

## COMMUNITY-LED ENERGY SOLUTIONS IN WARTIME UKRAINE: LOCAL RESILIENCE, DECENTRALIZATION, AND LEGAL CHALLENGES

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*The article examines the emergence and development of community-led energy initiatives in Ukraine in the context of a full-scale war and systematic attacks on critical energy infrastructure. Large-scale destruction of electricity generation and transmission facilities, prolonged power outages, and energy shortages have highlighted the need for alternative models for ensuring energy security at the local level. The article analyzes how localized and decentralized energy solutions – including rooftop solar power plants, autonomous power systems for critical social infrastructure facilities, and the creation and operation of “Points of Invincibility” – have become key tools for ensuring energy sustainability, social stability, and community self-sufficiency.*

*Drawing on practical cases from Ukrainian cities and territorial communities, the authors demonstrate how a combination of municipal support, civic mobilization, and the use of hybrid energy technologies contributes to the uninterrupted functioning of basic services during periods of prolonged blackouts. Particular attention is paid to the role of local governments as coordinators of energy initiatives and a “local umbrella” that provides institutional support, financial mediation and strategic planning at the community level. A separate part is devoted to the analysis of the legal and regulatory environment in the field of renewable energy and community energy projects. The article highlights both positive developments in the direction of harmonization of Ukrainian legislation with European standards and existing structural and legal barriers that limit the scaling of such initiatives. In conclusion, it is argued that community-oriented energy practices perform not only the function of a short-term crisis response, but also form the basis for Ukraine’s long-term transition to a decentralized, sustainable and citizen-oriented energy system.*

**Key words:** community-led energy initiatives, energy resilience, decentralized energy systems, renewable energy, wartime Ukraine.

**Соловійова Аліна, Мамонов Дмитро. Громадські енергетичні рішення у воєнний час в Україні: місцева стійкість, децентралізація та правові виклики**

*У статті досліджується становлення та розвиток громадсько-орієнтованих енергетичних ініціатив в Україні в умовах повномасштабної війни та систематичних атак на критичну енергетичну інфраструктуру. Масштабні руйнування об’єктів генерації та передачі електроенергії, тривалі відключення світла та енергетичні дефіцити актуалізували потребу в альтернативних моделях забезпечення енергетичної безпеки на локальному рівні. У статті аналізується, яким чином локалізовані та децентралізовані енергетичні рішення – зокрема дахові сонячні електростанції, автономні системи живлення для критично*

важливих об'єктів соціальної інфраструктури, а також створення та функціонування «Пунктів незламності» – перетворилися на ключові інструменти забезпечення енергетичної стійкості, соціальної стабільності та самозабезпечення громад. Спираючись на практичні кейси з українських міст і територіальних громад, автори демонструють, як поєднання муніципальної підтримки, громадянської мобілізації та використання гібридних енергетичних технологій сприяє безперебійному функціонуванню базових послуг у періоди тривалих блекаутів. Особливу увагу приділено ролі органів місцевого самоврядування як координаторів енергетичних ініціатив та «локальної парасольки», що забезпечує інституційну підтримку, фінансове посередництво та стратегічне планування на рівні громад. Окрему частину присвячено аналізу нормативно-правового та регуляторного середовища у сфері відновлюваної енергетики та громадських енергетичних проєктів. У статті висвітлюються як позитивні зрушення в напрямі гармонізації українського законодавства з європейськими стандартами, так і наявні структурні та правові бар'єри, що обмежують масштабування таких ініціатив. У підсумку аргументується, що громадсько-орієнтовані енергетичні практики виконують не лише функцію короткострокової кризової відповіді, а й формують підґрунтя для довгострокового переходу України до децентралізованої, стійкої та орієнтованої на громадян енергетичної системи.

**Ключові слова:** енергетичні ініціативи, керовані громадами, енергетична стійкість, децентралізовані енергетичні системи, відновлювана енергія, Україна часів війни.

Since the start of the full-scale Russian invasion in 2022, Ukraine's energy infrastructure has been subjected to systematic and sustained military attacks. Large-scale power outages, severe energy shortages, and the destruction of thousands of energy facilities have exposed the structural vulnerabilities of highly centralized energy systems. During major offensives in 2024 and 2025, Russian forces reportedly launched coordinated strikes using up to 300 drones and missiles simultaneously, targeting power plants, transmission networks, and other critical infrastructure in the Zaporizhia, Dnipropetrovsk, Kharkiv, Sumy, Poltava, Kyiv, and Odesa regions [1].

According to estimates by the United Nations Development Programme, these attacks have resulted in approximately USD 6.5 billion in damages and have deprived more than 12 million people of reliable access to electricity [2]. Subsequent waves of attacks in 2025–2026 have continued to inflict widespread damage on energy facilities and caused prolonged power outages, particularly in urban centres such as Kyiv during the winter months, underscoring the persistent vulnerability of the country's energy system under ongoing war. As a result, energy security has become a key element of Ukraine's national resilience strategy, leading to a reassessment of policy priorities with a stronger emphasis on energy self-sufficiency and infrastructure reliability. Within this evolving policy framework, recent assessments of

Ukraine's energy system show that during periods of disruption, power supply stability increasingly relies on decentralized operational mechanisms and flexible capacity allocation mechanisms, particularly in the face of systemic imbalances caused by external shocks [3]. These system-level findings are further supported by scholarly analyses, which demonstrate that decentralized energy systems, including autonomous microgrids, substantially enhance the resilience and continuity of energy supply for critical infrastructure under conditions of external shocks and heightened security risks [4]. Collectively, these developments underscore the growing strategic relevance of decentralized energy solutions as a key component of Ukraine's response to wartime energy disruptions.

Against this backdrop, localized and decentralized energy solutions have gained heightened significance, particularly within the social sector. Ongoing wartime conditions have demonstrated that effective energy resilience cannot rely solely on centralized state systems, but must increasingly be anchored in community-level initiatives coordinated through local governance structures. This "local umbrella" approach strengthens local autonomy, enhances adaptive capacity, and contributes to broader security and resilience objectives. Against this background of sustained disruption, the article examines the role of community-led energy initiatives in addressing the immediate challenges posed

by wartime conditions while simultaneously laying the groundwork for a more resilient, decentralized, and sustainable energy system in Ukraine.

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This article examines the role of community-led energy initiatives in addressing the immediate challenges posed by wartime disruption while simultaneously laying the groundwork for a more resilient, decentralized, and sustainable energy system in Ukraine.

**Main Directions of Community-Led Energy Initiatives.** The development of community-led energy initiatives in Ukraine has taken place within a rapidly evolving legal and regulatory framework shaped by wartime exigencies, decentralization reforms, and Ukraine’s obligations under European energy law. In practice, these initiatives have concentrated on four primary areas: 1) the deployment of renewable energy solutions in residential buildings, particularly rooftop solar installations; 2) the decentralization of energy supply for critical infrastructure; 3) the establishment of Points of Invincibility (Punkty Nezlámnosti) as legally defined hubs of community energy resilience; and 4) public campaigns aimed at improving energy efficiency and responsible energy consumption.

From a legal perspective, these developments operate at the intersection of national energy legislation, municipal competences, emergency governance, and Ukraine’s commitments under the EU *acquis* in the field of energy and climate policy. Research emphasizes that the development of energy communities in Ukraine depends on the harmonization of national energy legislation with EU regulatory standards, particularly with regard to decentralized generation, collective self-consumption, and municipal participation in energy management [5].

**Solar Energy in Residential Areas: The Case of Kyiv.** The expansion of the use of solar energy on residential roofs is facilitated by a combination of national legislation and local regulations. At the national level, the key legal framework is provided by the Law of Ukraine “On Alternative Energy Sources” [6], which establishes the principles of state support for the production of renewable energy, including small-scale and distributed generation. Pursuant to Article 1 of the Law, solar energy is classified as a renewable energy source, which constitutes the legal basis for electricity generation from photovoltaic installations, including rooftop systems in residential buildings. Additional regulatory support derives from the Law of Ukraine “On the Electricity Market” [7]. In accordance with Paragraph 3-2 of Part One of Article 1 of this Law, an active consumer is a consumer, including a private household, an energy cooperative and a consumer who is a customer of an energy service (both before and after the transfer to the customer under an energy service contract of ownership of property formed (established) under an energy service contract), who consumes electrical energy and generates electrical energy, and/or carries out energy storage activities, and/or sells surpluses of generated and/or stored electrical energy, or participates in energy efficiency and demand management measures in accordance with the requirements of the law, provided that these activities are not his main economic or professional activity.

At the municipal level, Kyiv City Council and the Kyiv City State Administration have adopted a series of targeted programs enabling the practical implementation of these national norms, particularly through co-financing mechanisms for condominiums (OSBBs) and housing cooperatives. In response to persistent energy disruptions caused by the war, Kyiv has emerged as a leading example of community-driven solar energy adoption. Residents of multi-storey apartment buildings across the city have increasingly installed rooftop solar panels, showcasing a growing commitment to energy independence and residential resilience.

**Notable Local Initiatives.** Empirical evidence from municipal and district-level

sources points to the growing diffusion of community-led solar energy projects within Kyiv's residential sector. In the Holiivskyi District, a residential building installed solar panels and inverters in July 2024 through the city's "70/30" co-financing program. This system ensures autonomous operation of the heating unit and lighting in communal areas during power outages. Similarly, a building on Andrii Sheptytskyi Street in Dniprovskyi District installed 72 panels in October 2024, enabling residents to maintain electricity, hot water, and elevator service even during blackouts [8], [9]. In Pecherskyi District, members of the "Khudozhnyk" condominium association completed a solar installation in February 2023, ensuring uninterrupted heating and hot water access [10]. By early 2024, over 60 buildings had applied for compensation for renewable energy solutions, with more than UAH 7.7 million disbursed by the Darnytsia District administration [11]. Additional projects illustrate increasing technological sophistication and collective organization.

In the Shevchenkivskyi District, municipal support facilitated the installation of a solar power station capable of supplying electricity to water pumps, corridor lighting, access control systems, and elevators. Particularly noteworthy is a 16-storey residential building in which residents collectively financed the installation of a rooftop solar power plant combined with inverters and battery storage. Since October 2024, this building has sold surplus energy to the national grid as an "active consumer," contributing up to 80 kWh daily in summer months [12].

**Municipal Support and Co-Financing Programs.** Kyiv's success in promoting rooftop solar installations is largely supported by four municipal programs, as outlined by Deputy Head of the Kyiv City State Administration, Petro Panteleiev: "70/30" co-financing program for OSBBs and housing cooperatives; "Capital Repairs" program for all residential buildings; Reimbursement for independent electricity sources, such as generators and solar stations; "Revolving Fund" providing accessible loans for energy upgrades [13]. By Decision № 5586/5627 of 10 November

2022, the Kyiv City Council approved the Procedure for the partial reimbursement of the cost of independent electricity sources acquired by homeowners' associations of multi-apartment residential buildings in the city of Kyiv during the period 2021–2025. Partial reimbursement shall be granted in the amount of 75 % of the total cost of the acquired electricity source per multi-apartment residential building, subject to the following maximum ceilings: UAH 100,000 for buildings with up to six storeys (inclusive); UAH 200,000 for buildings with seven to sixteen storeys (inclusive); UAH 300,000 for buildings with seventeen or more storeys, as well as for buildings equipped with attached, integrated, or rooftop boiler installations [14].

In 2024, Kyiv expanded municipal support under the "70/30" co-financing programme, increasing the overall volume of compensation available for residential buildings implementing renewable energy solutions. Depending on the type of building and eligible works, municipal compensation covered a substantial share of project costs, with maximum amounts differentiated across categories in accordance with programme guidelines. Since November 2022, additional reimbursement incentives have encouraged the purchase of independent generators.

**Broader Impact and National Relevance.** These developments underscore the critical role of municipal support in scaling decentralized energy systems. Community-led solar installations not only enhance local autonomy and reduce reliance on vulnerable centralized grids but also contribute surplus energy to national reserves. Kyiv's model demonstrates how targeted urban policy, co-financing mechanisms, and citizen engagement can accelerate the adoption of renewable energy, particularly during times of crisis.

These municipal practices reflect broader national priorities in strengthening energy resilience and align with Ukraine's obligations under the Energy Community Treaty and its gradual harmonization with EU energy law, particularly Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (RED II) [15]. Community-led solar

initiatives not only enhance local autonomy but also contribute to the decentralization objectives embedded in European energy governance models.

Kyiv's experience demonstrates how legally supported municipal policy, targeted co-financing instruments, and collective action by residents can operationalize the concept of energy democracy even under conditions of armed conflict. As such, these initiatives represent not merely ad hoc crisis responses, but an emerging legal and institutional framework for a resilient, decentralized, and citizen-oriented energy system in Ukraine.

**Decentralized Solar Energy Integration in Ukraine's Critical Infrastructure.** Following the onset of the full-scale invasion in 2022, Ukraine has accelerated efforts to decentralize energy supply systems, with particular emphasis on critical infrastructure facilities. A central strategy in this initiative involves the widespread installation of solar power plants to ensure continuous electricity supply, enhance energy independence, and improve resilience against systemic disruptions.

A notable example is the city hospital in Zvyahel (formerly Novograd-Volynskiy) in the Zhytomyr region, where a 32.4 kW solar installation was completed in December 2022. This system secures the continuous operation of the hospital's intensive care unit and generates annual savings of up to 500,000 UAH [16]. Similarly, in Dubno, Rivne region, a 43.6 kW solar station installed in June 2023 now meets approximately one-third of the hospital's electricity demand, resulting in annual savings of around 154,000 UAH [16].

In Sumy, the Central City Clinical Hospital benefited from a GIZ-funded project (€100,000), receiving a 60 kW solar plant commissioned in December 2023. This installation ensures the uninterrupted provision of hot water and electricity to the Saint Zinaida Children's Clinical Hospital, strengthening the facility's operational resilience [16].

Post-reconstruction efforts in Gorenka, Kyiv region, in 2023 included the deployment of a hybrid solar system with battery storage and a heat pump. This system has successfully reduced heating costs by 43%

and now covers 55% of the building's daily electricity needs, significantly enhancing energy self-sufficiency [17].

In addition, the municipal water utility in Voznesensk, Mykolaiv region, became the first in Ukraine to install a 50 kW solar power plant, thereby improving operational autonomy and reducing electricity expenses [18].

Comparable advancements have been realized in Zhytomyr, Brody (Lviv region), Nizhyn (Chernihiv region), and Rivne, where local hospitals have implemented rooftop solar systems, ensuring more reliable energy access and financial savings. Furthermore, in Kremenchuk, Poltava region, strategic plans are underway to expand the deployment of solar energy systems across multiple critical infrastructure sites, further bolstering the city's resilience to potential power disruptions. These initiatives collectively illustrate the critical role of decentralized renewable energy solutions in safeguarding Ukraine's essential services and strengthening local communities' capacity to withstand energy crises.

**Establishment of Points of Invincibility as Hubs for Community Energy Resilience.** Following large-scale missile attacks on Ukraine's energy infrastructure, numerous cities and towns experienced prolonged power outages, resulting in severe disruptions to the provision of drinking water and district heating services. In response to these systemic challenges, units of the State Emergency Service of Ukraine, in coordination with local authorities, established so-called "Points of Invincibility" (Punkty Nezlamnosti) to provide emergency assistance to the affected population. The institutionalization of this practice was formalized on 17 December 2022, when the Cabinet of Ministers of Ukraine adopted Resolution № 1401, entitled "Issues of the Organization and Functioning of Points of Invincibility" [19], which approved the Procedure governing the organization and operation of these facilities [20].

These centers offer essential services, including access to electricity, mobile communication, Internet connectivity, heating, potable water, and basic medical supplies. All services are provided free of charge

and are available around the clock. The establishment and operation of the Points of Invincibility are organized based on the available resources of executive authorities and local self-government bodies. In response to widespread power outages caused by targeted attacks on critical infrastructure, Ukraine has launched the nationwide initiative known as Points of Invincibility. These are specially designated public spaces equipped to provide essential services during emergencies, thereby strengthening community energy resilience.

The Ministry of Digital Transformation introduced a dedicated service within the "Diya" mobile application that enables users to locate nearby Points of Invincibility through an interactive map, which can also be accessed offline. The service displays all available facilities within a 1.5-kilometre radius, allowing citizens to access electricity, communication services, and internet connectivity during outages. According to official data from the State Emergency Service of Ukraine, more than 8,000 Points of Invincibility have been deployed nationwide, including over 800 operated directly by the Service, encompassing both stationary and mobile units. Since the onset of the full-scale invasion, these facilities have assisted more than 670,000 individuals, particularly during periods of intensified attacks or widespread power disruptions [21].

Points of Invincibility are a local, practical energy solution created to provide essential services (electricity, heating, communication) during energy crises caused by infrastructure destruction. They show how local actors, such as communities, municipalities and emergency services, organize decentralized energy sustainability.

While many Points of Invincibility were coordinated by state bodies (e.g., the State Emergency Service), local authorities and communities also established and maintained many Points of Invincibility, especially in smaller towns and villages. This reflects community-led mobilization and local initiative under extreme conditions.

Many Points of Invincibility rely on autonomous energy systems: diesel generators, solar panels with battery storage, and hybrid energy units. Their opera-

tion demonstrates practical deployment of decentralized energy technologies, exactly what your topic aims to highlight.

The creation of these Points raised public awareness of the need for energy self-sufficiency and local resilience. Points of Invincibility are not only emergency structures but also a prototype for permanent local energy hubs in Ukraine's future energy system, contributing to the long-term transformation of energy infrastructure.

### **Teaching Energy Responsibility: The Impact of Educational Campaigns and Interactive Learning.**

Education and interactive learning have proven crucial for fostering energy responsibility across Ukraine. Recent initiatives demonstrate how structured efforts cultivate energy-conscious behavior and practical skills. At the school level, the Lviv Municipal Community organized the Week of Energy Conservation in September 2022. Through interactive lessons, creative competitions, and games, students learned practical methods to save energy at home, fostering habits that extend to families and the wider community [22].

At the community level, the Sustainable Energy Days organized by the Pology Urban Territorial Community (Zaporizhzhia Oblast) in June 2023 actively engaged citizens through informational campaigns, flash mobs, and essay competitions, fostering greater public awareness of energy efficiency measures and renewable energy solutions [23].

Nationally, Energy Efficiency Week 2025 expanded these efforts by uniting experts, local authorities, and businesses to promote education on sustainable energy practices, incorporating competitions, mentorship programs, and innovative technologies like AI for energy optimization [24].

Complementing these programs, initiatives such as the Energy Efficiency Champions competitions and the development of local energy strategies in Vinnytsia [25] and Zdolbunivka have played an important role in teaching residents practical energy-saving skills. As part of broader educational efforts, schools also received copies of environmental-themed board games and comics aimed at fostering ecological awareness among children. Public cam-

paigns such as Energy Saves Ukraine further promoted simple but impactful behavioral changes, encouraging citizens to adopt measures like switching to LED lighting and improving home insulation.

Collectively, these initiatives demonstrate that education, supported by interactive engagement tools, plays a transformative role in cultivating energy responsibility and advancing Ukraine's transition toward a resilient and decentralized energy future.

### **The Legal Framework for Community Energy Solutions in Times of Crisis: Progress and Challenges in Ukraine.**

The advancement of community-led energy initiatives in Ukraine is closely linked to the broader legal and regulatory framework supporting energy decentralization and renewable energy integration. Although Ukraine has made significant progress in developing its energy legislation, important regulatory challenges persist.

The ongoing war and energy crises have underscored the necessity of treating access to energy services and energy security as integral aspects of fundamental human rights, particularly within the constitutional right to an adequate standard of living. This evolving perspective has prompted scholars and policymakers to advocate for clearer regulation and stronger legal mechanisms to guarantee these rights. There is growing consensus that access to energy should be recognized as a distinct constitutional right, reinforcing state obligations to manage energy resources effectively and promote efficient consumption.

Ukraine's energy regulatory framework operates across several levels: international treaties, the Constitution of Ukraine, national laws such as the Law on Alternative Energy Sources and the Law on the Electricity Market, subordinate legal acts, decisions of the Constitutional Court, judicial practice, and strategic planning documents at both the national and EU levels. Efforts to harmonize Ukraine's legislation with European standards began with the 2004 National Program for the Adaptation of Ukrainian Legislation to the EU *acquis* [26] and were reinforced through agreements such as the Memorandum of Understanding on the Strategic Energy

Partnership between Ukraine and the European Union, jointly with the European Atomic Energy Community (Euratom) [27] and Ukraine's 2017 accession to the International Renewable Energy Agency (IRENA) [28].

Despite these achievements, major gaps remain. In the field of solar energy regulation, legal frameworks are fragmented and inconsistent. While solar energy is prioritized in strategic documents, the absence of a dedicated law specifically regulating its development limits the formation of a coherent national policy and impedes the creation of a transparent, competitive market. State support for solar initiatives has often been inconsistent and insufficiently systematic.

On a practical level, important steps have been taken to simplify access to renewable energy. Since July 1, 2023, small solar installations (up to 30 kW) no longer require construction permits, although technical assessments for grid connections remain mandatory. The National Commission for State Regulation of Energy and Public Utilities oversees the establishment and regulation of green tariffs, which incentivize households and businesses to produce renewable energy. However, the procedures for securing green tariffs and grid connections remain bureaucratically complex and technically demanding, often requiring specialized legal and technical consultations.

Further regulatory influences include Ukraine's taxation frameworks, customs regulations, and the Energy Strategy of Ukraine until 2035 [29], which shapes long-term planning for energy decentralization and the promotion of renewables. While certain tax incentives exist for solar producers, navigating the fiscal and administrative requirements often proves burdensome, particularly for small-scale community-led initiatives.

In conclusion, Ukraine has made significant progress in aligning its energy legislation with European standards and promoting decentralized energy solutions. However, significant regulatory gaps, in particular in the area of coordinated solar energy governance and market access, continue to hinder progress. Addressing

these shortcomings through comprehensive legal instruments, clearer procedural standards, and consistent policy implementation is essential to unlock the full potential of community-led energy initiatives and strengthen Ukraine's energy resilience in an increasingly challenging environment.

### **Challenges in Implementing Community-Driven Energy Initiatives.**

The implementation of community-driven energy initiatives faces a number of ongoing challenges beyond the immediate impact of ongoing hostilities and Russian attacks on energy infrastructure. These initiatives are significantly hampered by long-standing structural deficiencies in the energy sector itself.

One of the key challenges is the deteriorating condition of energy infrastructure, including distribution networks, substations, and technical equipment. This deterioration limits the capacity of distribution networks to accommodate decentralized generation units and contributes to increased technical losses in the system.

Furthermore, chronic underinvestment in the reconstruction of distribution systems poses a serious obstacle. Addressing this issue requires significant capital investment, particularly in the development and implementation of modern smart grid technologies capable of effectively integrating decentralized energy sources.

Legal and regulatory deficiencies further complicate implementation. The current regulatory system for connecting decentralized generating units to distribution networks remains complex and, in many cases, lacks transparency. As a result, grid connection often entails high capital costs and creates opportunities for unnecessary actions, including potential abuse and corruption by distribution system operator management. O. Bytyak rightly notes that in the legal literature there has not yet been a consensus on the definition of energy legislation, the problem of its internal structuring, and even more so any consolidated opinion on energy law, and the process of separating its components into separate sub-branches continues more and more actively. Thus, the "law of primary energy sources" is developing separately and quite actively [30, P. 163].

Another serious problem is the growing accumulation of debt in the electricity market, including arrears on electricity generated from renewable and alternative sources. This undermines financial stability and hinders investment in community-based energy projects.

Finally, the most serious obstacle to the development of community-based energy initiatives remains the continuation of military hostilities and the resumption of a wave of Russian attacks on energy infrastructure, expected in the fall and winter of 2025. These ongoing security risks pose a systemic threat to both the physical integrity of energy assets and the long-term viability of decentralized energy development.

**Conclusion.** Community energy initiatives in Ukraine have demonstrated a remarkable capacity for self-organization and adaptive governance, especially in the context of a protracted systemic crisis. Local actors have successfully mobilized financial, technical, and social resources to implement decentralized energy solutions, often bridging gaps in consistent state support. At the societal level, these initiatives have contributed to the gradual formation of an energy-conscious culture, reflected in the wider adoption of energy-saving practices and the integration of renewable energy technologies into everyday life. Practical solutions such as rooftop solar installations, energy sustainability centers, and hybrid energy systems are increasingly being implemented in both urban and rural communities.

At the same time, the long-term sustainability and scalability of community energy initiatives remain limited by structural problems embedded in Ukraine's broader energy system. These include the deteriorating state of the electricity distribution infrastructure, limited grid capacity to support decentralized generation, and persistent underinvestment in grid modernization. Legal and regulatory barriers, including the complexity and lack of transparency in grid connection procedures, further increase financial risks and capital costs for public projects. These challenges are compounded by financial instability in the overall market, including the accumulated debt

for renewable electricity, which continues to undermine investor confidence and limit access to long-term financing. The ongoing military conflict and repeated attacks on energy infrastructure further exacerbate this vulnerability, creating ongoing risks to both physical assets and institutional continuity.

Despite these limitations, community-led energy initiatives have proven effective in strengthening short-term energy resilience while laying the foundation for a long-term structural transformation towards a decentralized and sustainable energy system. Several policy priorities emerge to consolidate and scale up these achievements. First, the establishment of a dedicated national support system for community-led energy initiatives is essential to ensure sustainable financial, technical and institutional support. Second, successful local practices should be systematically integrated into a coherent national strategy for decentralized energy

development, rather than remaining fragmented or ad hoc responses to crisis conditions. Third, expanding educational efforts and improving access to affordable financing at the community level are necessary to lower barriers to entry and enhance the long-term viability of such initiatives.

Given the growing role of local actors in Ukraine's evolving energy landscape, serious consideration should also be given to the formal legal recognition of "energy communities," drawing on relevant European Union models. This raises two key questions for future policy development: should the legal status of energy communities be explicitly enshrined in Ukrainian legislation, and how can the long-term sustainability of community-led initiatives be ensured during the post-war recovery period? Addressing these questions will be critical for building a resilient, citizen-driven, and sustainable energy system in Ukraine.

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