similarity in terms of technological and economic development levels, yet significant diversity in terms of the share of community ownership, share of renewables and policy support for local and co-operative ownership (see table 2). These countries also share characteristics with various Canadian provinces - such as the strong role of public integrated utilities in some Australian states, or the more marketized power system that exists in the U.K.

In each country, searches were conducted on the policy frameworks shaping the development of co-operative energy as well as projects that led to a wide range of co-benefits beyond economic returns. From these searches a long-list of approximately 60 projects emerged. 14 are profiled in this report, selected to cover important variations in business model, benefits and energy activity. This approach allows us to highlight the variety of designs in both policy and practice internationally that can contribute to strengthening innovation and resilience across very diverse provincial and territorial energy contexts.

TABLE 2 - CASE COUNTRY PROFILES

COUNTRY (POP.)	**% OF RENEWABLES & RESOURCE CONTEXT**	**EXTENT OF COMMUNITY ENERGY OWNERSHIP**
GERMANY (~84 MILLION)	62.8% electricity from renewables (2025); wind ~27.2%, solar ~21.4%, biomass ~8.7%; Centralized grid managed by four major TSOs regulated by the Federal Network Agency.	896 energy co-operatives (2020) with >200,000 members; €3.2 billion invested; includes co-ops, municipal utilities, hybrid models (Krug et al., 2022; DGRV, 2021)
DENMARK (~6 MILLION)	>85% electricity from renewables (2025); wind ~57%, solar ~13%, biofuels ~15%; Centralized grid by the national transmission system operator (TSO), Energinet (independent state-owned company - energy infrastructure), and integrated into Nord Pool (European power exchange across 16 countries).	Historically strong; ~50% of wind turbines still community-owned; 175,000 households involved in 1990s; many small co-ops closed, replaced by mega-coops and municipal partnerships (Gorroño-Albizu et al., 2019; Mey & Diesendorf, 2018)
UNITED STATES (~330 MILLION)	24.2% of electricity from renewables. Wind 10.3%, Solar 6.9%, Hydropower ~6%, Biomass ~1.4% Geothermal ~0.6%Total. ~44 states + DC host community solar; 19 states + DC have formal policies; regional ISOs/RTOs cover ~60% of market. Combining centralized and decentralized elements operated through three major interconnections: Eastern Interconnection. Western Interconnection. ERCOT (Texas Interconnection).	Community solar is primary model; 190 million people served by ISOs/RTOs; 900+ members of rural electric co-ops (NRECA) serve rural and low-income areas; no national count of other energy co-ops available (EPA, 2016; FERC, 2020)
UNITED KINGDOM (~67 MILLION)	42.9% electricity from renewables. Wind 22.7%, Biomass 7.0%, Solar 6.0%, Hydroelectric 1.0%. CfD and SEG schemes; Centralized grid, named National Grid, for England, Wales and Scotland. Moving towards a more decentralized grid.	Community Benefit Societies and co-ops widely used; CARES (Scotland) supported 990 projects with £67M; Welsh Energy Service secured £107.7M for local energy (Energy Saving Trust, 2025; Welsh Government, 2025)
AUSTRALIA (~27.4 MILLION)	~40% electricity from renewables (2024); rooftop solar growing; NEM interconnects most states; WA & NT separate.	~100+ active community energy groups; Hepburn Wind co-op has ~2,000 members; models include co-ops, associations, trusts, partnerships (Mallee et al., 2024; Hicks & Mey, 2016)
NEW ZEALAND (AOTEAROA) (~5.1 MILLION)	~85% electricity from renewables (2023); hydro ~55–60%, geothermal ~20%, wind ~6%. Centralized grid owned and operated by Transpower.	260+ community/local energy projects; 26 consumer-owned distribution companies; Māori iwi/hapū play key role in geothermal (MacArthur & Berka, 2020; Roberts et al., 2021)

5 ✵ INTERNATIONAL POLICIES FOR CO-OPERATIVE ENERGY

This section provides an overview of the policies, programs, rates, and regulations impacting community energy co-operatives in Australia, Denmark, Germany, New Zealand, the United Kingdom, and the United States. To provide consistency across these diverse jurisdictions, this report adopts Berka MacArthur and Gonelli's (2021) approach, and this section is divided into separate sections for *legal frameworks for mutual ownership, market and grid access, enabling policies and financial incentives, regional resource planning and access to key inputs, and capacity building.*

5.1 International Legal Frameworks for Mutual Ownership

GERMANY

Germany's community energy landscape is evolving. Germany does not have a single legal definition of "community energy," but several terms are used in policy and practice. The Renewable Energy Sources Act (RESA/EEG) introduced the concept of "citizen energy companies" (Bürgerenergiegesellschaften) in 2017, primarily for wind energy auctions. These entities must be majority-owned by individual citizens and meet specific criteria regarding local ownership and control (Krug et al., 2022).

Energy co-operatives (Genossenschaften) are the most common legal form for community energy. They are governed by the co-operative Law (GenG), which mandates democratic decision-making (one member, one vote) and allows for social and cultural objectives beyond profit (Miller, 2022). Other legal forms include limited partnerships (GmbH & Co. KG), civil law partnerships, and associations, particularly for smaller or regional projects (Krug et al., 2022).

The policy framework for community ownership rests under the Renewable Energy Sources Act (EEG 2021), energy communities must consist of at least 10 people, with 51% of voting rights held by local residents. These communities can participate in wind energy tenders for up to 6 turbines totaling 18 MW, and municipalities must be offered at least 10% ownership (Clean Energy Islands, 2025).

DENMARK

Denmark's energy transition has historically been shaped by strong citizen involvement, particularly in wind and district heating. It is one of the EU countries with the highest share of citizen ownership of energy assets, with more than 600 energy communities as of 2023 (Wierling et al 2023).

Denmark does not have a single legal definition of "community energy." Instead, various ownership models have emerged over time, including:

- Individual ownership (e.g., farmers, households)
- co-operatives (local and national)
- Guilds (commercial partnerships with closed membership)
- Municipal companies
- Foundations

These models differ in terms of geographical scope, inclusiveness, and profit orientation (Gorroño-Albizu et al.,2019). Wind co-operatives (andelsselskaber) were the dominant legal form for community wind energy, particularly in the 1980s and 1990s. These entities were often registered as commercial partnerships for tax reasons, even when functioning as co-operatives (Gorroño-Albizu et al., 2019). In the 1990s over 80% of wind turbines were owned by individuals or co-operatives, with more than 175,000 households participating in wind ownership (Mey & Diesendorf, 2018).

More recently, the law on promotion of renewables in 2021 provides definitions of both 1) RECs-VE-fællesskaber (Renewable Energy Communities) which focus on ownership based on proximity to project sites and renewable power generation activities, and 2) CECs Borgerenergifællesskaber (Citizen Energy Communities), which have a broader set of energy activities (e.g., storage, EV charging, demand management, microgrids) and are less focused on proximity for community membership.

Today, community ownership remains significant but has evolved. Nearly half of Denmark's wind turbines are still owned by local co-operatives, ensuring that profits flow back to communities through dividends and local economic benefits (Global Society, 2024). This is supported by the Danish Renewable Energy Act, which requires that new wind projects offer at least 20% ownership to local citizens (IEA, 2023).

However, the landscape has changed: while consumer-based co-operatives in district heating remain strong, many small wind co-operatives have disappeared due to the rise of large-scale, investor-driven projects. Research indicates that four out of five traditional wind co-operatives have closed since 2000, though large "mega-co-operatives" and municipal partnerships now dominate the co-operative sector (Kohl, 2022).

UNITED STATES

Whereas in the EU, CE is defined in statute, the U.S. electricity sector blends federal, state, and local jurisdiction, with historical roots in vertically integrated, monopoly utilities and later state-level restructuring beginning in the late 1990s (Pacific Northwest National Laboratory, 2002; Tuttle et al., 2016). CE projects, while locally driven, exist within a multi-level regulatory environment which results in different types of CE projects emerging in different jurisdictions. Community energy, in the US context, includes initiatives led and owned by rural electric co-operatives, municipalities and municipal utilities, tribal entities, and community/urban energy co-operatives (including worker co-operatives). In states with unbundled electricity markets, as shown in Figure 4, the federal government, through the Federal Energy Regulatory Commission (FERC), plays a significant role in setting rules for distributed energy resources (DERs) which RECs rely on (Federal Energy Regulatory Commission, 2025).

Rural Electric Co-operatives

Most rural electric co-operatives in the United States were formed in the wake of the establishment of the Rural Electrification Administration in 1935, and as democratically governed businesses that are motivated by

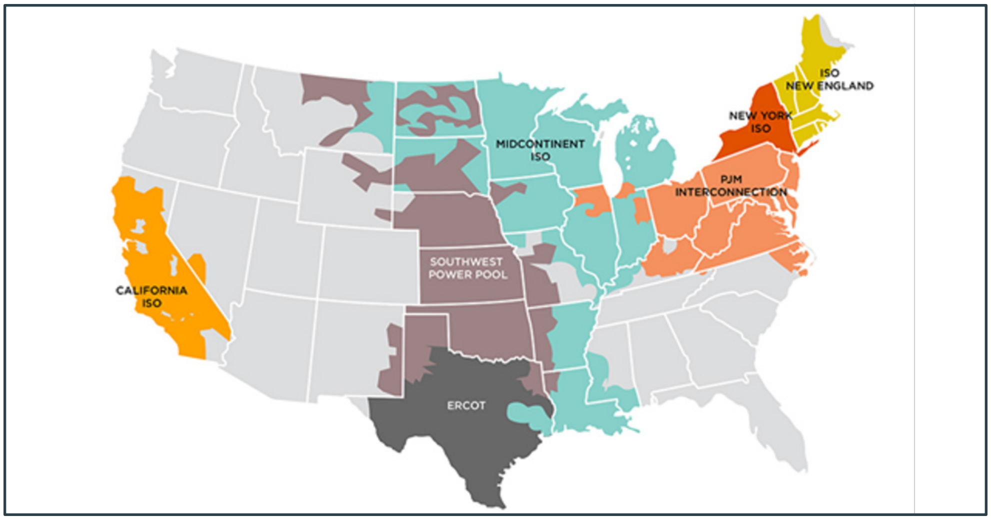

FIGURE 4 - US FEDERAL ENERGY REGULATORY COMMISSION JURISDICTIONS
SOURCE: (FERC, 2025)

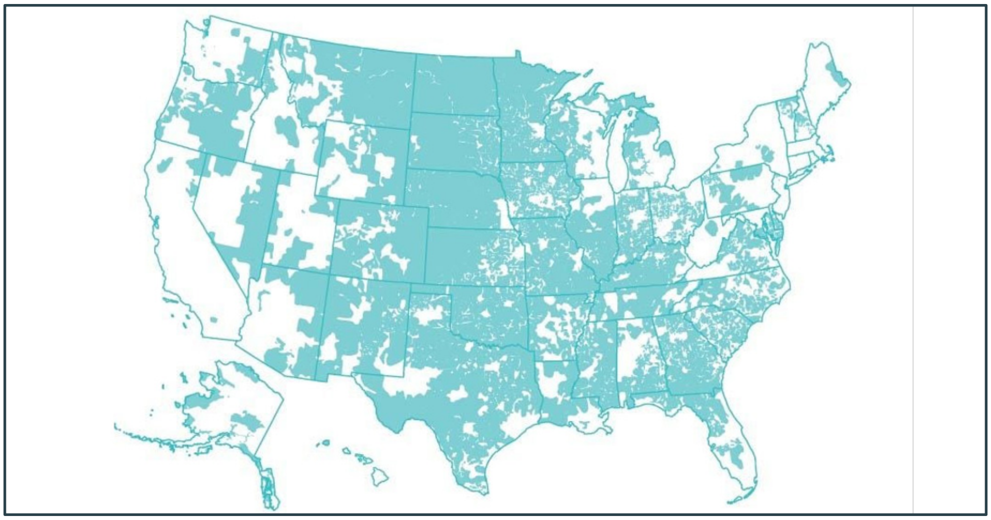

FIGURE 5 - US RURAL ELECTRIC CO-OPERATIVE UTILITIES
SOURCE: (NRECA, 2025)

socially orientated goals of local development and closely regulated by their consumers/members, local co-operatives have played an important role in electrifying rural areas across the United States (Yadoo & Cruickshank, 2010) and in recent years have begun to deploy significant renewable energy capacity (Gilcrease et al., 2022). Today, there are 64 generation and transmission co-operatives and 830 distribution co-operatives providing electricity to over 40 million people, with 23% of that electricity coming from renewable sources (National Rural Electric co-operative Association [NRECA], 2025a). Rural electric co-operatives do not have one-size-fits-all characteristics, rather, they are diverse and are formed to meet the needs and wants of their local members (Gilcrease et al., 2022) and their offerings include non-energy services. Over 250 electric co-operatives are deploying or developing plans to deliver broadband service to their consumers (National Rural Electric co-operative Association, 2025b).

Municipal Utilities

Municipal electric utilities are a widespread but often under-examined part of the power sector (Lenhart, 2020; Patel & Parkins, 2023). They operate in every U.S. state, with 2,003 utilities in total (American Public Power Association, 2025). Their distribution is highly uneven: states in the Midwest and Plains, such as Nebraska (144), Kansas (135), and Minnesota (128), host particularly high concentrations, while many western states like Nevada (1) and Wyoming (8) have only a handful. Like rural electric co-operatives, municipal utilities are typically not regulated by state public utility commissions in the same way as investor-owned utilities. Instead, they are governed by local boards or municipal governments, which allows them to set rates and design programs tailored to community priorities (U.S. Environmental Protection Agency, 2010). This local accountability has also enabled municipal utilities to band together into larger co-operative or non-profit entities for economies of scale. Examples include Energy New England (2025), a co-operative of municipal utilities in the Northeast, and the Massachusetts Municipal Wholesale Electric Company (2025), a non-profit joint action agency that provides wholesale power supply and energy services to its member utilities.

These collaborative groups allow municipal utilities to offer services beyond basic electricity supply, including home energy assessments, electric vehicle (EV) charging infrastructure, and customer rebate programs. At the project level, partnerships with community energy groups are becoming more common. For instance, the Fayetteville Public Works Commission (NC), a municipal utility, has developed a 1 MW community solar array coupled with battery storage to serve local customers (NC Clean Energy Technology Center, 2020). In Colorado, Fort Collins Utilities has engaged in community solar programs designed to extend access to renters and low-income households (City of Fort Collins, 2025).

Community Solar and Urban Energy Communities

Community solar, sometimes referred to as a “solar garden,” is currently the most popular form of shared renewables, with about 1,600 projects nationwide. According to a 2015 study by the National Renewable Energy Laboratory, over 50% of Americans who would like to use solar energy are unable to install a rooftop solar array (NREL, 2015). Community members in various models can either 1) buy or lease panels and receive credits for the electricity their panel(s) produce or 2) subscribe (often monthly) to a portion of the solar output, which offsets their overall electricity consumption on their utility bill (U.S. Department of Energy 2025). Co-operatives play a key role in US solar project development through organizations like Namaste Solar, a worker cooperative based in Boulder, Colorado that designs, installs and operates solar systems. It also engages in broader sector scaling and community wealth building through creation of a supportive network of co-operative businesses (e.g. Clean Energy Credit Union and the Kachuwa Fund).

FIGURE 6 - COUNTIES SERVED BY US UTILITIES SOURCE: (U.S. EIA, 2019) NOTE: A COUNTY MAY HAVE MANY UTILITY TYPES THAT PROVIDE SERVICE.

Shared renewables legislation - specifically, community solar legislation - has been enacted in 24 states (Arizona, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Louisiana, Massachusetts, Maryland, Maine, Minnesota, North Carolina, New Hampshire, New Jersey, New Mexico, Nevada, New York, Oregon, Rhode Island, South Carolina, Virginia, Vermont, and Washington), the District of Columbia and Puerto Rico (U.S. Department of Energy, 2024). The National Renewable Energy Laboratory's (NREL) Sharing the Sun Community Solar Project Dataset has more state-level information on community solar projects, including a catalogue of additional community solar capacity currently being planned (but not yet in operation) that will serve low- to moderate-income households (National Renewable Energy Laboratory, 2024).

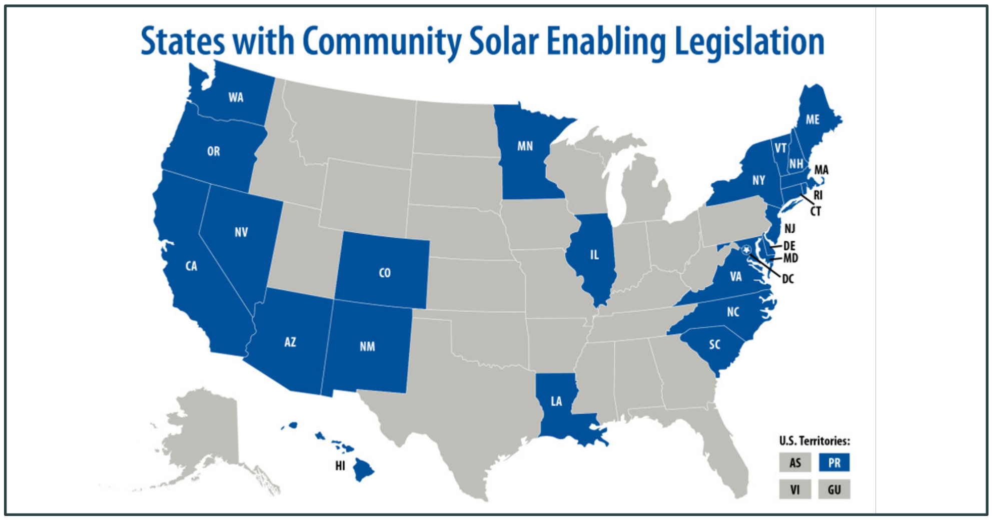

FIGURE 7 - STATES WITH COMMUNITY SOLAR ENABLING LEGISLATION
SOURCE: (NREL, 2025)

UNITED KINGDOM

The UK CE sector has been a primarily grassroots-led sector (Seyfang et al., 2013). Government support for renewable energy dates to at least the 1974 Renewable Energy Support Programme (Nolden et al., 2020), though the first support for smaller-scale initiatives came with the Feed-in-Tariff Scheme in 2010 (Braunhaoltz-Speight et al., 2018) which led to the rapid growth of renewable energy co-operatives (Nolden et al., 2020), the first of which was the Baywind co-operative in 1997 which raised £2 million directly from its members and the general public who could become members and purchase shares in the project (Braunhaoltz-Speight et al., 2018; Walker, 2008; Baywind Co-operative, 2025).

As summarized by Walker (2008), different legal and financial models of ownership have been adopted in the UK, including:

Co-operatives and Community Benefit Societies
Community energy in the U.K. is typically organised through legally recognised co-operative structures. The most common vehicles are Community Benefit Societies (BenComs) and Co-operative Societies, both of which are registered with the Financial Conduct Authority (FCA) (co-operatives Europe, 2020). Using the model transferred from Scandinavia (Boxer and Harrop, 1997; Tordoff, 2004), people in the local community or further afield become members of the co-operative/BenComs) and buy shares to finance the project. These forms are built on democratic governance principles, such as one-member-one-vote, and are explicitly required to demonstrate either community benefit or co-operative purpose. The federal government provides guidance and detailed criteria for registration, ensuring that societies operate in line with community-oriented objectives rather than purely private interests (Financial Conduct Authority [FCA], 2015; co-operatives Europe, 2020).

Community Charities
These usually take the form of an association with charitable status that provides or runs facilities for the local community, such as village hall associations which use renewable energy to heat or power their buildings. Such charities can also have trading arms or community interest companies to provide local services. For example, they can manage energy projects, as with the biomass district heating network in Kielder, Northumberland (Walker et al., 2008).

Development Trusts
These have been particularly used in Scotland to represent communities' interests in revenue-generation enterprises, and in some cases, this has been extended to include variants of community ownership (Slee, 2020).

Shares Owned By a Local Community Organization
The gifting of shares in a commercial project to a local community organization such as a trust, or in the case of wind farms, the gifting of one of more turbines (as at Earlsburn wind farm in Scotland), has been used as a way of providing a community benefit that is closely tied to the performance of the production unit (Centre for Sustainable Energy, 2007). Part-ownership by the community may confer only limited rights to control or to make inputs into decision making.

AUSTRALIA

In Australia, CE generally refers to projects where a local community group initiates, develops, owns, or benefits from a renewable energy installation. A Victorian guide defines community energy as "projects where a community group initiates, develops, operates and benefits from a renewable energy resource or energy efficiency initiative" (Hancock et al., 2024, p. 9). Similarly, a 2021 proposal (the Australian Local Power Agency Bill) defined a community energy project as one "carried out mainly by the community or by community organizations" (Hancock et al., 2024, p. 9). In practice, this means ordinary citizens play a central role in project decision-making, ownership, and benefit-sharing, distinguishing CE from purely commercial developments (Hicks et al., 2014). Early examples, like the Hepburn Wind, Australia's first community-owned wind farm, set the tone for this. The wind farm has been operational since 2011 and was driven by locals forming a co-operative to develop two wind turbines with government and industry support [1] (Hepburn Wind Park co-operative Ltd., 2023). That co-operative now has 2,000 members (about half local residents) and embodies the "community" ethos of broad ownership and local benefit (Hepburn Wind Project, 2023; Hicks, 2020).

Organizational structures in Australia are not a one-size-fits-all model and have evolved to suit different project models. Early projects, like other countries mentioned, often used co-operatives – a legal form well-aligned with democratic, one-member-one-vote governance. In the example of the Hepburn Wind project, the co-operative structure allowed it to raise capital from many small investors without complex securities compliance (Howard, 2020).

Other groups began as incorporated associations (not-for-profits), especially for donation-based or pilot projects. For example, the Denmark Community Windfarm in Western Australia started as a non-profit association and later transitioned to an unlisted public company to raise construction capital (Hicks, 2020). In that case, 116 mostly local investors bought shares (on a one-share-one-vote basis) in the company owning the turbines (Hicks, 2020). The choice to incorporate as a company was deliberate, as the founders felt it would attract larger investors more easily than a coop, while they voluntarily adopted rules to preserve democratic decision-making (Hicks, 2020). Many newer projects choose a company limited by shares, as it's a familiar structure for financiers and regulators, but some modify their constitutions to emulate co-operative principles (e.g. caps on shareholdings, local membership requirements, or one-member-one-vote provisions) (Hicks & Mey, 2016). Other models include trusts or partnerships, for instance, some solar projects use a unit trust financed by community investors, which then lends to a project developer (Hicks & Mey, 2016).

Partnerships with local authorities or firms are also common. In several projects, community groups partner with municipal councils that provide sites, seed funding, or power purchase agreements. A notable example is Lismore Community Solar (NSW), a "council/community partnership" that built two 100 kW solar farms on city-owned sites (a sports center and a sewage plant) using community investor loans (Cities Power Partnership, 2018). The council uses the solar power on site and repays the community investors, who in turn earn modest returns (Cities Power Partnership, 2018). This 2018 project, the first of its kind in Australia, demonstrates how local governments can co-own projects or facilitate community financing for public renewables (Cities Power Partnership, 2018).

More recently, communities are also partnering with commercial developers in large projects. For example, the 270 MW Sapphire Wind Farm in NSW (commissioned 2018) offered a community co-investment scheme, where local residents could buy into an investment vehicle funding part of the project (Holmes à Court, 2018). This model, introduced by community energy advocates (Embark) and adopted by the developer, essentially gave the community a minority equity stake and a share of profits (Holmes à Court, 2018). Overseas, such compulsory community stakes are common (Denmark even requires at least 20% local ownership for onshore wind) and Australian policy is moving in that direction) (Holmes à Court, 2018). The proposed Local Power Plan in 2020 called for a Community Renewable Investment Scheme mandating that new large-scale renewable developments offer 20% equity to local communities (Mallee et al., 2024).

NEW ZEALAND

The term 'community' in CE is understood in New Zealand to emphasize inclusive participation and local benefits. International literature often defines community energy projects by two key features: open, participatory management and local collective outcomes beyond private profit (MacArthur & Berka, 2020, p. 55). Consistent with this, the New Zealand Government (Ministry of Business, Innovation and Employment – MBIE) defines community energy as energy activities "managed in an open and participative manner and [having] local collective benefits and outcomes" (MBIE, 2019, as cited in Brent et al., 2025, p. 2). In practice, "community" may refer to a geographic community or a community of interest, including iwi (Māori tribal groups) or other interest-based collectives (Roberts et al., 2021).

In practice, "community" in New Zealand spans four main forms: (1) consumer or co-operative trusts (legacy of power board reforms), (2) Māori iwi and hapū organizations, (3) local authorities, and (4) grassroots social enterprises (Berka et al., 2020, p.1). Māori trusts, such as Tuaropaki and Tauhara North No. 2, are central actors in geothermal projects, embedding cultural values such as kaitiakitanga (guardianship) into governance (MacArthur & Matthewman, 2018). Local government-led initiatives, such as Energise Ōtaki, exemplify municipalities and civic groups co-developing solar projects (Brent et al., 2025). Social enterprises like the Blueskin Resilient Communities Trust pursued wind projects to enhance local resilience and sustainability (Willis, 2015). Key features of these community projects are outlined below.

Overall, community energy in New Zealand is defined less by legal form than by process and outcomes: participation, openness and local benefit (Sokolowski, 2019). It's important to note that central to this is indigenous energy sovereignty, which expands the concept beyond Western co-operative models to include iwi-driven projects tied to Treaty rights and cultural frameworks.

New Zealand's CE initiatives are undertaken by a diverse range of community-based organizations and partnerships. One recent study identified over 260 community/local energy projects in Aotearoa New Zealand "ranging from large geothermal generation facilities co-owned by iwi [tribal groupings], to relatively small energy efficiency and retrofitting projects (MacArthur & Berka, 2020, p.56). The various models identified by their research are:

Consumer Trusts and Co-operatives
Many projects are run by consumer-owned trusts or co-ops descended from former electric power boards (accounting for roughly 40% of New Zealand community energy initiatives). These trusts reinvest utility revenues into community benefits and local energy projects. New Zealanders thus tend to favor the trust model for community ownership in contrast to Canada's preference for co-ops (Hoicka & MacArthur, 2018).

Local Government Partnerships
Nearly one-third of community energy initiatives (approximately 34%) involve local authorities. City and district councils often act as partners or intermediaries, providing support, co-investment, or facilitative roles in projects (for example, city-owned utilities collaborating on community solar installations). Indeed, partnerships with councils and utilities have been key for groundbreaking projects (MacArthur, 2020).

Grassroots Community
organizations and charities
Independent community trusts, nonprofit organizations and social enterprises (often at the grassroots level) make up roughly 17% of projects. These range from sustainability organizations running local solar schemes to charitable trusts addressing fuel poverty through efficiency programs.

Māori-owned Organizations
Iwi and hapū (tribal entities) are increasingly important CRE actors (approximately 6% of initiatives). Māori communities leverage collective land rights and Treaty settlements to develop renewable projects, notably in geothermal energy, where several large generation facilities are co-owned by iwi. Iwi-led energy projects align with Māori principles and often aim to deliver long-term intergenerational benefits.

Schools and oOthers
A small portion (approximately 1%) of projects are led by schools or other community institutions.

5.2 Market and Grid Access

GERMANY

Germany's regulatory framework for grid access has evolved significantly, with community energy projects historically benefiting from guaranteed grid access and priority dispatch under the EEG (Pant & Belz, 2026), however, the shift to competitive auctions and market-based mechanisms has made access more difficult for smaller actors (Tews, 2018).

While an early leader in CE (Krug et al., 2022), energy sharing within renewable energy communities, as defined under the EU's RED II directive, is not yet fully implemented in German law (European Commission, 2025). While entities can produce, consume, and sell renewable energy, there is no comprehensive regulatory framework for collective self-consumption or energy sharing (Krug et al., 2022). The federal government has committed to addressing this gap, including in its 2021 coalition agreement and the 2022 "Easter Package" of legislative proposals (Amelang, 2021).

Despite delays with implementing a peer-to-peer energy trading mechanism, other mechanisms are in place to support CE initiatives. Tenant electricity (Mieterstrom) models allow residents of multi-unit buildings to consume solar electricity generated on-site paired with a with a ls tenant electricity bonus, but implementation remains complex due to administrative burdens and billing requirements (Miller, 2022).

Germany's experience showcases the potential for community energy to drive renewable deployment, democratize energy systems, and foster local economic development. However, recent policy shifts, such as the move from FITs to competitive auctions, have introduced new challenges for community actors, particularly smaller co-operatives (Krug et al., 2022; Herbes et al., 2017).

DENMARK

Historically, Denmark provided guaranteed grid access for community energy projects which was formalized through voluntary agreements and later codified into law during the peak of community wind development in the 1990s (Mey & Diesendorf, 2018). These measures enabled widespread participation and reduced barriers for small-scale producers. However, some planning reforms since those early developments have also centralized decision-making and introduced environmental impact assessments, increasing costs and limiting community involvement (Mey & Diesendorf, 2018).

Under EU law, renewable energy communities (RECs) must be treated in a non-discriminatory and proportionate manner regarding their roles as consumers, producers, traders, aggregators. However, CEC and REC entities in Denmark still cannot own or operate distribution networks and must share electricity via the collective grid. Electricity sharing remains subject to general tariffs and taxes, but a new tariff type as of 2025 – lokal kollektiv tarifering (local collective tariffing) – has been introduced and is now being implemented by some DSOs, offering reduced grid tariffs for energy communities that demonstrably relieve the local grid (Nordic Energy Research 2023).

UNITED STATES

Because the U.S. regime is multi-level, routes to market for community/co-operative energy largely depend on state or local programs and tariffs. Public Utility Commission decisions shape net metering and virtual net metering, interconnection, and subscription community-solar crediting, while independent system operators/regional transmission operators (ISO/RTO) rules govern wholesale participation.

While the interstate electricity markets are regulated by the Federal Energy Regulatory Commission (FERC) and the regional ISOs, each state regulates the electricity sector within its borders. Large utilities, therefore, need to adhere to FERC, ISO, and state regulations when determining factors such as electricity generating sources, customer rates and programs, and support for renewable energy, including those that they may be owned by co-operatives within their service territories. State government and regulatory actors which can impact grid access typically include the state's Public Utility Commissions (PUCs) (Pennsylvania Public Utility Commission, 2025) and a state department or office (National Association of State Energy Officials [NASEO], 2025) which is responsible for the sector, with various other state, non-profit, academic and industry groups supporting the renewable energy sector. PUCs typically regulate all investor-owned utilities (IOUs) in their state, but municipal and co-operative utilities are often exempted from PUC regulation or have limited regulation (U.S. Environmental Protection Agency, 2010). As shown in Figure 8, because of the diversity among US states, support for community power vary widely, with Illinois have the most overall supports, with Massachusetts, New York, and California also being leaders (Institute for Local Self-Reliance, 2025-a).

Community solar is the primary access pathway for shared ownership/subscription. As of mid-2024, 44 states + DC host at least one community-solar project, with 19 states + DC operating formal, pro-growth policies. In states without statewide programs, utility-led offerings (e.g., Florida's SolarTogether) or co-op/municipal initiatives provide access (U.S. Department of Energy, 2025). Mature markets include CA, CO, IL, ME, MD, MA, MN, NJ, NY, OR (Institute of Local Self-Reliance, 2025-b)

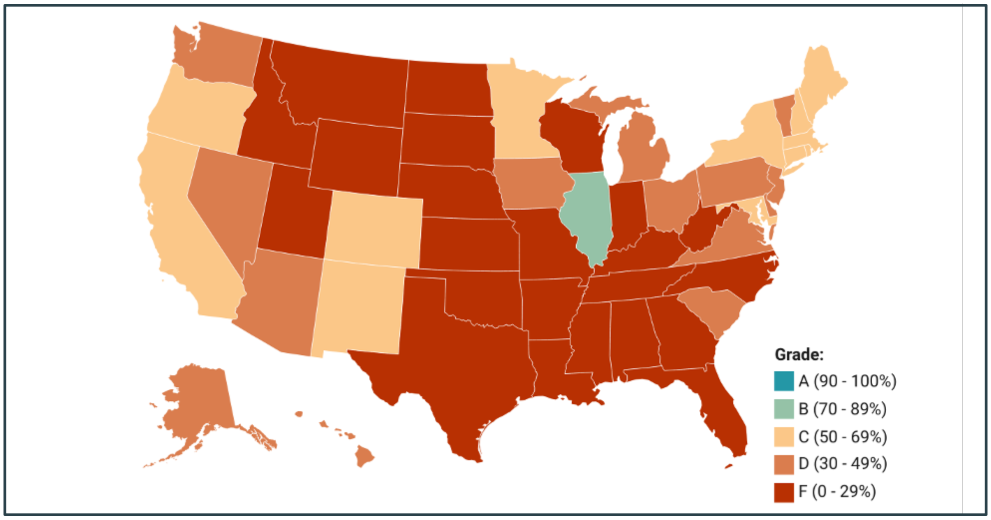

FIGURE 8 - STATE LEADERS IN SUPPORT OF COMMUNITY POWER
SOURCE: (INSTITUTE OF LOCAL SELF-RELIANCE, 2025A)

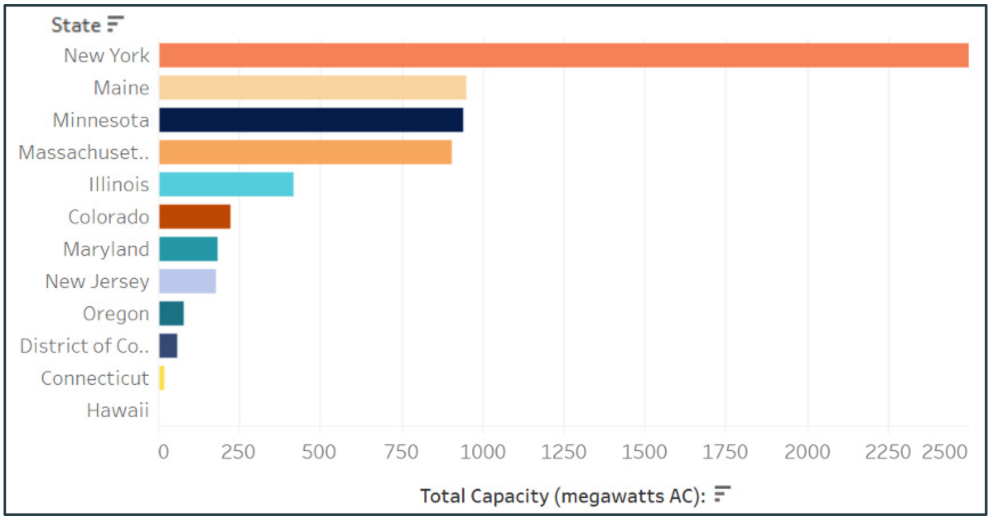

FIGURE 9 - STATE LEADERS IN COMMUNITY SOLAR
SOURCE: (INSTITUTE OF LOCAL SELF-RELIANCE, 2025-B)

UNITED KINGDOM

Solar PV has been the primary technology which co-operatives in the UK have utilized, though wind projects, including those with co-operative ownership, exist throughout the UK. The introduction of a Feed-in Tariff scheme (FITs) to the UK in 2010 is widely regarded as having spurred the rapid expansion of community renewables projects, and changes to the program in 2012 and 2015 had detrimental effects on the growth and viability of many energy co-operatives (Nolden et al., 2020). The FIT closed to new applicants in 2019 (Ofgem, 2025-a) and was replaced with the less lucrative Smart Export Guarantee (SEG) (Ofgem, 2025-b).

Despite changes to and eventual replacement of the FIT, opportunities for community and co-operative energy groups in the UK remain through their participation in national and local flexibility markets. At the national level, the Demand Flexibility Service (DFS) - introduced by National Electricity System Operator (NESO) - has enabled households to engage directly in balancing the grid via suppliers and aggregators. During the winters of 2023/24 and 2024/25, DFS programs achieved multi-gigawatt-hour reductions in peak demand, demonstrating both technical feasibility and consumer willingness to participate in these programs. The service is now moving beyond seasonal emergency use toward a year-round flexibility mechanism, creating ongoing opportunities for co-operatives and community aggregators to participate in balancing markets (NESO, 2025). At the distribution level, Distribution Network

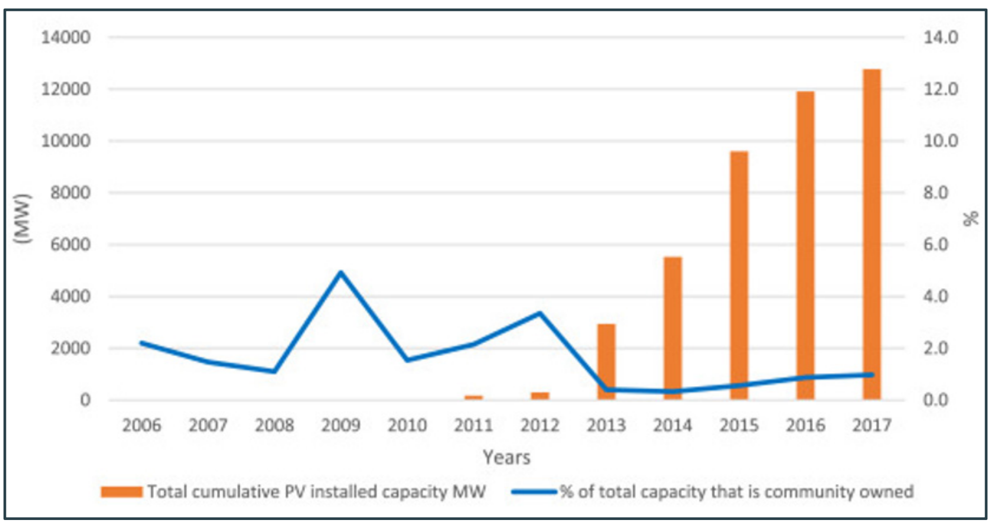

FIGURE 10 - SHARE OF CE PV GENERATION IN ENGLAND
SOURCE: (NOLDEN ET AL., 2022)

Operators (DNOs) - transitioning into Distribution System Operators (DSOs) - are rapidly scaling their procurement of local flexibility services. These services typically focus on curtailment avoidance, congestion management, and constraint resolution within local networks. By March 2025, Western Power Distribution (now National Grid Electricity Distribution, NGED) reported more than 1,400 MW of flexibility capacity registered, with 162,800 flexible assets connected to their local markets. These figures highlight the significant potential for community-owned storage, renewable generation, and demand-side resources to play a direct role in system operation at the local level (National Grid, 2025).

Developments in retail market reform and smart metering are also enabling more granular and dynamic customer participation in the electricity market. For example, the UK regulator Ofgem's Market-wide Half-Hourly Settlement (MHHS), due to be implemented from 2025, will ensure that all domestic and small business consumption is settled on a half-hourly basis. This reform, combined with the rollout of smart meters - 67% of which were smart or advanced by March 2025 - create the foundation for time-of-use (ToU) and dynamic tariffs across the retail market. These changes make co-operative-led aggregation models more feasible, as they allow communities to coordinate local load shifting, integrate distributed energy resources, and capture value from participating in both national and local flexibility markets (NESO, 2025).

AUSTRALIA

In the case of Australia, CE projects must navigate the general energy regulatory regime, which was not designed with small community generators in mind (Hicks & Mey, 2016). Grid access rules are largely set nationally under the National Electricity Market (NEM) framework but implemented by state regulators and distribution network businesses (National Electricity Rules, n.d.). Australia does not have a NEM-wide "net metering" policy; small systems self-consume first and receive a retailer FIT credit for surplus exports, per government and state guidance (Australian Government: Electricity Pricing Plans and Tariffs, n.d.; NSW Energy, n.d.; Essential Services Commission, 2025). Absent special provisions, a community project connecting to the grid is treated the same as any other generator or customer (Australian Energy Market Commission [AEMC], 2012).

FIGURE 11 - THE UK ELECTRICITY DISTRIBUTION NETWORK SERVICE TERRITORIES SOURCE: (UK POWER NETWORKS, 2025)

A central constraint has been the inability to trade electricity locally between community generators and nearby consumers. As of the mid-2010s, standard rules provided no mechanism for virtual net metering or peer-to-peer trading (Solar Choice, 2016). Consequently, community generators either consumed power on the host site ("behind-the-meter") or sold their output to a licensed retailer (Hicks & Mey, 2016). Direct sales to members or neighbours were, and largely remain, impossible without going through a retailer or obtaining a retail licence (Hicks & Mey, 2016). This barrier drove innovation with many groups pursuing behind-the-meter models by securing a willing host (e.g., a business or council facility) and selling all energy under a private agreement, thereby avoiding the need to trade over the network (Hicks & Mey, 2016). According to Australia's Renewable Energy Agency (2025), behind-the-meter or distributed energy resources will make up approximately 45% of Australia's electricity generation capacity by 2050.

Two durable models emerged (Hicks & Mey, 2016). The first is donation/revolving fund, as exemplified by schemes like Citizen's Own Renewable Energy Network Australia (CORENA) that loan capital for nonprofit solar, repaid from bill savings. The second is investment-based, where community investors finance a system and sell electricity to the host via a power purchase agreement. Both avoid spot-market participation and retailer negotiations that small projects often find limiting (Hicks & Mey, 2016).

In recent years, pressure has grown to enable local trading through trials and rule-change proposals. The Institute for Sustainable Futures simulated Local Electricity Trading and Local Network Credits to credit a local user's bill and recognise reduced network use (University of Technology Sydney [UTS], 2016). In 2016, community advocates proposed Local Generation Network Credits, but the AEMC declined to mandate such credits in 2017, a decision critics called a missed opportunity for community-scale projects (UTS, 2016).

As a result, community-oriented retailers have stepped in. Enova Energy, which is Australia's first community-owned retailer, launched in 2016 in northern New South Wales (Turnbull, 2016). Beyond green retailing, Enova facilitated local-generation uptake and supported community-trading pilots, including a Byron Bay "solar garden" that credited off-site customers' bills (One Step Off the Grid, 2017; UTS ISF, 2018). Enova was hailed as an "exciting development" that could help projects secure fair prices without each group seeking a retail licence, by aggregating and purchasing community-generated electricity on fair terms (Hicks & Mey, 2016).

In addition to trading, another regulatory aspect is grid connection standards and network tariffs. Community projects, especially mid-scale (100 kW to a few MW), often face connection complexity and cost and may be asked to fund augmentations (Martin & Rice, 2015; Ausgrid, 2024; Essential Energy, n.d.). Projects must meet distribution network technical requirements and follow the National Electricity Rules (NER) pathways - Chapter 5A for many embedded generators under 5 MW, and Chapter 5 for larger/registered units (Energy Networks Australia, 2018; Australian Energy Market Commission [AEMC], 2014).

There is no special national "community" category, a 1 MW community solar farm proceeds through the same studies as a 1 MW commercial plant (Australian Energy Market Operator [AEMO], 2022; AEMC, 2014).

To ease burdens in weak-grid areas, advocates proposed recognizing local use via Local Electricity Trading and Local Generation Network Credits (LGNC), a reduced "local use of system" charge and bill credits for nearby consumption (University of Technology Sydney – Institute for Sustainable Futures [UTS ISF], 2016; Hicks & Mey, 2016). The AEMC declined to adopt LGNC in 2016–2017 (AEMC, 2016). While not broadly implemented, New South Wales has trialed community-battery tariffs that lower charges when energy is cycled (Australian Energy Regulator [AER], 2021; Ausgrid, 2023; Endeavour Energy, 2025).

State governments increasingly embed community engagement and benefit-sharing in renewable procurements. The Australian Capital Territory (ACT) pioneered reverse auctions (2015–2016) for wind and solar tied to its 100% Renewable Electricity Target, weighting community engagement/benefit-sharing in bid assessment (Holmes à Court, 2018). Winning projects received 20-year FIT contracts, including Sapphire Wind Farm in New South Wales (Holmes à Court, 2018). An example of a guaranteed FIT for a community-led project is the ACT 1 MW community-solar carve-out that SolarShare won to build the Majura Valley solar farm (Solar Choice, 2015; Solar Choice, 2016).

Victoria created a Renewable Energy Auction (VRET) in 2017 which included community-engagement plans and benefit-sharing. The successful projects established community-benefit funds and local participation initiatives (Holmes à Court, 2018). The state also issued formal Community Engagement and Benefit Sharing guidance and broader benefit-sharing options (Lane & Hicks, 2019).

New South Wales' Electricity Infrastructure Roadmap (2020) established the Renewable Energy Zones (REZs) with strong community-consultation and benefit-sharing expectations, including a $50 million Community Benefit Fund (Holmes à Court, 2018). NSW also ran the Regional Community Energy Fund (2019–2020), awarding >$15 million to innovative community projects (e.g., community solar with storage, a "solar garden," and a community battery) (Bloch, 2020). Such grants help overcome grid and market hurdles by providing upfront capital and technical support.

NEW ZEALAND

New Zealand's electricity market is liberalized and competitive, with no dedicated FIT or power purchase obligations for small or community generators (MacArthur & Matthewson, 2018). Moreover, there is no single legal form for CE in New Zealand; instead, projects operate under various structures (co-operative companies, charitable trusts, incorporated societies, or limited liability companies with community ownership). Moreover, no dedicated "community energy law" exists, but these partnerships are shaped by general laws (e.g., co-operative and trust law) and often formalized through community trusts or co-ownership agreements. Some networks, like Community Energy Network (CEN), a national umbrella of community energy and healthy homes organizations, provide guidance on governance. CEN emphasizes that true community energy involves local ownership/control and collective benefit-sharing. This distinguishes it from mere "prosumer" (individual) projects (MacArthur, 2020). Overall, the "community" in CRE is defined by who initiates/owns the project (a local collective) and who benefits (the local community), rather than by project size or technology (MacArthur & Berka, 2020).

Existing Frameworks for Partnerships

While New Zealand lacks a specific CE national framework several broader frameworks support community partnerships:

- (1) The Treaty of Waitangi settlements framework facilitates iwi partnerships by returning resources and requiring co-management (see Resource Planning and Participation Rules), which has enabled iwi to enter joint ventures in geothermal and other renewables (Parson et al., 2025).
- (2) Local Government Act 2002 empowers councils to engage in partnerships that promote community well-being, under which some councils have established energy trusts or companies benefiting their communities.
- (3) Energy trusts (established during electricity sector reforms in the 1990s) provide a template for community ownership of distribution assets and revenues. Many community energy projects today build on these trust structures, reinvesting electricity dividends into local renewable projects (MacArthur & Berka, 2020).

New Zealand's electricity market is fully liberalized and does not provide special priority for community energy projects by law (Level: The Authority on Sustainable Building, 2025). All generators, community-based or commercial, operate under the same regulatory framework. Key national rules affecting grid access include the Electricity Industry Participation Code and related regulations, which ensure non-discriminatory connection to the grid but offer no preferential treatment for community projects.

Grid Connection and Access

In New Zealand, the Electricity Industry Participation Code mandates that distribution network companies allow connection of distributed generation (DG) that meets safety and technical standards, (Electricity Industry Act 2010 and Code Part 6). This open-access regime means community projects can connect solar panels, wind turbines, etc., to local lines as long as they comply with standards (Level: The Authority on Sustainable Building, 2025). Technical requirements (e.g. inverter standards, safety disconnects) are in place to protect the grid, but there is no capacity carve-out or expedited process specifically for community-owned systems (Level: The Authority on Sustainable Building, 2025).

It's important to note that New Zealand has no nationwide net metering mandate or FIT. Unlike many countries, electricity retailers are not obliged to buy excess power from small generators at a fixed price (Level: The Authority on Sustainable Building, 2025). Current buy-back rates vary by retailer; Consumer New Zealand's Powerswitch table (updated June 2025) shows typical rates around 8–17 c/kWh and independent market summaries report approximately 7–17 c/kWh (My Solar Quotes, 2025; Powerswitch by Consumer, 2025). Consequently, small/community generators face market conditions when selling power with no guaranteed, legislated purchase terms.

Priority Grid Access

New Zealand does not grant priority dispatch or guaranteed grid access to renewable generators (community run or otherwise). The way it works is that the system operator (Transpower) dispatches generation based on market bids and demand (Trixl, 2024). All generators must meet connection requirements under the Electricity Industry Participation Code and distribution companies must treat applicants non-discriminatorily (Electricity Authority, 2023). There are also no renewable portfolio standards which require utilities to include a specified share of community energy (Trixl, 2024). As a result, the national grid operator and distribution businesses treat all generators on an impartial basis and community projects compete on equal footing with commercial projects for connection and market access (Electricity Authority, 2023; Trixl, 2024).

5.3 Enabling policies and financial incentives

GERMANY

Germany's community energy sector has historically benefited from a robust set of financial incentives, particularly under the EEG. These incentives have evolved over time, with significant implications for the viability and structure of community energy projects.

Feed-in Tariffs (FITs) and Market Premiums
The EEG originally provided fixed FITs for renewable energy producers, guaranteeing long-term price stability and grid access. This mechanism was instrumental in the rapid growth of energy co-operatives and citizen-led renewable energy projects between 2006 and 2013 (Krug et al., 2022; Herbes et al., 2017).

Since 2017, FITs have been largely replaced by market premiums and competitive auctions. Under the market premium model, producers sell electricity directly to the market and receive a premium to cover the difference between market price and a reference value (Krug et al., 2022). This introduces greater financial risk and complexity, particularly for smaller community actors.

Auction System and Citizen Energy Privileges
To mitigate the impact of auctions, the EEG 2017 introduced special provisions for "citizen energy companies." These included reduced prequalification requirements and uniform pricing rules. However, these were exploited by commercial developers, leading to reforms and a decline in genuine community participation (Krug et al., 2022).

The new federal government has proposed further reforms, including exempting small community energy projects below certain capacity thresholds from auctions, in line with the EU's "de minimis" rules. Key benefits from this exemption have been:

- Lower barriers to access the grid
- Reduced administrative burdens making it easier for small, local actors to participate
- Reduced financial risk: avoiding auctions means community groups don't need to invest heavily in prequalification or risk losing money if unsuccessful.

Tenant Electricity Bonus
Introduced in 2017, the tenant electricity bonus supports solar PV installations in multi-unit residential buildings. It provides a premium for electricity consumed on-site by tenants. However, uptake has been limited due to administrative complexity and low financial returns (Miller, 2022).

Regional and Subnational Support
Some federal states have introduced targeted financial support:

- Schleswig-Holstein: Bürgerenergiefonds provides risk capital for community energy initiatives (Krug et al., 2022).
- Thuringia: Plans to replicate Schleswig-Holstein's model.
- North Rhine-Westphalia: offers networking platforms and advisory services (Krug et al., 2022).

Low-Interest Loans and Public Financing
Public banks such as KfW and Landwirtschaftliche Rentenbank offer low-interest loans for renewable energy projects. These are accessible to co-operatives and citizen energy companies but are not specifically tailored to RECs (Krug et al., 2022).

Tax Incentives and Fiscal Measures
Germany does not currently offer specific tax deductions or fiscal incentives for community energy projects. Retail customers pay the same network charges, taxes, and levies as for conventional tariffs, limiting the competitiveness of regional electricity products (Ehrtmann et al., 2021).

DENMARK

Denmark's early success in community energy was supported by generous FITs and tax exemptions. Key measures included:

- Tax-free investment grants (1979)
- Income tax exemptions for wind revenue (1984)
- FITs offering fair prices for electricity
- Grid access guarantees

These incentives enabled the rapid growth of community wind projects and institutionalized citizen participation (Mey & Diesendorf, 2018; Gorroño-Albizu et al., 2019). However, from 2002 onward, FITs were phased out in favor of market-based premiums. The 2004 removal of power purchasing obligations led to a substantial decrease in community wind development (Mey & Diesendorf, 2018).

Auction System and Local Ownership Measures
In response to declining community participation, Denmark introduced the "Option to Purchase Shares Scheme" (OPSS) in 2009. This requires developers to offer 20% of project shares to residents within 4.5 km of new wind projects (Wierling et al., 2018). While well-intentioned, the scheme has had limited impact due to financial barriers and lack of early community involvement (Gorroño-Albizu et al., 2019; Mey & Diesendorf, 2018). Beginning in 2019, all onshore wind projects are subject to competitive auctions, further disadvantageing small co-operatives (Wierling et al., 2018).

Regional and Subnational Support
Some municipalities have supported community energy through partnerships and land access. Examples include:

- Samsø: Municipal company owns five offshore turbines as part of the Renewable Energy Island project (Gorroño-Albizu et al., 2019).
- Copenhagen: Municipal utility HOFOR invests in wind projects and offers 20% of shares to local residents (Gorroño-Albizu et al., 2019).

However, support varies widely, and some municipalities prioritize large-scale development over community participation.

Low-Interest Loans and Public Financing
The Danish Energy Agency (DEA) provides project development funds for local energy communities. According to the International Energy Agency policy database, from 2022 to 2025, DKK 4 million annually are allocated to local energy communities for information, planning, and project development (IEA 2025).

UNITED STATES

At the federal level, the landscape includes the 2022 Inflation Reduction Act (IRA) and Environmental Protection Agency funding lines that support community energy and low-income access. The IRA developed a community energy bonus tax credit, which grants credits for community projects being developed on brownfield sites (Internal Revenue Service [IRS], 2025; U.S. Environmental Protection Agency, 2025b). Like all jurisdictions, political changes can impact policy and regulations, and many aspects of the IRA may change in the coming years.

Renewable Portfolio Standards (RPS) are a proven policy tool for increasing the deployment of renewable energy. Policymakers hoping to promote a more diverse resource mix in their states have sometimes augmented their RPS policies with various carrots and sticks to encourage the development of technologies and applications with more challenging economics (e.g. behind-the-meter or community-scale renewables). The most popular mechanisms for targeting specific technologies or applications are RPS carveouts and credit multipliers. A carve-out serves as a subset of a larger RPS, requiring a certain percentage of the overall requirement to be met with a specific technology or application. Credit multipliers, on the other hand, award more than one (or less than one) renewable energy certificate for electricity produced by certain technologies or applications. Of the 29 states with an RPS, 21 states plus DC have adopted a credit multiplier, a carve-out, or both as of June 2018. An additional three states with non-binding goals for renewable energy development include credit multipliers or carve-outs. In total, 38 credit multipliers have been adopted across 15 states plus DC since 1996. Eight of these states have both a credit multiplier and a carve-out (CleanEnergy States Alliance, 2018). In some jurisdictions, like Wisconsin, co-operatives are exempt from some state financial regulations, like filing prospectuses, making it less administrative burdensome for co-operatives to issue securities (Wisconsin State Legislature, 2009).

In addition to RPS and community solar, several states, primarily in FERC/ISO regulated jurisdictions, have energy storage demand response programs such as National Grid's Connected Solutions program which operates in Massachusetts, New York, and Rhode Island (National Grid, 2025), to allow residential and commercial customers to benefit from providing grid services. Individuals, and co-operatives, can benefit from the demand response programs to generate additional revenue streams.

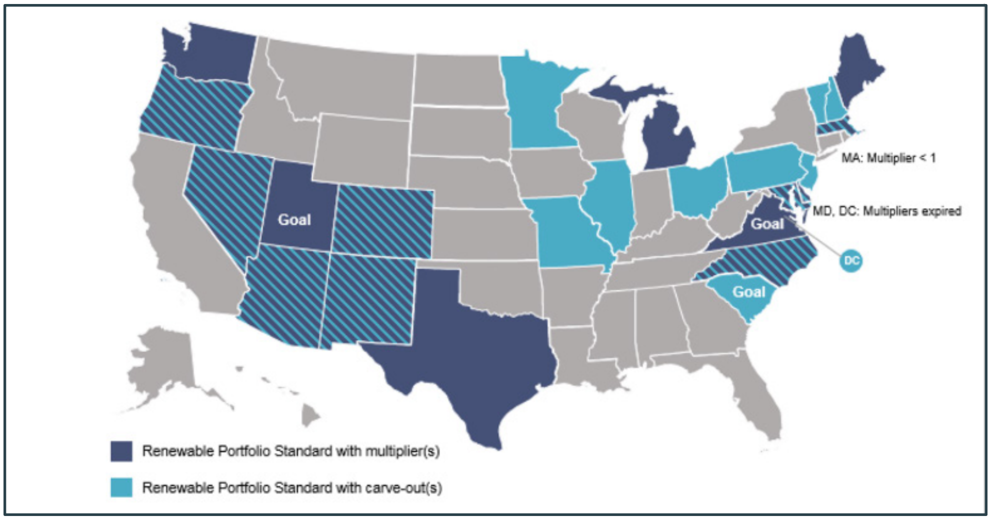

FIGURE 12 -STATES WITH RPS SOLAR CARVE-OUTS AND MULTIPLIERS
SOURCE: (CLEAN ENERGY STATES ALLIANCE, 2018)

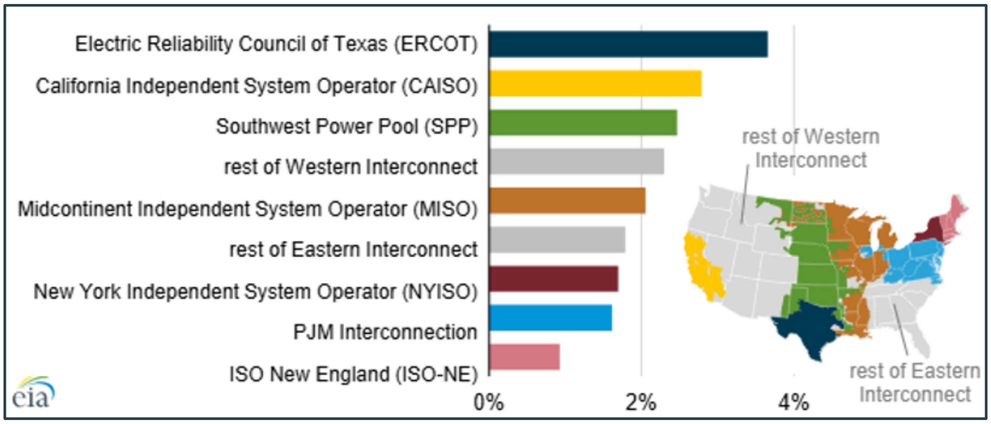

FIGURE 13 - PEAK DEMAND SAVINGS FROM DEMAND RESPONSE
SOURCE: (U.S. ENERGY INFORMATION ADMINISTRATION, 2019)

UNITED KINGDOM

The Community Energy Strategy (2014) was the first national policy framework to explicitly recognize the role of communities in delivering the U.K.'s energy and climate goals. While much of the direct policy support was later scaled back, the strategy remains a reference point in the academic and policy literature, shaping how community energy is conceptualized in the U.K. (Department of Energy and Climate Change [DECC], 2014; Seyfang et al., 2014).

A key enabling statute is the Co-operative and Community Benefit Societies Act 2014, which consolidated society law and established a legal basis for community benefit societies and co-operatives. The Act clarified governance requirements and underpinned the development of community shares, a distinctive form of withdrawable, non-transferable equity used to capitalize local projects. Guidance from the Financial Conduct Authority (FCA) provides further clarity on registration tests for co-operatives and community benefit societies (FCA, 2015). Community shares have since become a resilient and widely adopted instrument for financing renewable energy, with evidence showing strong uptake across wind, solar, and energy efficiency projects (Bauwens et al., 2016).

Long-term strategic direction has been set by the Net Zero Strategy (2021) and the Energy Security Strategy (2022), which outline the U.K.'s pathways to decarbonization and energy resilience. Both strategies emphasize decentralization, local authority leadership, and citizen participation, with Local Area Energy Planning (LAEP) highlighted as a key mechanism for coordinating place-based decarbonization (U.K. Parliament, 2021; House of Commons Library, 2022).

Raising capital for community projects relies on a diverse toolkit. Community shares represent a distinctive and resilient form of withdrawable, non-transferable equity, widely used to fund renewable energy projects while preserving democratic ownership and long-term community returns (Co-operatives U.K., 2025). In the U.K., energy co-operatives are exempt from the prospectus requirements when issuing community shares laid out in the Financial Services and Markets Act 2000 (U.K. Parliament, 2000; Co-operatives U.K., 2024).

Tax reliefs once played a significant role in incentivising investment, but policy shifts have altered this landscape. Since November 2015, renewable energy generation has been excluded from key venture capital relief schemes, including the Enterprise Investment Scheme (EIS), Seed Enterprise Investment Scheme (SEIS), and Venture Capital Trusts (VCTs). Similarly, the Social Investment Tax Relief (SITR), which was later extended to include certain community projects, ceased to apply to new investments from April 2023. These changes marked a major retreat from earlier government support for community energy through the tax system (HM Revenue and Customs, 2015).

Ofgem's Regulatory Sandbox (also known as the Innovation Link) provides innovators with time-limited exemptions, bespoke guidance, and "comfort letters" to test new retail and flexibility models in a controlled environment. Reviews of the scheme note its importance for enabling novel approaches to demand-side response, peer-to-peer trading, and community-led flexibility. In 2023, Ofgem proposed reforms to create a Future Regulation Sandbox, extending the scope and accessibility of these tools to support the transition to net zero (Ofgem, 2023; Britton & Woodman, 2022).

In the wake of the 2024 general election, the new government introduced some important changes that could positively impact the co-operative sector and community energy in the UK. The bold declaration of working toward a doubling of the co-operative sector will presumably fuel funding and policies for the sector. One potentially significant change is the creation of Great British Energy (GBE), "a publicly owned energy company" whose goal is "to power Britain with clean, secure, home-grown energy and to become a global leader in clean energy". Further, the company promises to "ensure communities have a direct stake in local energy projects"" (Great British Energy, n.d.). What exactly this means going forward, and its relevance to co-operative/community-owned projects in the U.K., is unclear. To date, the work of GBE has included fitting five NHS sites and three schools, with GBE solar panels. The government claims these installations will save these organizations money, but the ownership structure is not immediately evident. Critics have noted that GBE solar panels were made in China (BBC, 2025). Related to GBE is the Local Power Plan, which does have potential to lead to community and co-operative energy projects (Department for Energy Security and Net Zero, 2025). Under the UK.'s Clean Energy Superpower Mission, the LPP will provide 10 million GBP to encourage investment of 8GW of local/community-owned renewable energy projects by 2030 (Department for Energy Security and Net Zero, 2025b).

At the small-scale generation level, as noted in section 5.2 of this report, the Smart Export Guarantee (SEG) was introduced in 2020 to replace the FIT. The SEG requires some electricity suppliers, known as SEG Licensees, to pay small-scale generators, known as SEG Generators, for low-carbon electricity which they export back to the National Grid, providing certain criteria are met. The SEG requires licensed suppliers to offer payments for eligible low-carbon sources of electricity up to 5 MW exported from one DSOs to another, creating a new incentive for households and communities to participate in distributed generation (Ofgem, 2025a). Most post-FIT community projects rely on a combination of income streams. These include payments through the Smart Export Guarantee (SEG) for small-scale exports, Power Purchase Agreements (PPAs) negotiated with energy suppliers, and growing opportunities to earn from flexibility markets such as the Demand Flexibility Service (DFS), distribution system operator (DSO) tenders, or DSO residential and commercial demand response programs (National Grid, 2025). This "stacking" of revenues is increasingly necessary to ensure project viability in the absence of earlier, more generous subsidies (Nolden et al., 2020).

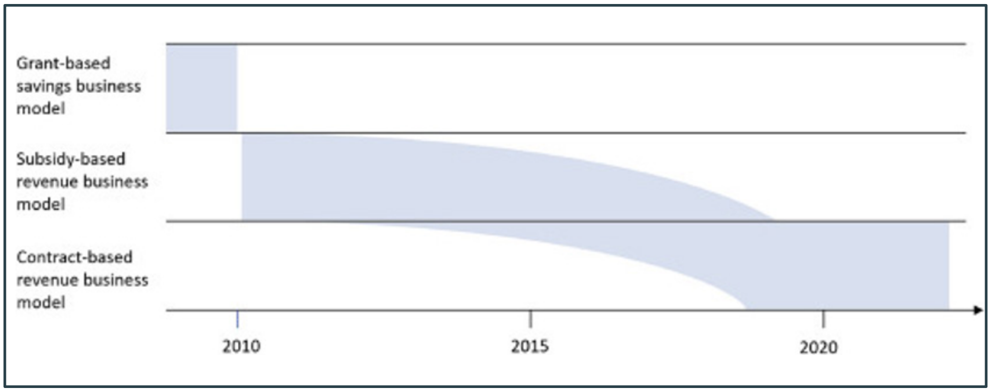

FIGURE 14 - EVOLUTION OF ENGLISH CE BUSINESS MODELS AS POLICIES CHANGE
SOURCE: (NOLDEN ET AL., 2022)

AUSTRALIA

The national framework that has guided much of Australia's CE projects has been the Renewable Energy Target (RET) and its tradable Renewable Energy Certificates (Climate Change Authority, 2012). This meant that community renewable projects would be eligible for Small-Scale Technology Certificates (STCs), providing them with upfront rebates via STCs (for systems <100 kW) (Australian Government: Clean Energy Regulator, 2025; C4CE, 2016). This has helped to initiate community solar on rooftops of halls, and sports clubs, etc. Many community groups leveraged STCs to lower capital costs for their 5 kW–100 kW solar projects (Australian Government: Clean Energy Regulator, 2025; C4CE, 2016).

The RET also created Large-Scale Generation Certificates (LGCs) for projects >100 kW to earn LGCs per MWh of production until 2030. However, LGC prices have fluctuated with policy uncertainty. In 2014, the RET was reviewed and ultimately reduced, which "dramatically reduced forecast earnings" for projects like Hepburn Wind Farm, which relied on LGCs and threatened their financial viability and led to a financial restructuring of the wind project (Lane & Hicks, 2019). This had negative consequences as the RET's instability during 2013–2015 was a deterrent to new community projects at the time (Howard, 2020). After 2015, LGC prices rebounded and remained relatively strong through the late 2010s, so they did provide an ongoing incentive for community wind and solar farms in operation. Since the RET scheme stopped taking new targets after 2020 (the national target was met), the future value of LGCs has been on the decline (Australian Government, Clean Energy Regulator, 2021).

Financial incentives have been crucial for the growth of community renewables, though few have been exclusive to community projects. Around 2008–2012, many states rolled out premium FITs (some as high as 60¢ per kWh) to reward solar generation (Mercer, 2025). These schemes were mostly aimed at households and small generators, and by the time community-owned projects got going (circa 2010–2015), most state FITs were being wound back or closed. For example, New South Wales briefly had a gross FIT (60¢), but it ended in 2011; Queensland's 44¢ FIT closed to new entrants in 2012 (Energy.gov.au, n.d., Grattan Institute, 2015; IPART, 2011; Queensland government, 2012). Today, FITs are minimal (e.g. ~5¢/kWh in NSW, and Victoria's regulated minimum fell to virtually $0, meaning new community projects cannot rely on high FITs for revenue Mercer, 2025).

Beyond market-based incentives, direct grants and public funding have been pivotal, especially for covering high upfront costs that communities struggle with. In the development phase, community groups often face expenses for feasibility studies, permits, and grid studies long before any revenue. Multiple projects have only succeeded thanks to government grants or subsidies in those early stages (Hicks & Mey, 2016; Howard, 2020).

Starting in the mid 2010s, state governments launched community-specific support programs. New South Wales led with the Growing Community Energy program (2014–2015) which gave small grants for community group formation and feasibility studies. Later, NSW announced a A$15 million Regional Community Energy Fund (RCEF) in 2018, which (after some delay) awarded grants in 2020 to seven projects totaling 17.2 MW of solar PV, 17 MWh of batteries, and even a hydrogen storage pilot (SolarQuotes, 2020). Recipients included community solar farms (e.g. 1.2 MW in Goulburn), Australia's first solar garden (a 1 MW array where members purchase "virtual panels"), a shared community battery by Enova, and a hybrid solar-battery-hydrogen project in Manilla (SolarQuotes, 2020).

Finally, communities have creatively marshaled their own financial incentives through volunteer labour, in-kind support, and local fundraising. Hepburn Wind, for instance, benefited from a local wind monitoring firm deferring AUS$100k+ of fees until construction (a form of in-kind credit) and even taking part of their payment as co-operative shares (Lane & Hicks, 2019). Dozens of volunteers contributed to events and marketing, "sweat equity" that reduced cash costs (Lane & Hicks, 2019). CORENA's revolving fund uses donated money to create effectively interest-free finance for community groups (Lane & Hicks, 2019).

NEW ZEALAND

There are no specific procurement set-asides for community energy in New Zealand. Government agencies and utilities are not required by law to purchase energy from community projects. However, in practice, some local governments voluntarily procure locally generated renewable power or partner with community trusts on projects (e.g., a city council purchasing solar power from a community solar farm), but these are case-by-case arrangements, not mandated by regulation. Recent sector discussions have proposed enabling "local energy markets" or peer-to-peer trading platforms to better integrate community energy (Electricity Authority's Innovation & Participation Advisory Group, 2022), but these remain in pilot stages.

The regulatory environment has been characterized as "exclusive" and challenging for widespread community energy uptake (Berka et al., 2020, p. 179). As mentioned, without targeted provisions, community projects must navigate the same grid connection process as large developers. Some barriers include network upgrade costs for connecting remote projects and lack of standardized contracting for community groups.

In absence of formal mandates, some voluntary initiatives have emerged. For instance, private renewable developers have partnered with iwi or communities to share benefits (e.g., Lodestone Energy partnering with Far North iwi on solar farms) (Electricity Authority, 2022). Additionally, a few line companies (many of which are community-owned trusts themselves) offer special tariffs or support for community projects in their regions. Overall, New Zealand's regulatory framework provides no special grid privileges, net metering, or priority access for community renewable projects. Rather, they must operate under the general market-based system. This market-driven approach is in contrast to some jurisdictions (e.g., parts of Europe), where community projects receive feed-in tariffs or guaranteed offtake (Berka et al., 2020).

New Zealand's financial incentive landscape for community energy is relatively sparse. However, despite this, highlighted below are some key financial mechanisms that are relevant to community energy:

Emissions Trading Scheme (ETS)
The primary policy driver for renewable energy (including community projects) is the New Zealand Emissions Trading Scheme, which prices carbon and indirectly improves the economics of renewables (Trixl, 2024). Renewable projects benefit from avoided carbon costs, but this is a market-wide incentive rather than a targeted support—it applies equally to all renewable generation and the ETS alone is insufficient to spur small community projects because it does not provide upfront capital or guaranteed revenue (Trixl, 2024).

Government Grants and Funds
In recent years, the government introduced grant programs to support community-based renewables. The Community Renewable Energy Fund (CREF) was launched with NZ$28 million in 2022–2023 to fund community energy projects (MBIE, 2022). Its goal is to enable innovative local projects (e.g., solar and storage at a marae or community centre) that improve energy affordability and resilience (MBIE, 2022). Early rounds targeted off-grid communities and Māori housing initiatives, which builds on the prior Māori and Public Housing Renewable Energy Fund (MBIE, 2022).

Loans and Investment Programs
New Zealand lacks a dedicated low-interest loan or FIT-contract program for community energy. However, New Zealand Green Investment Finance (NZGIF) can invest in clean-energy projects via debt or equity; while not community-specific, some large solar financings could indirectly support community outcomes (NZGIF, 2024).

Tax Credits and Exemptions
There are no broad tax credits or rebates for installing renewable energy; standard business provisions (e.g., depreciation) may apply, but there is no analogue to the U.S. Investment Tax Credit.

Feed-in Tariffs and Net Metering
As noted above, New Zealand has no mandated FITs or net metering. All buy-back rates are set by retailers and are market-driven (Level: The Authority on Sustainable Building, 2025). The absence of a guaranteed tariff is frequently cited as a barrier to community project bankability, which often depends on stable revenue streams (Berka et al., 2020).

Subsidies and Other Supports
Direct subsidies are limited. Programs addressing energy hardship (e.g., Warmer Kiwi Homes) and EECA contestable funds (e.g., for EV charging) can indirectly support community-energy goals by freeing local capacity and pairing renewables with transport (MBIE, 2022).

5.4 Regional resource planning and access to key inputs

GERMANY

Spatial planning and permitting are primarily the responsibility of subnational governments. While there are no formal privileges for community energy actors, municipalities can support projects by providing land, facilitating approvals, or becoming shareholders in energy co-operatives (Schmid et al., 2020). Examples include:

- Wolfhagen: Local co-operative owns 25% of the municipal utility.
- Rheinhessen: co-operative holds a stake in the grid operator.

However, relationships vary. Some municipalities view co-operatives as undemocratic, lacking diversity and being primarily an investment opportunity for the well-off. Other municipalities prefer full control over energy assets (Miller, 2022).

DENMARK

Spatial planning is mostly managed at the municipal level. In the 1990s, Denmark introduced planning zones to concentrate wind development in high-yield areas. While this improved efficiency, it also reduced opportunities for community ownership and increased public opposition (Mey & Diesendorf, 2018).

Municipalities can support community energy by:

- Providing land for projects
- Facilitating approvals
- Partnering with co-operatives or foundations.

However, planning processes often favor large developers, and community projects face higher upfront costs due to environmental assessments and legal requirements (Mey & Diesendorf, 2018).

UNITED STATES

Because regulations and policies differ widely across the US, access to host sites (brownfield areas, municipal buildings, schools, churches, etc.) is not uniform. At the federal level, the IRA includes a bonus credit for community energy projects taking place on brownfield sites, and tax credits are also available through the Opportunity Zone Program which grants credits for projects taking place in low-income and rural communities (Dentons, 2024). While there has been much public discussion surrounding the IRA and some aspects have changed, many portions of the IRA remain in place (U.S. Environmental Protection Agency, 2025b). Particularly for urban RECs, engagement with municipal and county organizations and processes, as well as with utilities, is crucial for gaining access to project locations.

UNITED KINGDOM

As noted in Section 5.3, the UK has developed a robust set of legislative and policy instruments to enable community participation and innovation in the energy transition. In relation to access to land, the Localism Act 2011 introduced new rights for neighbourhood planning and community action, including the Right to Build, Right to Challenge, and Right to Bid. These mechanisms gave local groups a stronger role in shaping development, including energy infrastructure, and provided important foundations for community benefit in renewable energy projects (U.K. Government, 2011). UK community and co-operative organizations commonly work with local authorities to develop projects and gain access to project sites which otherwise would be cost-prohibitive to obtain. There are several benefits for RECs to leverage the Localism Act (Stafford Borough Council, n.d.; Wigan Council, n.d.).

Neighbourhood Planning
Planning is a major aspect of the Act which benefits community energy projects. Communities can create a Neighbourhood Plan which sets out where new developments (including community energy installations) should be located and what they should look like. If the plan is in line with national and local strategic policy and approved by a local referendum, it becomes part of the statutory development plan, giving community-led energy projects more weight in the planning process.

General Power of Competence
The Act grants eligible local authorities and parish councils the "general power of competence" (GPC), allowing them to do anything an individual can do, as long as it's not prohibited by other legislation. This provides greater flexibility and confidence for councils to engage in innovative projects, such as investing in or running community energy schemes, without needing to identify specific statutory powers for every action.

Community Right to Bid
This allows local voluntary and community organisations to nominate land or buildings as "assets of community value". While primarily used for local amenities like pubs or shops, it could potentially be relevant for protecting sites earmarked for community energy projects, giving groups time to prepare a bid if the land comes up for sale.

Community Infrastructure Levy (CIL)
The Act changed the CIL regulations to allow local authorities to pass a portion of funds raised from new developments directly to the neighbourhoods where the development occurs. These funds can be used to support local infrastructure, potentially including community energy infrastructure, provided the priorities are set out in the Neighbourhood Plan.

AUSTRALIA

Land and resource access for community energy projects must comply with the general land use planning laws in Australia, which operate at state and local government levels. There are no special planning exemptions for community-owned projects (a wind turbine or solar farm faces the same zoning and environmental approval processes whether community or corporate owned).

At the state level, planning approval thresholds often depend on project size. Small installations (rooftop solar, small wind on private land) are usually handled through local council permits or even considered "exempt development" below certain sizes. Larger community projects, like multi-megawatt wind or solar farms, require development approvals similar to commercial projects. Community support can sometimes expedite local permits (as councils tend to look favorably on community-led proposals that demonstrate public benefit).

Grid-Connected Projects on Public Land
For grid-connected projects on public land, communities may need a lease or license over the site (or 'host' agreement) with the public landholder; this is standard practice in Australian renewable development and is recognized in official guidance (e.g., NSW Land Registry Services Guidance on Renewable Energy Leases; Australian Energy Infrastructure Commissioner landowner materials; NSW planning guidance for large-scale solar) (NSW Renewable Energy Leases, 2025; Australian Energy Infrastructure Commissioner, 2021-2022).

More commonly, community solar projects use rooftops or land provided by willing hosts (such as a council roof or a farmer's field) and secure a roof lease/license and a power-sales agreement (typically a behind-the-meter PPA) with the host (C4CE, 2017; Hick & Mey, 2016).

Indigenous Land Rights and Participation in Energy Projects
A distinctive aspect in Australia is Indigenous land rights and participation in energy projects. Projects on Indigenous land or that may affect native title must consider the Native Title Act 1993 (Commonwealth), typically through Indigenous Land Use Agreements or the right-to-negotiate, and where relevant, Aboriginal land rights statutes such as the Aboriginal Land Rights (Northern Territory) Act 1976 (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2022; National Native Title Tribunal, 2024; Aboriginal Land Rights (Northern Territory) Act 1976). Historically, large renewable energy projects on Indigenous traditional lands have been limited, but this is changing. Many remote Indigenous communities, often not connected to the main grid, rely on diesel and have long sought renewables to cut costs and pollution (Martire, 2020). In the absence of a coordinated federal rollout, progress has been piecemeal, led by state utilities, non-government organizations, and communities themselves (Martire, 2020).

One pioneering initiative was Bushlight, funded under the Commonwealth's Remote Australia Strategies from the early 2000s to 2013 and delivered by the Centre for Appropriate Technology (Martire, 2020). Bushlight installed more than 150 stand-alone solar systems in remote Aboriginal communities and paired technology with co-design, training, and a simple "energy management" interface which has contributed to the project's longevity (Martire, 2020). Although Bushlight's dedicated funding ended, its legacy continues. For instance, the Indigenous Australians Agency now runs an Outback Power program that maintains and upgrades legacy systems in about 180 remote communities (Hancock et al., 2024).

Indigenous community-owned projects have been rare until recently. Examples include the Ngurrara Solar initiative in Borroloola, Northern Territory, which aims to reduce diesel reliance through a community-owned solar farm (Hancock et al., 2024), and a 209-kilowatt solar-battery system in Lockhart River, Queensland, financed by Indigenous Business Australia to support local energy autonomy (Martire, 2020). A recent milestone is the Marlinja Community Microgrid, launched in 2024 and described as Australia's first First Nations-owned, grid-connected renewable microgrid, advancing local energy resilience and ownership.

A national movement to amplify First Nations' role in the clean-energy transition has also grown. The First Nations Clean Energy Network (FNCEN), established in 2021, advocates reforms so Indigenous communities share in benefits through jobs, ownership stakes and culturally appropriate consultation (Hancock et al., 2024). FNCEN calls for genuine consultation and co-design on projects and makes note of the fact that many communities have felt excluded by past decisions (Hancock et al., 2024).

NEW ZEALAND

New Zealand's planning regime gives communities and iwi channels to participate, but it does not guarantee approval or priority for community-led projects. As Berka et al. (2020) note, stronger empowering measures would be needed to truly open up resource access, such as simplifying consents for community-scale projects or requiring proactive inclusion of community energy in regional plans. Below is an overview of New Zealand's resource planning and participation rules regarding community renewable energy projects:

Core statute and participation
Renewable energy infrastructure in Aotearoa New Zealand is primarily governed by the Resource Management Act 1991 (RMA). Despite brief 2023 reforms, those Acts were repealed, and the RMA remains the main planning statute, alongside a new Fast-track Approvals pathway for some projects (still leaving most consent decisions under the RMA). Community and iwi participation occurs through the RMA's submission/notification processes for resource consents. Many projects are publicly or limited-notified and affected people can lodge submissions and be heard at hearings (Ministry for the Environment, 2015; 2019; Environmental Protection Authority, 2024; Environment Guide, 2025).

Māori (iwi/hapū) provisions
The RMA requires decision-makers to recognize and provide for "the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga" (s. 6(e) and to take into account the principles of Te Tiriti o Waitangi (s. 8) (Resource Management Act, 1991). Iwi/hapū planning documents must be taken into account by councils when preparing plans (e.g., s. 66(2A) and are routinely used in consent processes (Quality Planning, 2017a; Bay of Plenty Regional Council, 2024).

Treaty settlements, co-management & statutory acknowledgements
Many iwi now hold formal roles in resource governance through Treaty settlement legislation, e.g., co-management of the Waikato and Waipā rivers via joint committees and the Waikato River Authority; councils must also attach and have regard to statutory acknowledgements in plans and consent processes (Waikato Regional Council, 2025;

Te Arawa River Iwi/Crown, 2010; Quality Planning, 2017b; Auckland Council, n.d.). In geothermal regions (Waikato/Bay of Plenty), councils are actively updating geothermal management plans with hapū/iwi input (Bay of Plenty Regional Council, 2024).

National policy direction (land access & enabling rules)
The National Policy Statement for Renewable Electricity Generation 2011 (NPS-REG) directs councils to recognize the national significance of renewable electricity generation and to enable development at all scales through regional/district plans. While not specific to "community" projects, the NPS-REG's enabling policies are frequently used by community groups seeking consent (Ministry for the Environment, 2011).

Facilitating Land Access for Communities
Policy advice commissioned by Energy Efficiency and Conservation Authority's (EECA) identifies practical ways to ease land access for community projects, like, working with the Department of Conservation/Crown/local authorities to negotiate access to public land, site pre-feasibility mapping and other supports (Energy Efficiency and Conservation Authority, 2022, pp. 17–19).

5.5 Capacity building – financial and soft policy

GERMANY

Capacity building is essential for professionalizing co-operatives, diversifying membership, and enabling participation by low-income and marginalized groups; however, many German co-operatives still rely on volunteer labor and face challenges in scaling operations (Miller, 2022).

Germany has a well-developed ecosystem of support for community energy, including:

- Umbrella organizations (e.g., Bürgerwerke)
- Regional energy agencies
- Co-operative associations.

These entities provide training, technical assistance, and networking opportunities. The Bürgerwerke enables member organizations to sell electricity directly to consumers, enhancing their business models and visibility (Ehrtmann et al., 2021; Miller, 2022). Germany also promotes benefit-sharing mechanisms, such as voluntary payments of €0.002 per kWh from developers to host municipalities, enhancing local support and economic participation (CAN Europe, 2025).

DENMARK

Denmark's community energy sector has benefited from strong institutional support, particularly during its formative years. Key organizations include:

- Danish Wind Turbine Owners Association (DWTOA): Provided technical assistance and advocacy for co-operatives.
- Nordic Folkecenter for Renewable Energy: Supported innovation and training for community projects.
- Samsø Energy Academy: Facilitates education, planning, and community engagement.

These entities played a crucial role in professionalizing the sector and mobilizing collective action. However, many co-operatives still rely on volunteer labor and face challenges in scaling operations (Mey & Diesendorf, 2018).

Recent efforts to revitalize community energy include:

- Partnerships with municipal utilities
- New aggregators and business models (e.g., Vindenergi Danmark)
- Expansion into solar PV, battery storage, and electric vehicles.

Vindenergi Denmark is a not-for-profit energy trading company that serves Danish wind turbine owners, both individuals and co-operatives. As the market in Denmark liberalized and feed-in tariffs were replaced by market-based pricing, these small actors faced challenges:

- Price volatility in wholesale electricity markets.
- Higher complexity in trading and compliance.
- Pressure from large commercial developers.

To address those challenges a business model like Vindenergi Danmark emerged to professionalize operations and create economies of scale without abandoning community principles. They act as intermediaries, enabling co-operatives to survive and thrive under competitive conditions.

These developments suggest potential for renewed growth but require targeted support and inclusive policy frameworks.

UNITED STATES

Like other aspects of CE in the U.S., capacity building initiatives are supported by a mix of federal (Ross & Day, 2022; U.S. Department of Energy, 2025), state (New York State Energy Research and Development Authority [NYSERDA], 2025), regional (Sustainable Westchester, 2025), local, and industry players. As noted in section 5.2 of this report, PUCs regulate investor-owned utilities in their respective states, and many have developed rules to promote various capacity building and energy equity initiatives (Clean Energy Action, 2022).

In addition to mandated PUC-support from utilities, there are several industry groups and associations which can support the

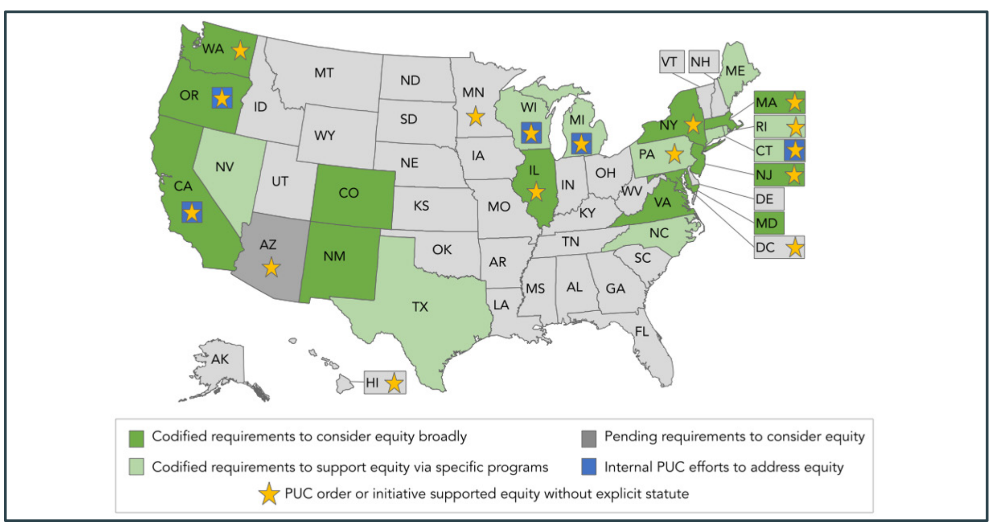

FIGURE 15 - PUBLIC UTILITY COMMISSION'S EQUITY MAP
SOURCE: (CLEAN ENERGY ACTION, 2022)

development of RECs though capacity building, training, and advocacy, such as the National Rural Electric Cooperative Association and the Institute of Local Self-Reliance. The Department of Energy's national labs, such as the National Renewable Energy Laboratory, have provided support through various programs, such as its Energy to Communities, Sharing the Sun, and State-Tribal Energy Collaboration programs (National Renewable Energy Laboratory, 2024; National Renewable Energy Laboratory, 2025b; National Renewable Energy Laboratory, 2025c). The National Rural Electric Cooperative Association (NRECA), as the national association for America's electric cooperatives co-ordinates and advocates on behalf of its nearly 900 member cooperatives and their communities.

UNITED KINGDOM

Many of the constituent countries within the U.K. (England, Scotland, Wales, Northern Ireland) have established strong support ecosystems that complement national policy frameworks and directly enable community and co-operative energy initiatives.

In Scotland, the Community and Renewable Energy Scheme (CARES) is delivered by Local Energy Scotland in partnership with the Energy Saving Trust. As of mid-2025, CARES had provided advice to more than 1,300 organizations, distributed £67 million in financial support across 990 projects, and facilitated the development of around 66 MW of community-owned renewable capacity (Energy Saving Trust, 2025). In addition to these achievements, the Scottish Parliament announced further growth funding in 2025, signaling ongoing political commitment to scaling up community-led energy projects (Scottish Parliament, 2025).

In Wales, the Welsh Government Energy Service provides a similarly integrated package of technical, commercial, and procurement support, alongside access to grants and loans. The service has become a cornerstone of public and community energy delivery in the country. Its 2024–25 impact report highlighted that £107.7 million in investment had been secured for local energy projects, with long-term results including the installation of tens of megawatts of renewable capacity and significant lifetime CO_2e savings (Welsh Government, 2025; Carbon Trust, 2025). This model demonstrates how devolved institutions can support communities not just with funding, but also with capacity-building and expertise to bring projects to fruition.

Another element of capacity building in the UK is the adoption of Local Area Energy Planning (LAEP). Originally developed by the Energy Systems Catapult in collaboration with the Centre for Sustainable Energy, LAEP provides a data-driven, whole-system methodology for local energy planning. The approach integrates heat, power, and transport considerations within a geographic boundary and has now been adopted or is in progress across numerous local authorities in Great Britain. It is increasingly being used by devolved administrations as an implementation tool to align place-based strategies with national net zero targets (Energy Systems Catapult, 2022a; Energy Systems Catapult, 2022b).

AUSTRALIA

A defining feature of Australia's community renewable energy movement is the strong network of capacity-building programs, educational initiatives and knowledge-sharing networks that have developed alongside projects. Recognizing that volunteer community groups often lack technical and legal expertise in energy, a variety of support structures have emerged to empower communities to participate in the energy transition.

The Coalition for Community Energy (C4CE), formed in 2014, is the peak body and collaborative network for Australia's community energy sector. It began with over 50 organizations and grew to 105 by 2018 (C4CE, n.d.). C4CE fosters initiatives "greater than the sum of their parts," notably through the 2014 and 2017 Community Energy Congresses, which convened hundreds of participants for workshops on planning, finance, and policy, while also attracting government support (C4CE, 2017; Hicks & Mey, 2016). In 2018, C4CE merged with Embark Australia and now manages a Knowledge Hub, while coordinating advocacy on regulatory reform and funding. Members have jointly lobbied for Local Energy Trading rules and advised parliamentarians on initiatives like the Local Power Plan (C4CE, 2020).

Another key player is the Community Power Agency (CPA), founded in 2011 by community energy researchers and activists (Nature Conservation Council, 2024). CPA is a not-for-profit workers' co-operative that provides training, advice, and advocacy for community energy in Australia (Mallee et al., 2024). Its members, experienced leaders and academics, have mentored over 50 groups, helping with legal structures, financial models and community consultations. CPA has supported initiatives like solar "bulk buy" programs and the Haystacks Solar Garden (which will be discussed subsequently as a case study) and has advised governments on benefit-sharing frameworks (Mallee et al., 2024; Lane & Hicks, 2019). More recently, it has contributed strategies for renewable energy zones, expanding its role from project support to shaping broader energy transition policy (Mallee et al., 2024).

Numerous community-based initiatives and networks have blossomed to share experience and inspire action. For example, the movement of "Totally Renewable" towns, like Totally Renewable Yackandandah (TRY) in Victoria, is a form of capacity-building by doing (C4CE, 2025; Totally Renewable Yackandandah [TRY], n.d.). TRY is a volunteer group that set a 100% renewable target for their town and developed projects like community battery storage and a mini grid (Smith 2022; TRY, n.d.). They provide knowledge sharing and mentoring with other neighbouring towns (e.g. Euroa, Beechworth, Daylesford have similar groups, some spurred by TRY's success) (Department of Energy, Environment and Climate Action Victoria, 2025; Smith, 2022; TRY, n.d.).

Another notable stream of capacity-building is focused on Indigenous communities. The First Nations Clean Energy Network is developing a roadmap and providing training for Indigenous rangers and community leaders on renewable energy project planning. In 2023, they hosted an Indigenous Community Energy forum that brought together First Nations representatives from across Australia to share experiences (learning from Canada's robust Indigenous energy sector). Programs like Bushlight, beyond installing hardware, also devoted resources to community energy education – teaching community members how to maintain systems and budget energy use, thereby building local technical capacity and a sense of ownership (Martire, 2020). These investments in human capital have yielded resilient outcomes, as seen by the long survival of Bushlight systems and the confidence it gave communities to pursue further projects.

NEW ZEALAND

Building the capacity of communities to engage in and lead energy projects has become a focal area in New Zealand's energy transition. Given the historical dominance of large utilities, empowering local groups with the knowledge, skills and networks to undertake CRE projects is critical. As will be highlighted below, several initiatives and organizations are contributing to community capacity building in energy:

Community Energy Network (CEN) CEN is a national coalition of community-based energy organizations across New Zealand. With 20+ member groups from Kaitaia to Bluff, it serves as a knowledge-sharing and support network (Community Energy Network, 2018a; 2018b). CEN's members are deeply embedded in their communities, working on projects like home insulation, solar installations and energy education. The network's mission is to grow local resilience and leadership in energy (Community Energy Network, 2018c). CEN facilitates training, hosts an annual Community Energy Forum for practitioners and advocates for policies to reduce energy hardship and include communities in the transition (Community Energy Network, 2018c). Through its communications and events, CEN helps build technical and organizational capacity, enabling small community groups to learn from successful projects (like the Rau Kumara Solar Farm) (Community Energy Network, 2018c).

Educational Guides and Toolkits
According to the EECA Briefing on the EECA's potential role in community energy noted the "lack of local capacity [and] expertise ("don't know where to start") that many communities face (EECA, 2022, p. 16). As such, some community-centred renewable energy agencies and NGOs have developed guides. For example, in 2024 Ara Ake (the government-funded future energy innovation center) published a "Community Energy How-to-Guide" (Ara Ake, 2024). This practical toolkit covers project planning, technology options, governance models and case studies, aimed at demystifying project development for community groups. It walks communities through steps like conducting feasibility studies, engaging stakeholders and securing financing.

Community Energy Activator Program In 2024, a pilot called Community Energy Activator launched in Christchurch, led by Ara Ake with Orion and CEN (Ara Ake, 2024). The intensive three-month cohort coached nine groups with mentoring, training and site visits (Ara Ake, 2024). Participants, from a community housing trust to a youth development group, developed proposals such as resilience hubs with solar-plus-storage, peer-to-peer sharing and a solar-heated community pool (Ara Ake, 2024). The Activator connected groups with expert "navigators," mapped funding pathways and fostered collaboration; plans are to expand to other regions in 2025 (Ara Ake, 2024).

Technical assistance and "handholding"
Community projects often face long timelines and high failure rates without support (EECA, 2022). In response, stakeholders have called for a more formal one-stop shop and standardized processes, akin to Scotland's model (EECA, 2022). While New Zealand lacks a central advisory agency, EECA services and local partners (including CEN) train energy advisers and guide projects; these efforts speak to the need for "project handholding, matchmaking and seed-finance facilitation," identified by researchers as crucial for an inclusive transition (Berka et al., 2020; EECA, 2022).

Capacity building for Māori communities
Targeted initiatives support iwi, hapū and marae, for example, the Māori and Public Housing Renewable Energy Fund and the Community Renewable Energy Fund (CREF) provide capital and technical assistance that build capability for solar and storage on communal facilities (MBIE, 2022; MBIE, 2023).

6 COMMUNITY ENERGY PROJECT CASES

The following are snapshots of 14 different CE projects from each of the case countries: Australia, Denmark, Germany, New Zealand, United Kingdom and United States.

AUSTRALIA

Haystacks Solar Garden

(NSW CLIMATE AND ENERGY ACTION, 2025)

The Haystacks Solar Garden is Australia's first large-scale community solar garden. It is located in Narrandera, New South Wales and was officially completed in 2024. The project is co-developed by the Community Power Agency, Pingala and Komo Energy, with support from local councils making it Australia's first large-scale community solar garden (Mallee et al., 2024).

Structure The structure is co-operative in nature, and as such it allows members to purchase a "plot" in the solar farm and receive bill credits through an agreement with the retailer Enova Energy (Pingala, 2025).

Participation The participation model enables around 300 members, many of whom are renters or apartment dwellers, to access the benefits of solar energy without needing rooftop ownership. This is made possible through a subscription-style approach in which members' virtual solar plots generate credits that are applied to their electricity bills (Pingala, 2025).

Financing The financing model combines member capital contributions, government funding through the NSW Regional Community Energy Fund and facilitation from local councils (Mallee et al., 2024).

Activities The project's activities include the development of a 1.5 MW solar farm that allocates virtual plots to its members and coordinates bill credit transfers via Enova Energy (Pingala, 2025).

Benefits The key benefits of the Haystacks Solar Garden include expanding renewable energy access to people excluded from rooftop solar, strengthening community participation in clean energy, and demonstrating a replicable subscription model for future solar gardens in Australia (Mallee et al., 2024).

AUSTRALIA

Marlinja Indigenous Microgrid

(VORRATH, 2024)

The Marlinja microgrid was launched in 2021 in the Barkly region of the Northern Territory (NT). It was initiated by the Indigenous-led NGO Original Power in partnership with the Marlinja Land Trust. It was designed as a response to chronic under-service by the NT grid, where remote Aboriginal communities often experience blackouts and rely on costly diesel generators. The project is notable for being among the first Indigenous-owned microgrids in Australia and the first to apply virtual net metering to pre-pay households, which essentially means the output of the community solar farm is measured and converted into a daily credit on each household's pre-paid meter (effectively a bill credit). This represents a shift toward energy sovereignty and Indigenous-led climate justice projects. (Original Power, 2021).

Structure The structure is co-operative in nature, and as such it allows members to purchase a "plot" in the solar farm and receive bill credits through an agreement with the retailer Enova Energy (Pingala, 2025).

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DENMARK

Middlegrunden Wind Turbine Co-operative

(MIDDELGRUNDEN WIND TURBINE CO-OPERATIVE, n.d.)

The Middelgrunden Offshore Wind Farm was initiated in 1996 by the Copenhagen Environment and Energy Office (CEEO) as part of Denmark's growing push to expand renewable energy and citizen participation in the 1990s. At the time, it was the world's largest offshore wind farm and supplied around 4% of the city's electricity. The project's participatory model and transparent planning process helped shift public attitudes toward offshore wind and influenced Denmark's subsequent energy policy (Larsen et al., 2005; Middelgrunden Wind Turbine co-operative, 2003b).

Structure The Middelgrunden Offshore Wind Farm operates under a 50/50 ownership model between the Middelgrunden Wind Turbine co-operative and Copenhagen's municipal utility, HOFOR. Each partner owns 10 of the 20 turbines, reflecting a hybrid governance framework that combines citizen ownership with public-sector management (Middelgrunden Wind Turbine co-operative, 2003a).

Participation The co-operative has more than 8,500 citizen-members, with about 90% from Greater Copenhagen. This makes it one of the largest community-owned offshore projects worldwide (Larsen et al., 2005). Active participation of members includes extensive public hearings, stakeholder consultations and early outreach fostered trust and minimized opposition (Middelgrunden Wind Turbine co-operative, 2003a).

Financing There was a total investment of approximately €48 million, with €23 million raised through citizen share purchases and the rest financed by the municipal utility (Larsen et al., 2005). Each share cost €570 and had to be paid upfront (Middelgrunden Wind Turbine co-operative, 2003b).

Activities The project includes 20 Bonus Energy (Siemens) 2 MW turbines, totaling 40 MW, located 3.5 km off Copenhagen's coast (Larsen et al., 2005). The co-operative led extensive environmental assessments and community engagement processes and pioneered offshore assembly methods to reduce costs and construction time (Middelgrunden Wind Turbine co-operative, 2003a).

Benefits Middelgrunden generates about 100 GWh annually (Larsen et al., 2005). The project's co-operative ownership ensures that profits remain local while ensuring strong public acceptance. The project has played a big role in shaping Denmark's participatory approach to offshore wind policy (Middelgrunden Wind Turbine co-operative, 2003b).

DENMARK

Samsø Renewable Energy Island

(VISITSAMSØ, 2022)

The Samsø renewable transition began in 1997 when the Danish government issued a competition for communities to achieve 100% renewable energy. Within a decade, Samsø transitioned completely, becoming one of the most cited global examples of cooperative-led energy transitions (Hermansen, 2015; Sperling, 2017).

Structure The project consists of a mix of cooperatives that also involves the municipality and private farm investors (Sperling, 2017).

Participation Participation consists of broad citizen shareholding and cooperative ownership of wind and district heating plants (Hermansen, 2015).

Financing The financing of the cooperative was done through shares, municipal support and state feed-in tariffs (Sperling, 2017).

Activities The project allowed for a 100% transition of renewable electricity and 70% renewable heating within ten years (Hermansen, 2015).

Benefits Retains profits locally, earns national and international recognition and proves that bottom-up initiatives can drive entire-island transitions (Sperling, 2017).

GERMANY

Bioenergy Village Jühnde

(DEUTSCHLAND – LAND DER IDEEN, 2014)

Launched in 2005, Jühnde was Germany's first official "bioenergy village." It was spearheaded by Göttingen University's sustainability research program and quickly became a template for rural transitions, inspiring more than 150 other "Bioenergiedorf" initiatives (Brohmann et al., 2006; IEA Bioenergy Task 37, n.d.).

Structure The co-operative project was initiated with municipal frameworks as well as support from Göttingen University's Sustainable Development Centre (Brohmann et al., 2006).

Participation About 70% of households in the village are co-operative members (IEA Bioenergy Task 37, n.d.).

Financing The co-operative has a diverse financing model that includes co-operative shares, municipal planning support and state/federal policy incentives (Brohmann et al., 2006).

Activities The co-op uses biogas (from farm waste) in a combined heat and power (CHP) plant with a local heat grid to supply energy to the village (IEA Bioenergy Task 37, n.d.).

Benefits Among the various benefits that have emerged from the co-op is: reduced dependence on fossil fuels, income is circulated locally, and the co-op structure has inspired replication of the "Bioenergiedorf" model across Germany (Brohmann et al., 2006).

GERMANY

Feldheim Renewable Energy Village

(NEUE ENERGIEN FORUM FELDHEIM, 2025)

Feldheim's energy transition began with its first wind turbine in 1995. It later, in 2010, expanded into a fully self-sufficient village. By constructing its own electricity and heating grids, Feldheim separated from national utilities and became internationally known as a model of grassroots energy autonomy (Neue Energien Forum Feldheim, 2015).

Structure The co-operative consisted of local residents and farmlands (Neue Energien Forum Feldheim, 2015).

Participation Collective ownership of the local electricity and heating grids (Neue Energien Forum Feldheim, 2015).

Financing The co-operative was able to receive financing for the project through co-operative contributions and revenues from renewable energy FITs (Neue Energien Forum Feldheim, 2015).

Activities Wind turbines, solar PV, biogas plants and a wood-chip heating system integrated with self-built electricity and heat grids.

Benefits Achieves complete energy self-sufficiency, with electricity costs around €0.12 /kWh (below the national average) and serves as an internationally studied model (Neue Energien Forum Feldheim, 2015).

NEW ZEALAND

Our Energy Kia Whitingia

(HEAGNEY, 2024)

Launched in 2021, Kia Whitingia was one of the first Indigenous-led peer-to-peer energy platforms in New Zealand. The project was brought about by MBIE's Renewable Energy Fund and Electricity Authority exemptions and represents how Māori communities are reshaping energy governance (Berka et al., 2024; Berka et al., 2024; MBIE, 2023).

Structure The project is managed by Te Reureu Kotahitanga Ltd, a legal entity created to coordinate across multiple marae, hapū and households. This setup is intended to gradually transition into a more collaborative community-governed entity (Berka et al., 2024). Solar panels were placed on the roofs of five marae and three whānau homes. Combined, the installed capacity is ~150 kWp (as designed and built. Moreover, the project deployed a 120-kWh battery (3-phase) next to the marae with the largest solar array, enabling storage and smoothing of supply, and allowing power to be shifted into peak demand periods.

Participation Participation in Kia Whitingia is grounded in collective Māori governance and household engagement. The project involves five marae as anchor institutions, which host solar PV systems, alongside three whānau homes with rooftop arrays (Berka et al., 2024). In addition, around a dozen whānau households without solar participate by purchasing surplus energy from marae and solar households through the Our Energy peer-to-peer trading platform (Berka et al., 2024)

Financing The project received funding vis-a-vis the Māori and Public Housing Renewable Energy Fund (NZ$28m). Moreover, it was able to leverage national policies, i.e., Electricity Authority regulatory sandbox, to carve out a temporary regulatory "safe space" so Kia Whitingia could test peer-to-peer solar trading and shared community governance without breaking the Code (Berka et al., 2024; MBIE, 2023).

Activities Along with the installation of solar PV on five marae and three whānau homes as well as a 120-kWh community battery, to create a distributed generation base (Berka et al., 2024), other activities include peer-to-peer trading platform and an innovative billing trading model (Berka et al., 2024; MBIE, 2023).

Benefits The project has many benefits including lower household electricity costs (up to a third below regional averages), extended solar benefits to renters and non-generating households and reinvested revenues into marae and community initiatives (Berka et al., 2024). It also strengthens Māori tino rangatiratanga by embedding hapū governance in energy decision-making.

NEW ZEALAND

Raū Kūmara Solar (Ōtaki)

(COMMUNITY ENERGY NETWORK, 2018)

Established in 2020, Raū Kūmara was among New Zealand's first community-scale solar projects funded primarily by philanthropy and municipal support. It has since become a showcase for how local governance can pioneer energy projects despite the absence of national subsidies (Haxton, 2020; NZ Energy Excellence Awards, 2021).

Structure The community solar initiative is led by Energise Ōtaki (a charitable trust) in partnership with the Kāpiti Coast District Council (Community Energy Network, 2018).

Participation Participation in the project consisted of council and community engagement, with revenues reinvested into local sustainability projects via a community fund (Haxton, 2020).

Financing The financing of the project was largely a result of philanthropic grant (Wellington Community Trust, NZ$407–408k) as well as council land/PPA agreements (Kāpiti Coast District Council, 2018a, 2018b).

Activities The project allowed for the construction of a 107-kW ground-mounted array (240 panels) and a 23-kW roof-mounted array (52 panels) at Ōtaki College (Community Energy Network, 2018; Energise Ōtaki, 2025).

Benefits Among the various benefits to the community are overcoming subsidy gaps, and funding sustainability projects in Ōtaki and strengthening community resilience (Haxton, 2020).

NEW ZEALAND

Ngāwhā Geothermal (Top Energy)

(JLE, 2025)

Ngāwhā's geothermal plant, originally developed in the 1990s, expanded in 2021 under the consumer trust model of Top Energy. Its reinvestment of profits into the Northland community and alignment with Māori cultural agreements make it a unique community-governed geothermal project (Top Energy, 2022; Tauhara North No.2 Trust, 2024; JLE. n.d.)

Structure The project is governed by Top Energy Consumer Trust (approximately 32,000 consumers) with Māori cultural agreements (Top Energy, 2022).

Participation The participation model is based on consumer trust ownership, which ensures that community members directly benefit from the project and maintain meaningful control over decision-making (Electricity Authority, 2018).

Financing The project's financing model is structured around the reinvestment of profits into the local community, with geothermal revenues allocated to cutting electricity bills and supporting regional development programs (Tauhara North No.2 Trust, 2024).

Activities Its activities include the development of a 57 MW geothermal plant, with revenues reinvested into infrastructure and social initiatives (Power Magazine, 2015).

Benefits The key benefits of the Ngāwhā geothermal project are the provision of affordable, stable energy for the Northland region, local reinvestment of profits into social programs and support for Māori cultural values in energy governance (Top Energy, 2022).

UNITED KINGDOM

Bristol Energy Co-operative

(BRISTOL ENERGY CO-OPERATIVE, N.D.)

The Microgrid Foundry was first created in 2019 and soon after became a testbed for integrating storage, EV charging and local renewables into community–developer partnerships. It operated under Ofgem's regulatory sandbox and showcases how financial and technical innovation could work at neighborhood scale (Bristol Energy co-operative, n.d.; Ofgem, 2025-b).

Structure The Microgrid Foundry is a hybrid co-operative–developer initiative in Bristol that was co-founded in 2019 by Bristol Energy Co-operative, Chelwood Community Energy and Clean Energy Prospector (Bristol Energy Co-operative, n.d.).

Participation The participation model involves a co-operative structure that integrates community ownership with partial involvement from professional developers, creating a partnership approach to project delivery (Bristol Energy co-operative, n.d.).

Financing The project's financing model draws on support from Triodos Bank (leading sustainable bank), Bristol City Council, and community investors, reflecting a blend of ethical finance, municipal backing, and grassroots investment (Triodos Bank, 2024).

Activities The project's activities include piloting neighborhood-scale microgrids that integrate renewable generation, battery storage, and electric vehicle (EV) charging infrastructure (Bristol Energy Co-operative, n.d.).

Benefits Some of the benefits of the project include: the demonstration of flexibility services, the testing of regulatory sandbox frameworks, and the creation of a replicable community–developer partnership model (Ofgem, 2025-b).

UNITED KINGDOM

Brixton Energy Co-ops

(BRIXTON ENERGY, N.D.)

Launched in 2012, Brixton Energy was one of the U.K.'s first urban community solar co-operatives. It pioneered rooftop PV on social housing estates, which coupled renewable generation with youth training and energy efficiency programs (Repowering London, 2018).

Structure The Brixton Energy Co-ops are urban community solar co-operatives based in Lambeth, London. They are structured as Community Benefit Societies (BenComs) under the U.K.'s Co-operative and Community Benefit Societies Act (Repowering London, 2018).

Participation The participation model is built on local shareholding, where community members invest in the co-ops and surpluses are reinvested into a Community Energy Efficiency Fund to support further local sustainability measures (Repowering London, 2018).

Financing The financing model relies on community shares, small grants and partnerships with organizations such as EDF and U.K. Power Networks, which have enabled the co-operative to grow and experiment with innovative models of delivery (Repowering London, 2018).

Activities The project's activities include the installation of rooftop photovoltaic (PV) panels on Lambeth social housing estates, providing youth training opportunities, and piloting peer-to-peer energy trading trials (Repowering London, 2018).

Benefits The main benefits of Brixton Energy's work include household energy savings, upgrades to social housing as well as the creation of employment and training opportunities for young people, particularly in marginalized communities (Repowering London, 2018).

UNITED STATES

Co-op Power

(CO-OP POWER, N.D.)

Founded in 2004 in Massachusetts, Co-op Power has grown into a multi-racial, multi-class co-operative federation operating across New England and New York. Over two decades, it has incubated dozens of projects and developed one of the first subscription solar programs in the U.S., explicitly designed for renters and low-income households (Co-op Power, n.d.a; Co-op Power, n.d.).

Structure The structure of the project is a federation of local community energy co-operatives across New England and New York that operate as a co-operative-of-co-operatives (Co-op Power, n.d.a).

Participation The participation model is an inclusive one that features multi-class, multi-racial membership including renters, low-income households, NGOs and community institutions, Moreover, local co-ops partner with housing associations, universities and NGOs (Co-op Power, n.d.a).

Financing Community shares, subscription solar programs, collective purchasing and green fund support vis-a-vis non-profit green banks that invest in community renewable energy projects (Co-op Power, n.d.a).

Activities Subscription solar for renters; regional co-operative development; local projects such as the New York City Community Energy Co-op, Worcester Community Energy Co-op and Boston Metro East (Co-op Power, n.d.b; Co-op Power, n.d.c; Co-op Power, n.d.d).

Benefits Expands access to renewable energy for underserved households, scales co-operative capacity and demonstrates a replicable model for co-operative federations (Co-op Power, n.d.a).

UNITED STATES

Green Energy Justice Co-operative

(GREEN ENERGY JUSTICE CO-OPERATIVE, N.D.)

The GEJC was formed in 2021 and arose from grassroots organizing in Chicago led by Blacks in Green and supported by Accelerate Climate Solutions. By leveraging the Illinois Solar for All program, it built a co-operative pipeline designed to embed equity and racial justice into solar development (Blacks in Green, n.d.a; Blacks in Green, n.d.b).

Structure The Green Energy Justice Co-operative (GEJC) is an equity-focused community solar co-operative in Illinois. It was founded by Blacks in Green and Accelerate Climate Solutions as a multiracial, multi-class co-operative structure (Blacks in Green, n.d.a).

Participation The participation model is based on tiered memberships of $5, $25, and $750, which were designed to enable participation by low-income households, community organizations, and other groups that might otherwise be excluded from renewable energy ownership (Accelerate Climate Solutions, n.d.).

Financing The co-operative's financing model relies on programs such as Illinois Solar for All, support from the Blacks in Green, n.d.-b, and county-level siting approvals, which together provide pathways for equity-oriented energy development (Blacks in Green, n.d.b, 2023).

Activities Its activities include the development of a co-operative solar pipeline of approximately 9 MW in partnership with co-operative Energy Future, with the goal of expanding energy access to underserved communities (Blacks in Green, n.d.a).

Benefits The key benefits of the project include affordable and equity-driven energy access, participation opportunities for approximately 1,200 households, and a commitment to channeling renewable energy benefits toward Black, Indigenous, people of color (BIPOC), and low-income residents (Accelerate Climate Solutions, n.d.).

PUERTO RICO (US TERRITORY)

Cooperativa Hidroeléctrica de la Montaña

COOPERATIVA HIDROELÉCTRICA DE LA MONTAÑA. (N.D.).

Founded in 2019 in Adjuntas, Puerto Rico, the co-operative emerged after Hurricane María (2017) and exposed the fragility of centralized electricity provision. With federal and utility-led reconstruction lagging, mountain communities organized to restore dormant hydroelectric infrastructure and combine it with solar and storage (Cooperativa Hidroeléctrica de la Montaña, 2023). It is the first rural electric co-operative on the island.

Structure Consumer-owned electric co-operative (“Owner-Partners” model) with one-member-one-vote governance (Cooperativa Hidroeléctrica de la Montaña, 2023).

Participation The co-op uses an inclusive and equitable approach to participation that encompasses open membership with tiered contributions. The co-op operates by retaining ownership of generation assets and leases them to members (Cooperativa Hidroeléctrica de la Montaña, 2023).

Financing The co-op utilizes a diverse array of financing methods including member capital, state/territorial clean energy funds and grants support a $120– 150 million rebuild of historic hydro power and a $17.5 million phased PV and battery rollout (Cooperativa Hidroeléctrica de la Montaña, 2023).

Activities The co-op has engaged in a number of innovative initiatives including the rehabilitation of legacy hydroelectric stations, installation of rooftop and community solar-plus-storage systems and construction of the “Microgrid of the Mountain” linking five municipalities (Cooperativa Hidroeléctrica de la Montaña, 2023).

Benefits The project is projected to produce 20–60 % energy savings and recreate local jobs as well as provide technical training. Moreover, a non-material benefit is improved energy resilience (Cooperativa Hidroeléctrica de la Montaña, 2023).

7 ✲ ANALYSIS OF CASE LESSONS

There are six pertinent features of CE projects that each case study in this report demonstrates: policy gaps that have resulted in innovation, policy enablers that have resulted in innovative CE practices, community energy resilience, partnerships, innovation and design and targeted equity and inclusion. Detailed summary breakdowns of each thematic area and the corresponding case studies specifics follows from this overview table.

TABLE 3 - CONSOLIDATED TABLE OF THEMATIC CATEGORIES

Country / Project/ Case	Policy Gaps → Innovation	Policy Enablers → Innovation	Community Energy Resilience	Partnerships	Innovative Design & Delivery	Targeted Equity & Inclusion
AUSTRALIA – Haystacks Solar Garden		●		●		●
AUSTRALIA – Marlinja Indigenous Microgrid	●		●	●	●	●
DENMARK – Middelgrunden Wind Turbine Co-operative				●	●	
DENMARK – Samsø Renewable Energy Island	●		●		●	
GERMANY – Bioenergy Village Jühnde	●		●		●	
GERMANY – Feldheim Renewable Energy Village	●		●		●	
NEW ZEALAND – Our Energy Kia Whitingia	●	●				●
NEW ZEALAND – Raū Kūmara Solar (Ōtaki)				●	●	●
NEW ZEALAND – Ngāwhā Geothermal (Top Energy)	●		●	●	●	●
UNITED KINGDOM – Bristol Energy Co-operative	●	●		●		●
UNITED KINGDOM – Brixton Energy Co-ops	●	●		●		●
UNITED STATES – Co-op Power (New England & New York)		●		●	●	●
UNITED STATES – Green Energy Justice Co-operative (Illinois)	●			●		●
PUERTO RICO – Cooperativa Hidroeléctrica de la Montaña	●	●	●		●	●

7.1 Policy gaps driving innovation

In all the case studies below, policy silence or inadequacy opened political and institutional space. Communities, trusts and co-operatives stepped in to design and create new forms of ownership, as seen with the example of Our Energy Kia Whitingia in New Zealand (Berka et al., 2024; MBIE, 2023) and Cooperativa Hidroeléctrica de la Montaña in Puerto Rico (Cooperativa Hidroeléctrica de la Montaña, 2023). Moreover, it allowed community projects to experiment with new business models such as leasing, virtual net-metering and community shares (Community Energy Network, 2018; Haxton, 2020). Lastly, it made way for community energy projects to forge alternative partnerships outside the state, including councils, NGOs, tribal groups and climate banks (Repowering London, 2018; Blacks in Green, n.d.-a). Overall, rather than stifling innovation, policy absence often pushed communities to create novel governance and financing mechanisms that, in many cases, influenced national frameworks.

TABLE 4 - POLICY GAPS DRIVING INNOVATION

COUNTRY/CASE	POLICY GAP / ABSENCE	RESULTING INNOVATION
AUSTRALIA, Marlinja Indigenous Microgrid	No strong national community energy policy. The NT grid leaves remote Indigenous towns underserved (Original Power, 2021).	Community and NGO (Original Power) developed solar and battery microgrid with virtual net metering. This led to affordability for pre-pay households (Original Power, 2021).
DENMARK, Samsø Renewable Energy Island	No initial state plan for full island transition. Government challenge left local actors to design pathways (Sperling, 2017).	Islanders self-organized through co-operatives and municipal backing. It was able to achieve 100% renewable electricity in 10 years (Sperling, 2017).
GERMANY, Bioenergy Village Jühnde	Early 2000s policy had no dedicated framework for village energy autarky (Brohmann et al., 2006; IEA Bioenergy Task 37, n.d.).	Villagers organized co-operative bioenergy supply. This later influenced national 'Bioenergiedorf' programs Rural Pact GP, 2023).
GERMANY, Feldheim Renewable Energy Village	Lack of policy pathways for local grids. National feed-in tariffs insufficient for full autonomy. (Neue Energien Forum Feldheim, 2015).	Built independent electricity and heat grids, achieving energy autarky. This became a model later studied by policymakers (Neue Energien Forum Feldheim, 2015).
NEW ZEALAND, Our Energy Kia Whitingia	Absence of clear retail/peer-to-peer frameworks under Electricity Industry Act (Berka et al., 2024; MBIE, 2023).	Indigenous-led peer-to-peer platform created legal 'workarounds' so hapū could redistribute solar generation and revenues (Berka et al., 2024)
NEW ZEALAND, Ngāwhā Geothermal (Top Energy)	Centralized planning overlooked because of locality (Electricity Authority, 2018, 2020). Lack of equitable reinvestment mechanisms (Tauhara North No.2 Trust, 2024; MBIE, 2020).	Consumer trust ensured local ownership, reinvestment of profits and Māori cultural agreements outside standard state planning (Power Magazine, 2015; Top Energy, 2022).
UNITED KINGDOM, Bristol Energy Co-operative	Regulatory uncertainty around microgrids and storage. Limited government support for flexibility (Bristol Energy Co-operative, n.d.)	Co-op and developer partnerships created pilot projects with council support and financing from 'ethical' banking sources (Triodos Bank, 2024).
UNITED KINGDOM, Brixton Energy Co-ops	No dedicated urban community solar policy. Austerity cutbacks reduced local authority capacity. (Repowering London, 2018).	Community benefit societies leveraged council housing rooftops and small grants to deliver social housing PV. (Repowering London, 2018).
UNITED STATES, Green Energy Justice co-operative (Illinois)	Lack of federal community solar legislation (Blacks in Green, n.d.-a). Fragmented state policies (Accelerate Climate Solutions, n.d.).	Grassroots groups leveraged Illinois Solar for All program and county siting to build equity-driven co-operative pipeline (Blacks in Green, n.d.b, 2023).
PUERTO RICO, Cooperativa Hidroeléctrica de la Montaña	Weak state response after Hurricane María (Cooperativa Hidroeléctrica de la Montaña, 2023). Lack of reliable federal or utility-led reconstruction.	The Co-operative pioneered hybrid model (hydro restoration/ PV/storage microgrids) and community leasing of household systems (Cooperativa Hidroeléctrica de la Montaña, 2023).

7.2 Policy enablers driving innovation

As demonstrated in Table 5, when and where policy frameworks create enabling conditions, community energy initiatives are able to flourish. This has been done in different ways, including legal recognition, structured market access, funding streams and/or regulatory flexibility. For instance, the U.K.'s Co-operative and Community Benefit Societies Act (2014) legitimized community benefit societies (BenComs) and provided the pathway from which Bristol Energy co-operative and Brixton Energy were able to create a solid legal structure for raising community shares and reinvesting surpluses (U.K. Government, 2014; Repowering London, 2018; Bristol Energy Co-operative, n.d.). Moreover, Germany's strong co-operative law similarly underpinned village-scale initiatives like Bioenergy Jühnde (Brohmann et al., 2006; IEA Bioenergy Task 37, n.d.). Certain policies that provided market access and export guarantees also allowed co-operatives to implement innovative strategies. This can be seen with policies like the U.K.'s Smart Export Guarantee (SEG) and Ofgem's regulatory sandbox, which enabled co-ops to access electricity markets, trial peer-to-peer trading and participate in flexibility services (Ofgem, 2025a, 2025b). Similarly, in Denmark, national renewable targets and FITs helped Samsø's island-wide co-operative ownership model flourish (Sperling, 2017).

Direct funding and subsidy programs for Indigenous communities was leveraged in the context of New Zealand to create innovative projects. For instance, New Zealand's Māori and Public Housing Renewable Energy Fund (NZ$28m) directly financed Indigenous-led projects such as Our Energy Kia Whitingia, which allowed for peer-to-peer trading and community-controlled solar-battery networks (MBIE, 2023; Berka et al., 2024; Berka et al., 2024). Moreover, municipal and philanthropic grants (e.g., Wellington Community Trust support for Rau Kūmara Solar Farm) allowed projects to bypass gaps in national subsidy schemes (Haxton, 2020; NZ Energy Excellence Awards, 2021).

In the United States, state co-operative law and enabling community-benefit frameworks greatly aided the growth of Co-op Power, a federation of local co-operatives across New England and New York. These legal structures allowed Co-op Power to develop innovative subscription solar programs and equity-driven participation models for renters, low-income households and community institutions, while member co-ops partnered with academia, housing associations, NGOs and industry to anchor projects locally

TABLE 5 - POLICY ENABLERS DRIVING INNOVATION

COUNTRY/CASE	POLICY ENABLERS	RESULTING INNOVATION
AUSTRALIA, Haystacks Solar Garden	Local council facilitation (Inner West Council, Narrandera Shire Council) with seed support and planning approvals (Mallee et al., 2024).	Community solar garden model where members buy 'plots' and receive bill credits (Mallee et al., 2024). The project is a prime example of co-operative governance with wide participation (Pingala, 2025).
NEW ZEALAND, Our Energy Kia Whitingia	Māori and Public Housing Renewable Energy Fund (NZ$28m) (MBIE, 2023). Regulatory sandbox from New Zealand Electricity Authority which supported and encouraged decentralized trials (Electricity Authority, 2020).	Allowed for innovative peer-to-peer solar and battery network on marae and whānau homes. Provided low-cost power (NZ$0.06/kWh). Redistributed revenues to Māori households (Berka et al., 2024; Berka et al., 2024).
UNITED KINGDOM, Bristol Energy Co-operative	Co-operative and Community Benefit Societies Act 2014 enabled democratic community ownership (U.K. Government, 2014). Smart Export Guarantee (SEG). Ofgem regulatory sandbox which allowed for renewable energy trials (Ofgem, 2025-b).	Scaled rooftop solar and microgrids. Allowed for the co-founding of Microgrid Foundry which integrates renewables, storage and EV charging (Bristol Energy Co-operative, n.d.).
UNITED KINGDOM, Brixton Energy Co-ops	BenCom legal form under 2014 Act (U.K. Government, 2014). Liberalized market under Ofgem with SEG and PPAs (Ofgem, 2025-a).	Community-owned solar co-operatives on social housing. Partnership with EDF (state utility) and U.K. Power Networks (regional distribution system operator) for flexibility and peer-to-peer trading. (Repowering London, 2018)
UNITED STATES, Co-op Power (New England & New York)	State co-operative law and community-benefit corporation frameworks provided enabling legal environment (Co-op Power, n.d.-a)	Co-operative-of-co-operatives model enabled cross-regional scaling while keeping governance local (Co-op Power, n.d.c). Enabled innovation in subscription solar and equity-driven participation for renters, low-income households, and community institutions (Co-op Power, n.d.a). Local member co-ops leverage partnerships with academia, housing associations, NGOs, and industry (e.g., NYC Community Energy Co-op, Worcester Community Energy Co-op, Boston Metro East Community Energy Co-op) (Co-op Power, n.d.b).

(Co-op Power, n.d.a; Co-op Power, n.d.b; Co-op Power, n.d.c; Co-op Power, n.d.d). Finally, regulatory experimentation and "sandboxing," like Ofgem's sandbox, provided the U.K.'s Brixton Energy the ability to pilot innovative peer-to-peer and flexibility models with EDF and U.K. Power Networks (Repowering London, 2018). In New Zealand, exemptions granted by the Electricity Authority let Our Energy operate legally in a retail market otherwise dominated by large utilities (Electricity Authority, 2020).

Overall, supportive policies did not dictate community energy models but created the legal, financial and regulatory space for communities to experiment with new ownership structures, co-operative financing and technological innovations. Where states provided enabling legislation, export guarantees, dedicated funds, or sandbox frameworks, communities leveraged these tools to scale projects, enhance equity and embed long-term resilience.

7.3 Community energy resilience

In the community energy projects selected under this category, resilience refers to both technical continuity (keeping lights on) and social continuity (ensuring all households can still afford energy). In Puerto Rico, the Cooperativa Hidroeléctrica de la Montaña emerged in the aftermath of Hurricane María. It blends hydro rehabilitation with PV and storage microgrids to serve the poorest, most disaster-prone regions. Similarly, the Marlinja Indigenous Microgrid in Australia couples solar, storage and virtual metering with Indigenous governance. This has allowed for both grid independence and affordability for the remote community. In Europe, German villages like Jühnde and Feldheim showcase collective autarky. These co-operatives built independent grids powered by local biomass, wind and solar. This greatly reduced reliance on external markets. The Samsø Renewable Island in Denmark extended this principle island-wide and achieved a full renewable transition in just a decade. In New Zealand, Top Energy and Ngāwhā Geothermal Plant demonstrate regional-level resilience in the ways the project is able to supply nearly all of Northland's demand while distributing dividends, as well as funding social programs through a consumer trust model.

TABLE 6 - RESILIENCE MODEL AND DESCRIPTION

PROJECT	RESILIENCE TYPE/MODEL	DESCRIPTION
AUSTRALIA, Marlinja Indigenous Community Microgrid	Indigenous led microgrid resilience.	Remote Aboriginal community microgrid co-developed with Original Power. Can island from grid and uses virtual credits to pre-pay meters. Expected to reduce bills by up to 70%. (Original Power, 2021).
DENMARK, Samsø Renewable Energy Island	Renewable island transition model.	Island community transitioned to 100% renewable electricity and 70% heating in 10 years. Bottom-up engagement, inclusive planning, reinvestment of profits locally. (Sperling, 2017).
GERMANY, Bioenergy Village Jühnde	Village-scale co-operative bioenergy model	Germany's first bioenergy village (Brohmann et al., 2006). Co-operative with 70% resident participation (IEA Bioenergy Task 37, n.d.).
GERMANY, Feldheim Renewable Energy Village	Energy Independence model	Fully energy self-sufficient village with wind, solar, biogas and wood chips. Built its own local electricity and heat grids. Residents pay approximately €0.12/kWh (below national average). (Neue Energien Forum Feldheim, 2015).
NEW ZEALAND, Ngāwhā Geothermal (Top Energy)	Trust-based regional resilience model	Trust-owned utility (Top Energy Consumer Trust, approximately 32,000 consumers) (Top Energy, 2022). Profits reinvested locally to cut bills and fund social programs (Power Magazine, 2015; Electricity Authority, 2018).
PUERTO RICO, Cooperativa Hidroeléctrica de la Montaña	Post-disaster co-operative resilience model	Formed after Hurricane María to deliver resilient, community-owned power. Expected to produce 50 MW after hydro restoration. Reduced costs of electricity by 20%. co-operative leases systems to households. (Cooperativa Hidroeléctrica de la Montaña, 2023).

7.4 Partnerships

Partnerships are key to scaling and legitimizing community energy. Hybrid developer–community ventures like Australia's Haystacks Solar Garden and the U.K.'s Microgrid Foundry illustrate how professional developers and co-operatives can jointly mobilize capital, expertise and governance (Mallee et al., 2024; Bristol Energy Co-operative, n.d.). Middelgrunden Offshore Wind demonstrates a hybrid utility–citizen ownership model, where 8,500 Danes co-own half the turbines alongside the municipal utility (Sørensen et al., 2002). Municipal and philanthropic backing underpin projects like Rau Kūmara Solar Farm in New Zealand, funded by the Wellington Community Trust and hosted on council land, with proceeds reinvested into local sustainability initiatives (Haxton, 2020; NZ Energy Excellence Awards, 2021).

In Indigenous contexts, partnerships take on sovereignty dimensions. This can be seen with Australia's Marlinja microgrid, which blends government funding with Indigenous leadership (Original Power, 2021). Moreover, in New Zealand, the Ngāwhā geothermal was co-developed through cultural agreements with Māori iwi (Top Energy, 2022; Tauhara North No.2 Trust, 2024).

In urban U.K. settings, Brixton Energy pairs housing councils, utilities and co-operatives to deliver rooftop PV, bill credits and youth training programs (Repowering London, 2018).

In the U.S., Illinois's Green Energy Justice co-operative (GEJC) brings together grassroots climate justice groups, state clean-energy programs and municipal partnerships to deliver equitable access to solar (Blacks in Green, n.d.-a; Accelerate Climate Solutions, n.d.). Similarly, Co-op Power in the U.S. operates as a federation of local co-operatives across New England and New York, where member co-ops partner with academia, housing associations, NGOs and industry—such as the New York City Community Energy Co-op with housing groups, Worcester with local NGOs, and Boston Metro East with community organizations—demonstrating how a co-operative-of-co-operatives model can scale while grounding energy projects in local partnerships (Co-op Power, n.d.-a; Co-op Power, n.d.-b; Co-op Power, n.d.-c).

TABLE 7 - PARTNERSHIP MODEL AND DESCRIPTION

PROJECT	PARTNERSHIP MODEL	DESCRIPTION
AUSTRALIA, Haystacks Solar Garden	Hybrid developer–community venture	Joint venture between community co-op Pingala, Community Power Agency and Komo Energy, hosted by a local farming family. Members buy 'plots' and receive bill credits. (Mallee et al., 2024).
AUSTRALIA, Marlinja Indigenous Microgrid	Community solar with council/philanthropy backing	The project was largely funded by the Barkly Regional Deal (Commonwealth, NT Govt, Regional Council). Climate-justice organizations and donations also supported the project's rollout. Jacana Energy and Secure Meters implemented virtual net metering to help reduce bills. (Original Power, 2021).
DENMARK, Middelgrunden Offshore Wind Farm	Hybrid municipal utility–community co-operative	50/50 ownership between municipal utility HOFOR and Middelgrunden Wind Turbine co-operative (over 8,500 members). Citizens bought shares (€570 each) (Sørensen et al., 2002).
NEW ZEALAND, Our Energy Kia Whitingia	Absence of clear retail/peer-to-peer frameworks under Electricity Industry Act (Berka et al., 2024; MBIE, 2023).	Indigenous-led peer-to-peer platform created legal 'workarounds' so hapū could redistribute solar generation and revenues (Berka et al., 2024)
NEW ZEALAND, Raū Kūmara Solar Power Plant	Community solar with council/philanthropy backing	Charitable trust Energise Ōtaki as the developer and the Wellington Community The Trust grant contributed greatly to the project (NZ$407–408k) (Haxton, 2020; Community Energy Network, 2018). The project was also supported by Kāpiti Coast District Council (land and PPAs). Revenues (approximately NZ$25k/year) fund local sustainability projects (NZ Energy Excellence Awards, 2021).

TABLE 7 - PARTNERSHIP MODEL AND DESCRIPTION (continued)

PROJECT	PARTNERSHIP MODEL	DESCRIPTION
NEW ZEALAND, Ngāwhā Geothermal (Top Energy)	Trust-owned utility with tribal partnerships	Trust-owned utility (Top Energy Consumer Trust, 32,000 consumers) which developed 57 MW Ngāwhā geothermal field (Top Energy, 2022). Profits are reinvested locally. The project involved Māori groups in consent and cultural agreements (Tauhara North No.2 Trust, 2024).
UNITED KINGDOM, Bristol Energy Co-operative	Hybrid developer–community venture	BEC co-founded the Microgrid Foundry with Chelwood Community Energy and Clean Energy Prospector (Bristol Energy Co-operative, n.d.). The initiative was supported by Bright Green Futures. BEC owns 49% and the project was financed by Triodos Bank and council collaboration (Triodos Bank, 2024).
UNITED KINGDOM, Brixton Energy Co-ops	Community benefit societies and council/utility partnerships	Community benefit societies (Solar 1, 2, 3) installing PV on Lambeth social housing Funded by community shares; surpluses go to the Community Energy Efficiency Fund. Partners with Lambeth Council, EDF, U.K. Power Networks for peer-to-peer and flexibility trials.
UNITED STATES, Green Energy Justice Co-operative (Illinois)	Non-profit/community co-operative with municipal and state partnerships (equity-focused)	Founded by Blacks in Green and Accelerate Climate Solutions. Builds approximately 9 MW community-solar pipeline in Illinois with co-operative Energy Future (Blacks in Green, n.d.a; Accelerate Climate Solutions, n.d.). Uses state funds and county siting.
UNITED STATES, Co-op Power (New England & New York)	Partnership/co-operative of co-operatives across different states in the Northeast. The federation model enables collective purchasing, financing, and innovation across regions while grounding projects in local partnerships.	Member co-operatives form local partnerships with academia, housing associations, NGOs and industry. Examples: • New York City Community Energy Co-op partners with academic institutions and housing associations (Co-op Power, n.d.b). • Worcester Community Energy Co-op partners with local NGOs and anchor institutions (Co-op Power, n.d.c). • Boston Metro East Community Energy Co-op engages with community organizations and industry to expand access (Co-op Power, n.d.d).

7.5 Community energy innovative design and delivery

Community energy projects demonstrate innovation not only in technologies but also in institutional, legal and financial design. Puerto Rico's Cooperativa Hidroeléctrica integrated hydro, solar and storage into a resilient hybrid model (Cooperativa Hidroeléctrica de la Montaña, 2023), while Marlinja adapted virtual net metering to benefit pre-pay households (Original Power, 2021). German villages like Jühnde and Feldheim showed how co-operative governance and self-built grids could bypass policy gaps to achieve autonomy (Brohmann et al., 2006; IEA Bioenergy Task 37, n.d.). Samsø combined co-operative and municipal investment to design an island-wide transition (Sperling, 2017; Hermansen, 2015). In New Zealand, Kia Whitingia used peer-to-peer solar trading and revenue redistribution under Māori governance (MBIE, 2023; Berka et al., 2024; Berka et al., 2024). While in New Zealand, the Rau Kūmara pioneered philanthropic-council financing to deliver community solar (Haxton, 2020; Kāpiti Coast District Council, 2018a, 2018b; New Zealand Energy Excellence Awards, 2021). In the U.S., Co-op Power represents an institutional breakthrough whereby a co-operative-of-co-operatives has scaled across states while maintaining local partnerships. This project demonstrates how federated structures and subscription solar models can embed equity into delivery (Co-op Power, n.d.a; Co-op Power, n.d.a; Co-op Power, n.d.b; Co-op Power, n.d.c; Co-op Power, n.d.d).

TABLE 8 - INNOVATION MODEL AND DESCRIPTION

PROJECT	INNOVATION MODEL	DESCRIPTION
AUSTRALIA, Marlinja Indigenous Microgrid	Pioneering virtual net metering	Introduced virtual net metering in a remote Indigenous context, an unprecedented adaptation of a tool usually reserved mainly for urban networks (Original Power, 2021). Showcases design tailored to pre-pay households, which aims to reduce inequities embedded in conventional billing systems (Original Power, 2021)
DENMARK, Middelgrunden Offshore Wind Farm	Technological innovation in offshore community energy design and delivery	First co-operative offshore wind project globally (commissioned 2001). Demonstrated that citizens could co-own and co-finance offshore infrastructure traditionally limited to utilities. Combined advanced marine engineering (20 x 2 MW turbines, 3.5 km offshore) with participatory planning through the Middelgrunden Wind Turbine co-operative and Copenhagen's municipal utility (HOFOR). Its hybrid engineering–governance model redefined large-scale community energy delivery and became a blueprint for offshore wind democratization (Middelgrunden co-operative, 2003; Larsen et al., 2005).
DENMARK, Samsø Renewable Energy Island	Comprehensive renewable island transition model with community-led planning and ownership	Experimented with blended ownership models, whereby co-operatives, municipal utility and private farm investors share costs and benefits (Sperling, 2017). Used co-operative innovation to create place-based trust that accelerated transition across multiple energy sectors (Hermansen, 2015).
GERMANY, Bioenergy Village Jühnde	Long-standing co-operative bioenergy at village scale	Innovated through village-scale co-operative governance supported by scientific expertise from Göttingen University (Brohmann et al., 2006). Became the template for national replication of "Bioenergiedorf" policies, whereby it turned a local pilot into a scalable governance model (IEA Bioenergy Task 37, n.d.).

TABLE 8 - INNOVATION MODEL AND DESCRIPTION (continued)

PROJECT	INNOVATION MODEL	DESCRIPTION
GERMANY, Feldheim Renewable Energy Village	First village in Germany to fully island with self-built local grids	Pioneered self-built independent grids, which allowed it to bypass national utilities when legal and financial pathways were unclear (Neue Energien Forum Feldheim, 2015). Institutional innovation: villagers collectively financed both electricity and heat grids to achieve full local autonomy (Neue Energien Forum Feldheim, 2015).
NEW ZEALAND, Raū Kūmara Solar Power Plant	Innovative Financial Design	Innovation came from financing design, which allowed for the project to bypass national subsidies through philanthropy (Wellington Community Trust) and municipal PPA arrangements (Haxton, 2020; Kāpiti Coast District Council, 2018a, 2018b). Created a local reinvestment fund from generation revenues to finance community sustainability projects (NZ Energy Excellence Awards, 2021).
NEW ZEALAND, Ngāwhā Geothermal (Top Energy)	Trust-owned geothermal utility reinvesting profits locally	Pioneered peer-to-peer solar and battery trading platforms under Māori governance, enabled through regulatory sandbox exemptions (MBIE, 2023). Reconfigured the retail model by redistributing revenues directly to hapū households and allowed for cultural values to be embedded into the project's design (Berka et al., 2024; Berka et al., 2024).
UNITED STATES, Co-op Power (New England & New York)	Innovative Co-op to Co-op Federation	Institutional innovation as a federated co-operative-of-co-operatives, spanning New England and New York (Co-op Power, n.d.-a). Developed subscription solar models so renters and low-income households could access renewable energy without property ownership (Co-op Power, n.d.-a). Member co-ops deliver projects via multi-sector collaborations with co-operative governance (Co-op Power, n.d.b) Represents a scalable equity-driven model by combining federated structure with localized innovation.
PUERTO RICO, Cooperativa Hidroeléctrica de la Montaña	First-of-its-kind hybrid microgrid integrating hydro, PV and storage	Innovation lies in its hybridization of restored hydro with PV and battery storage which creates a multi-resource community grid rather than a single-technology solution (Cooperativa Hidroeléctrica de la Montaña, 2023). The project pioneered a household leasing model, where the co-operative retains ownership of assets and households lease affordable systems, spreading access beyond homeowners (Cooperativa Hidroeléctrica de la Montaña, 2023).

7.6 Targeted equity interventions

While every case demonstrates some form of inclusion (either universal benefit-sharing or community-wide reinvestment), the subset highlighted here focuses specifically on targeted equity models that centre historically excluded groups (racialized communities, Indigenous peoples, low-income and renters). The Green Energy Justice co-operative channels state clean-energy funds to BIPOC communities (Blacks in Green, n.d.-a), while Co-op Power enables renters to benefit from subscription solar (Co-op Power, n.d.-a). Marlinja ensures pre-pay customers receive equal credits (Original Power, 2021), and Māori-led Kia Whitingia reduces costs and redistributes revenues (Berka et al., 2024). In urban contexts, Brixton reinvests surpluses into housing and youth programs (Repowering London, 2018). Trust-based utilities like Top Energy reinvest geothermal profits to lower household charges (Top Energy, 2022). Overall, beyond universal benefit distribution, these cases demonstrate how targeted equity logics explicitly intervene on structural energy inequalities.

TABLE 9 - EQUITY TARGET AND DESCRIPTION

PROJECT	EQUITY TARGET	DESCRIPTION
AUSTRALIA, Haystacks Solar Garden	Renter-inclusion co-operative ownership model	Co-operative allows renters and low-income households without rooftops to purchase shares and gain solar benefits (Haxton, 2020).
AUSTRALIA, Marlinja Indigenous Microgrid	Justice-driven affordability model and Indigenous energy sovereignty model that ensures renters and pre-pay customers benefit equally from solar credits	Virtual net metering ensures pre-pay customers (often renters and public housing tenants) receive equal credits, cutting bills dramatically. Avoided debt financing and kept community ownership. (Original Power, 2021).
NEW ZEALAND, Our Energy Kia Whitingia	Indigenous-community equity model using peer-to-peer platform which reduces Māori household energy burden and redistributes surplus revenues	Provides solar electricity at NZ$0.06/kWh (18% of retail rate) (Berka et al., 2024). Surplus revenues redistributed via a community fund which has reduced energy burdens for Māori households (MBIE, 2023). Builds energy literacy and shifts consumption to match local generation.
NEW ZEALAND, Raū Kūmara Solar Power Plant	Philanthropic and municipal equity model	Philanthropic and council funding redirect surplus revenues to low-income access (NZ Energy Excellence Awards, 2021).
NEW ZEALAND, Ngāwhā Geothermal (Top Energy)	Trust-owned utility equity model which reinvests geothermal profits into social programs and bill reductions for all consumers	Consumer-trust structure reinvests geothermal profits to lower charges and fund social programs (Top Energy, 2022). Ensures households without rooftop PV benefit. The project addresses inequities between affluent coastal and inland communities (Tauhara North No.2 Trust, 2024).
UNITED KINGDOM, Bristol Energy Co-operative	Solidarity finance model	Combines community shares and ethical loans to fund renewables; prioritizes accessible membership (Bristol Energy Co-operative, n.d.).
UNITED KINGDOM, Brixton Energy Co-ops	Urban co-operative equity model where local share reinvested surpluses benefit low-income tenants, with added social inclusion programs	Community shares are accessible to locals, and a Community Energy Efficiency Fund finances the upgrades on social housing estates. Youth training and internships add employment and inclusion benefits. (Repowering London, 2018).
UNITED STATES, Green Energy Justice Co-operative (Illinois)	Multiracial, multi-class co-operative with tiered memberships.	Provides access for renters and low-income households through subscription solar and member equity (Co-op Power, n.d.a).
UNITED STATES, Co-op Power (New England & New York)	Federated subscription solar equity model.	Co-founded by Blacks in Green (co-operative) and Accelerate Climate Solutions (climate-focused non-profit) to address energy inequities in Illinois (Accelerate Climate Solutions, n.d.). Offers tiered membership ($5 low-income, $25 standard, $750 organizations). Uses state clean-energy funds and legislation; inclusive structure channels benefits to BIPOC and low-income residents (Blacks in Green, n.d.-a).
PUERTO RICO, Cooperativa Hidroeléctrica de la Montaña	Post-disaster rural justice model.	o-operative hydro+solar+storage for low-income mountain communities after Hurricane María (Cooperativa Hidroeléctrica de la Montaña, 2023).

8 KEY INSIGHTS FOR THE CANADIAN COMMUNITY ENERGY MOVEMENT

The following section highlights important takeaways from the policies and cases presented in this report. Rather than an exhaustive synthesis exercise, it is meant as an inspiration for future discussions across and beyond the Canadian CE movement.

8.1 A nuanced take on FIT

Feed-in tariffs (FIT), one of the most widespread economic incentives for CE, sit at the center of a long-running tension in CE policy. On one side, they can be unstable: short political half-lives and sharp rate drops make revenue forecasts brittle. The Australian case is a good illustration: premium FITs (up to 60¢/kWh) that proliferated from 2008–2012 were wound back quickly; by the mid-2010s rates had plunged, closing off that financing route just as many community projects were getting organized. FIT can therefore look like a potential liability for REC leaders who need multi-year certainty. On the other hand, experience across countries shows why many practitioners still view FIT as necessary and worth advocating for, especially in the early market-formation phase. For instance, Denmark's national targets paired with FIT helped enable Samsø's co-operative, island-wide model. In short, when communities are first mobilizing capital, establishing legal forms, and proving reliability, the simplicity and bankability of a guaranteed tariff can be the difference between a successful and failed project.

In jurisdictions where policy has matured, we see deliberate shifts beyond FIT toward instruments that maintain participation while easing fiscal exposure and encouraging innovation. In the UK, the Smart Export Guarantee (SEG) and Ofgem's regulatory sandbox opened new market access and let co-operatives trial peer-to-peer and flexibility services. In New Zealand, direct public and Indigenous funding (such as the Māori and Public Housing Renewable Energy Fund) and regulatory exemptions allowed Our Energy to run community-controlled solar-battery networks in a market dominated by large retailers. Even when FITs act as a transitory mechanism in the broader CE policy context, they remain an important instrument: in many jurisdictions, they enable a first wave of CE projects to get off the ground, providing momentum to the movement. But they are only one of many support mechanisms for CE.

8.2 Embracing the plurality of CE models

This report has highlighted that CE initiatives operate in very different socio-political contexts and can have different aspirations and therefore cannot follow a standardized blueprint.

We presented a wide array of organizational forms in the CE umbrella. While co-operatives remain one of the most common in many jurisdictions (EU, UK), there are also municipal utilities, non-profit associations, community trusts, and indigenous organizations. Moreover, in some jurisdictions, the grid is the only possible output for electricity production, and thus CE groups push for a sustained guaranteed grid access (with price premiums if possible). In other areas, collective self-consumption is allowed at different levels. In Germany, where there is no comprehensive self-consumption framework, it can still be done through a tenant electricity model allowing large building residents to consume the energy produced on-site. In Australia, where the market is liberalized but still limited to licensed retailers, the CE movement has found 2 different ways to operate: they've established Enova Energy, a community-owned licensed retailer, and they also seek behind-the-meter arrangements with businesses or municipal facilities when possible. CE initiatives involving bioenergy, such as the Bioenergy Village Jühnde in Germany don't rely on grid connection and thus can operate much more autonomously from the start. Finally, in France, a series of national policies between 2015 and 2019 has enabled a rapid development of collective self-consumption. These initiatives, often led by existing local collective organizations or municipalities, are allowed to sell electricity directly to consumers without going through the national network or following regulated energy tariffs, as long as the energy sources and the consumers are located within a few kilometers (usually between 2 and 20) from each other (Debizet, 2023). While collective self-consumption accounted for only 50 initiatives, 600 consumers, and 2 MW of power when it was launched, it rose exponentially in just a few years to over 1300 initiatives, 12 500 consumers, and 190 MW of installed capacity across France (Enedis, 2025).

CE is also quite diversified along additional dimensions: energy source (solar, wind, geothermal, hydro, bioenergy), financing schemes, geographical concerns (isolation, climate, etc.) and member aspirations (investment opportunity, lower costs, inclusion of marginalized communities, autonomy and resilience). We therefore recommend the Canadian CE actors to adopt a movement mindset while keeping a contextualized approach. Embracing the specificities of local contexts can uncover joint advocacy opportunities that might not fit with every CE organization's priorities every time, but as the movement gains momentum, their impacts will be felt broadly.

8.3 A renewed perspective on public funding

Another topic of debate for the CE ecosystem is whether public funding is something to strive for or to break free from. CE ecosystems where a flagship project benefits from specific public programs or grants (Hepburn Wind received a $975,000 grant from Sustainability Victoria's Renewable Energy Support Fund; clean energy funds and public grants for the Cooperativa Hidroeléctrica de la Montaña in Puerto Rico; Green Energy Justice co-operative's 9 MW community-solar pipeline located on county lands and using state funds) can be perceived as fragile if an eventual withdrawal of these programs occur or if they were a one-off with no guarantee for replication potential. Striving for CE financial independence more broadly can appear as a more solid foundation, but it is challenging and could eventually come into conflict with some important CE principles of equity, when for instance financial viability and low tariffs collide. Instead of taking this dilemma head on, we rather want to highlight that public support is omnipresent and is not a liability.

Almost all CE initiatives benefit from some kind of direct or indirect public funding or support which could eventually falter. FIT (Germany's CE -wide FIT until 2013; Denmark's FIT until 2002, market premiums, and tax free investment grants; SolarShare 1 MW guaranteed FIT in Australia), virtual net metering programs, national strategies (i.e. UK's Community Energy Strategy, Net Zero Strategy and Energy Security Strategy), procurement rules (community engagement and benefit-sharing in renewable procurements in Australian states), dedicated funds (New South Wales' Regional Community Energy Fund; Community Renewable Energy Fund in New Zealand), financially beneficial certifications (Small-Scale Technology Certificates in Australia), sandboxing permissions and exemptions (UK's Brixton Energy peer-to-peer; exemption granted to Our Energy in New Zealand to operate alongside large utilities). None of these public programs is guaranteed to be permanent, and thus they should not be disproportionately favoured in lieu of equity or resilience-based programs.

The role of the State is (and should be) to provide public services but also to support locally anchored initiatives that may be better positioned to provide such services. A wide variety of public CE programs is therefore a healthy indicator of the recognized social and environmental benefits of CE. The CE movement should therefore not strive to resolve the state support vs independence tension but rather frame it differently: it's not about if CE should rely or not on public funding, but rather how to multiply public funding opportunities and which specific ones to focus on.

8.4 Developing CE with or even within local governments

When we think of public funding or support for the (community) energy sector, we often have state or national governments in mind. This is where large scale financing schemes and energy regulations are usually designed and implemented, many examples of which were already mentioned in this report: New South Wales' Regional Community Energy Fund, Community Renewable Energy Fund in New Zealand, UK's Community Energy Strategy, Germany's FIT program in the early 2000s.

Support can however also come from local governments. Sitting closer to the notion of Community than that of State (MacArthur et al., 2025; Russell, 2019), municipalities can play a wide range of roles in the development of CE. A study conducted in Australia (Mey et al., 2016) has identified many local governments as role models in renewable energy, who adapt their procurement processes to favour renewable energy and generate awareness for their citizens. Others go further into an "enabling mode of governing" for CE by facilitating bulk purchases of renewable energy equipment for the community, developing innovative programs and incentives as a local utility, offering land for CE installations, and even building alliances with other like-minded communities for advocacy purposes.

Many cases highlighted in this report exemplify these roles. In Colorado and North Carolina, community solar programs focused on renters and low-income households have been developed through partnerships between municipal utilities and CE groups. In New England, there are even co-operatives whose members are municipal utilities who team up for advocacy but also to offer a wider

range of services, such as energy efficiency assessments and charging infrastructure for vehicles. The Samsø model in Denmark is also a multi-actor (co-operatives, municipal utility, farmers) partnership success story which put forward another benefit of working with local governments: the integration of CE into broader local planning. This translated into what has been coined as the Renewable Energy Island project, where citizens are actively involved and the municipal utility now owns five offshore turbines.
Recent indigenous-led initiatives also involve a greater role of local governments in CE. While indigenous communities' role in energy projects is usually either inexistent (i.e. extractive practices where their rights are simply baffled (Chagnon et al., 2022)) or limited to the granters of a social license to operate (Collins & Kumral, 2021) or Free, Prior and Informed Consent (Hanna & Vanclay, 2013), we now see more and more examples of projects where they are the leaders and owners. In Australia's Northern Territory, the Marlinja Community Microgrid is indigenous-owned and can operate in isolation or connected to the grid. In New Zealand's Kia Whitingia's initiative, the community institutions called marae serve as both spaces of Māori governance and sites of photovoltaic installations. These communities and their own forms of local, community-based governments leverage CE to address their own energy needs.

Local governments' contextual anchoring and flexibility in policy approaches position them as an interesting hybrid state-community actor beyond co-operatives and non-profits. We recommend paying special attention to their potential as both partners and leading figures for the Canadian CE movement. Their plurality might seem challenging since this implies a much greater number of policymakers to engage across Canada than if strictly focusing on provincial and national governments, but local governments are themselves organized in networks that could be a first focal point. Examples include the Federation of Canadian Municipalities and La Nouvelle vague municipale, a group of citizens and mayors in Québec looking to enhance the role of municipal elected officials and mobilize a new wave of citizen engagement in municipal politics.

8.5 A movement mindset supported by second-tier organizations

Second-tier organizations play a pivotal role in strengthening a CE ecosystem. REScoop.eu, the largest CE network in the world with over 2500 CE initiatives and 2 million citizens, initially leveraged a public grant to focus on mapping the extent of CE in Europe, identifying best practices, and providing tools to emerging CE projects (REScoop, 2025). Moreover, second-tier organizations can act as an enabling bridge to support CE organizations in times of need (with financing, knowledge, policy advocacy) which can alleviate a part of the sudden burden tied to policy changes. In Germany, co-operative associations offer training and technical assistance to their members, while in Australia there are numerous capacity-building programs, educational initiatives and knowledge-sharing networks.

These very practical concerns, which are very akin to the objectives of the 3-Phase project this report forms a part of, were quickly joined by matters that laid beyond REScoop.eu's current member base. First, REScoop.eu took an important advocacy role with national governments and the EU parliament, not only to secure specific favorable economic policies but also to push forward principles of energy democracy beyond their own network. Over the years, REScoop.eu has also built major alliances with both co-operative and environmental movements, as well as with municipality networks. In the United-States, Co-op Power, itself a co-op of co-ops, similarly partners with climate justice groups, housing associations and NGOs to anchor their projects in a comprehensive way. These partnerships are essential for the full flourishing of the sector. Some of these partnerships provided direct support for CE development, but they were also the result of mutual caring for general interests that, once again, extend beyond their respective networks. In parallel, REScoop.eu has been very active in reaching out to the general public, whether it be through convention or social media. The generated awareness is not only meant to increase public support for CE but also to drive new CE project developments, which is another core objective of REScoop.eu.

We believe the CECC can benefit from adopting such a plural mindset. Helping current CE members is crucial for success stories to blossom, while building a narrative and political momentum alongside a wide array of like-minded organizations strengthens the movement for a just and democratic transition of the energy sector and beyond.

9 CONCLUSION

International experience demonstrates that community energy systems can deliver wide spectrum environmental, economic, social, and governance-related benefits, when supported by enabling policy frameworks and robust local participation. Countries such as Denmark and Germany have shown that strong legal and financial incentives including feed-in tariffs, long-term government-backed low-interest loans, local ownership requirements, and capacity-building networks, can empower communities to control energy assets, resulting in stable revenue streams, local employment, and enhanced energy resilience. These models emphasize political capacity building, member engagement, and project governance as key categories for successful community energy. In Canada, similar approaches are emerging, particularly in provinces like Ontario, Alberta and British Columbia where community-owned wind, solar, and hydro projects have delivered local economic benefits and increased energy independence, though policy support and regulatory clarity remain uneven across provinces.

The United States offers instructive case studies that further illustrate the possibilities for Canadian jurisdictions. The Green Energy Justice co-operative (Illinois) demonstrates how equity-centered co-operative design, low-barrier membership, and state-level community solar policies can hard-wire inclusion for low-income and marginalized groups, while leveraging public climate finance and standardized bill credits to create resilient capital stacks. Co-op Power, operating across Massachusetts, Vermont, and New York, exemplifies a decentralized network of local co-operatives that combine flexible product offerings (community-owned solar, subscription credits, nonprofit PPAs) with targeted programs for renters and low-to-moderate income households. Their chaptered governance model and shared back-office capacity enable rapid replication across diverse regulatory environments, a lesson for Canada's multi-jurisdictional landscape. Meanwhile, Cooperativa Hidroeléctrica de la Montaña in Puerto Rico showcases how community ownership of distributed renewables and microgrids can anchor disaster resilience and long-term affordability in rural and remote regions—directly relevant to Canadian communities facing wildfire, storm, or grid-constraint risks. These U.S. cases highlight the importance of soft infrastructure such as education, technical support, and inclusive governance, alongside hardware investments, echoing the need for capacity building and institutional support in Canada.

> **"...co-operatives are a key organizational form through which communities develop, operate and benefit from energy infrastructure**

A final critical dimension across these international research cases is the integration of social and environmental objectives, including energy access for disadvantaged groups, Indigenous energy sovereignty, and the circular economy. Projects such as New Zealand's iwi-led geothermal developments, Australia's First Nations microgrids, and Puerto Rico's inter-municipal microgrid demonstrate how community energy can address energy poverty, foster Indigenous leadership, and build local capacity. In Canada, Indigenous communities are increasingly leading renewable energy projects that blend traditional stewardship with modern technology, advancing both energy sovereignty and reconciliation. Federal programs like Canada's Clean Energy for Rural and Remote Communities, as well as provincial initiatives and Indigenous-led utilities, illustrate the potential for community energy to reduce reliance on diesel, lower energy costs, and strengthen community resilience.

Based on this new research, Canadian jurisdictions should further strengthen enabling policies, streamline regulatory processes, and prioritize inclusive participation, especially for Indigenous and marginalized communities. By providing this policy support, Canada can achieve the full spectrum of community energy benefits: reduced grid pressure, enhanced local economic development, improved energy education, and resilient, low-carbon communities.

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