Lessons learned and recommendations

Deliverable 5

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INTRODUCTION

The energy transition in Colombia has evolved toward models that not only seek to diversify the energy mix through renewable sources, but also to promote greater territorial participation in energy generation, management, and use. In this context, Energy Communities have emerged as a strategic instrument for aligning climate, social, and economic objectives, enabling local actors to participate directly in energy production, consumption, and governance, integrating productive, organizational, and energy dimensions within a single framework.

These types of initiatives represent a significant opportunity to strengthen the energy resilience of territories, reduce costs for end users, promote technological adoption, and contribute to achieving national emissions mitigation targets. Furthermore, Energy Communities can become vehicles for revitalizing local economies, improving the competitiveness of productive activities, and fostering energy inclusion in rural and semi-urban areas.

However, their consolidation faces structural challenges related to the stages of technical structuring, financial closure, social dynamics, and implementation on the ground. Energy community projects in Colombia are composed of multiple small-scale generation units, geographically distributed and associated with different users or productive activities. Investments per system are significantly lower than those of centralized projects, which increases structuring and management costs per beneficiary and requires the participation of actors with varying levels of technical, organizational, and financial capacity. Additionally, financial viability depends on both energy generation and the performance of the associated productive activity, introducing interdependencies in cash flows that do not align with traditional project finance logic and hinder its application in this type of scheme, even in international contexts where energy community frameworks exist.

Additionally, the limited credit experience of community organizations, the financial sector's perception of risk, the transaction costs associated with structuring small and medium-scale projects, and the lack of specialized financial instruments create a gap that hinders the mobilization of climate capital toward these types of schemes. These constraints not only affect the viability of individual projects but also limit the possibility of replicating and scaling the model at the territorial and national levels.

Within the framework of the Climate and Financial Transition (CFT) approach[1] and its articulation with the principles of a just energy transition, aimed at guaranteeing equity, inclusion and a balanced distribution of costs and benefits, makes it necessary to advance in the design of financial instruments that allow these barriers to be addressed in a structural way, promoting an efficient allocation of risks, the complementary mobilization of public, private and concessionary resources, and the strengthening of bankability conditions[2]adapted to the community-based nature of these projects. The structuring of such instruments is a central element for consolidating the financial sustainability of Energy Communities, expanding their capacity to mobilize climate finance, and enhancing their contribution to a just, inclusive, and territorially balanced energy transition.

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[1] Climate and Financial Transition Framework (CFT)

[2] **Bankability - the ability of a project to be financed by third parties, based on the strength and predictability of its cash flows, the appropriate allocation of risks and compliance with the technical, financial, social and environmental criteria required by the financiers.**

This document systematizes the main lessons derived from the structuring and financial analysis process of Energy Communities in Colombia, identifying structural barriers, enabling conditions and opportunities for institutional and financial transformation that allow strengthening this ecosystem and consolidating its scaling potential.

I. Deliverable Objectives

General objective

To analyze the main structural barriers, enabling conditions and strategic lessons derived from the process of structuring Energy Communities in Colombia, to identify opportunities to strengthen their capacity to mobilize climate finance and consolidate replicable and scalable models within the framework of the Just Energy Transition.

Specific objectives

1. Identify and systematize the regulatory, financial, institutional and territorial barriers that limit the structuring and financial closure of Energy Communities in the country.
2. Analyze the interaction between Energy Communities and the financial system, evaluating the challenges associated with risk allocation, bankability and the suitability of existing financial instruments.
3. Examine the conditions necessary to strengthen the financial and organizational sustainability of Energy Communities, including aspects of governance, institutional maturity and technical structuring.
4. Identify opportunities for public-private partnerships and climate finance mechanisms that allow for the efficient and sustainable mobilization of resources towards these types of projects.
5. Formulate recommendations aimed at improving the public policy framework, sectoral regulation, financial system approaches and territorial capacities, with a view to facilitating the national scaling up of the model.

II. Methodology

The development of this deliverable was carried out through a two-tiered analytical process, building upon the evidence consolidated in the project's previous diagnoses and deliverables. The first tier consisted of consolidating and strategically interpreting the previously documented technical, regulatory, organizational, and financial findings to establish a robust baseline on the state of the Energy Communities ecosystem and its relationship to climate finance in Colombia. This baseline was then compared to energy community models internationally, identifying best practices and enabling conditions, as well as success stories and structural barriers, and generating an analysis of their suitability for adoption in the Colombian context. The second tier involved systematizing structural barriers, enabling conditions, and strategic lessons learned, translating the previous findings into actionable recommendations to strengthen bankability, sustainability, and scalability.

A. Consolidation of evidence from previous diagnoses

The analysis is based on information gathered and validated during previous phases of the consultancy, including ecosystem assessments, regulatory review, institutional analysis, and results derived from financial modeling. This foundation allowed for an integrated understanding of how Energy Communities are configured in practice and what the main factors are that determine their viability from a climate, territorial, and financial perspective.

The consolidated evidence included elements related to implementation modalities, such as Collective Self-Generation (RCSG) and Collective Distributed Generation (CDG), as well as the technical and operational requirements of the generation system, the interaction with actors in the energy sector and the macroeconomic and tariff assumptions used in the projection. In parallel, organizational and institutional findings related to governance, administrative capacity, resource traceability, and transaction costs of the structuring process were incorporated. Additionally, the results obtained through the financial model developed within the project framework were revisited, which allowed for the identification of recurring performance patterns: concentration of initial investment, gradual generation of economic benefits, sensitivity to seasonality and revenue collection, and leverage constraints under community structures.

This component made it possible to ensure that the conclusions of this deliverable are not based on abstract assumptions, but on observed conditions and previously systematized evidence, guaranteeing coherence between the diagnosis and the recommendations made.

B. Systematization of barriers, enabling conditions and formulation of recommendations

Based on consolidated evidence and interviews with stakeholders in the energy ecosystem, a systematization and comparative analysis process was developed to identify the structural factors that limit the mobilization of climate finance and, in turn, the conditions that can enable the implementation and scaling up of Energy Communities in Colombia. The findings were organized into four categories of analysis: (i) regulatory and normative challenges, (ii) financial system constraints, (iii) institutional and governance limitations, and (iv) technical, organizational, and territorial gaps.

Subsequently, enabling conditions and opportunities for transformation were identified, focusing on public-private partnership mechanisms, minimum institutional capacities, financial instruments with mobilization potential, and criteria for allocation and risk mitigation. At this stage, the methodological emphasis was on translating the findings into practical implications for the financial design and institutional closure of community projects, ensuring the analysis remained focused on the objective of listing obstacles.

Finally, based on this systematization, recommendations were formulated for different areas of intervention, such as public policy, regulation, the financial system, territorial capacities, and international cooperation, prioritizing those with the potential for replication and scalability. The methodological result consists not only of descriptive conclusions but also a strategic analysis that links diagnosis, lessons learned, and recommendations, aimed at strengthening the capacity of Energy Communities to mobilize climate finance sustainably.

ENERGY COMMUNITIES AND CLIMATE FINANCE IN COLOMBIA

This section provides an overview of the role of energy communities in the energy transition and their relationship to climate finance, both globally and in Colombia. Three key dimensions are analyzed: i) their contribution to a just energy transition, ii) their capacity to mobilize climate finance, and iii) the current state of the Colombian ecosystem for their development. This approach allows us to understand how these models can scale from pilot initiatives to structural solutions that strengthen energy sustainability, social inclusion, and territorial resilience.

I. Contribution to a Just Energy Transition

Energy communities have become globally established as a key mechanism to accelerate decarbonization, improve access to energy and strengthen territorial resilience through decentralized solutions based on renewable sources, with significant adoption in Europe where there are more than 8,000 initiatives compared to about 100 experiences in Colombia. These models transform users into active participants in the energy system, enabling them to produce, manage, and benefit from energy, thus contributing to the democratization of the service and the reduction of vulnerabilities associated with fossil fuels. Their sustainability depends less on the available technology and more on the coherence between technical design, governance, tariff structures, and financial mechanisms that guarantee continuous operation and equitable benefits.

Within the framework of a Just Energy Transition, energy communities enable the benefits of decarbonization—such as reduced energy costs, the replacement of fossil fuels with renewable sources, improved service quality and continuity, and income generation or savings for users—to reach historically disadvantaged areas, particularly rural and unconnected regions. These schemes integrate social, economic, and environmental objectives by facilitating reliable access to energy, promoting productive uses, and strengthening local capacities for managing energy infrastructure. In this way, they contribute to reducing territorial inequalities, improving quality of life, and generating economic opportunities linked to the energy transition.

II. Capacity of Energy Communities to Mobilize Climate Finance

Energy communities represent a strategic opportunity to mobilize climate finance by linking mitigation, adaptation, and local development objectives to concrete and verifiable projects. Internationally, their financing is typically structured through mixed financing schemes that combine public subsidies, concessional capital, and private resources, allowing infrastructure costs to be covered while tariff revenues sustain operation and maintenance. This approach reduces risks for investors and facilitates the channeling of climate resources to territories with limited access to traditional financing.

However, the main challenge lies not in financing CAPEX, but in securing resources for operation, maintenance, and asset replacement, which are crucial for the service's sustainability. International evidence shows that many projects fail due to weaknesses in financial management, low collection efficiency, or a lack of replacement funds, rather than technological failures. Therefore, climate finance instruments must incorporate risk mitigation mechanisms, OPEX financing, and performance-based payment schemes that strengthen the bankability of these projects.

In this context, it is essential to have tools that allow for the structuring of energy community projects in a way that is consistent with the territorial, social, operational, and financial conditions that determine their sustainability. The proposed decision tree fulfills this purpose by offering a structured instrument that guides project design according to key contextual factors, beginning with the distinction between the National Interconnected System (NIS) and Non-Interconnected Zones (NIZ), which defines the available regulatory and financing options. Building on this foundation, the tool incorporates variables such as the community's organizational capacity, the system's technical requirements, and the most appropriate financing pathways, in order to strengthen the bankability and viability of the projects.

DECISION TREE - ENERGY COMMUNITIES						
#	Condition/Question	YES →	Result (YES)	NO →	Result (NO)	Key notes
STAGE 1 — Entry conditions						
0	**TERRITORIAL CONDITION** Is the community in SIN or ZNI?	✓ YES	SIN → ZNI	✗ NO	NOT VIABLE	Define the applicable regulatory level
1	**COMMUNITY LEGALITY** Is the community legally constituted? • JAC / Already constituted associations • Communities must be formed under a legal structure	✓ YES	RCSG (Collective Self-Generator) CDG (Collective Distributed Generator)	✗ NO	NOT VIABLE	RCSG: Savings on tariffs CDG: Greater complexity Potential for selling surpluses
2	**ASSOCIATED PRODUCTIVE ACTIVITY** Is there an anchor or productive activity? • Agriculture • Artisanal fishing • Other sectors	✓ YES	Evaluation continues	✗ NO	NOT VIABLE	Anchor activity guarantees stable demand and social viability
3	**ACCESS TO PUBLIC RESOURCES** Are there subsidies or financing available? • Subsidized CAPEX • MinEnergía Programs • Foreign Coupons	✓ YES	Evaluation continues	✗ NO	Continue with greater risk	Sources: Ministry of Energy, IDEAM, international cooperation
STAGE 2 — Operational feasibility and economic model						
4	**INCOME STREAMS OR ECONOMIC BENEFITS** Is there a positive revenue stream or economic benefit? • Savings on bill vs. current rate	✓ YES	Evaluation continues	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Key: Compare RCSG tariff vs. current network operator tariff
5	**DEMAND FOR SUSTAINABLE ENERGY** Is the community's energy demand sustainable and quantifiable? • Stable historical demand • Reasonable growth projection	✓ YES	Evaluation continues	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Use network operator data or direct measurement
6	**GOVERNANCE AND SOCIAL RESPONSIBILITY** Is there community governance and corporate responsibility? • Defined management entity • Commitment to payment	✓ YES	Evaluation continues	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Governance model: JAC, cooperative, service company
7	**INCOME STREAMS OR ECONOMIC BENEFITS** Does the revenue stream cover operating expenses and debt service? • Detailed post-subsidy review	✓ YES	Evaluation continues	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Include O&M, replacement, and administrative costs
8	**DEMAND FOR SUSTAINABLE ENERGY** Is future demand assured? • Supply contracts signed • Operational continuity guaranteed	✓ YES	Evaluation continues	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Demand risk is the main operational risk
STAGE 3 — Bankability and financial closure						
9	**OPERATIONAL CONTINUITY** Question (box): Is there a continuity plan in place? (O&M, critical spare parts, replacement plan, backup if applicable)	✓ YES	VIABLE AND BANKABLE	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Revenue = OPEX + Replacement DSCR ≥ 1.2 (NPV 8% present)
10	**DEBT SERVICE CAPACITY** Question (box): Does the cash flow allow for debt service with a minimum buffer (if applicable)? • NPV positive	✓ YES	VIABLE AND BANKABLE	✗ NO	NO → VIABLE WITH ADJUSTMENTS	Revenue = OPEX + replacement DSCR ≥ 1.2 NPV > 0 at 8%
11	**FINANCIAL CLOSE** Question (box): Does the project achieve financial close? (Revenue ≥ OPEX + replacement; DSCR ≥ 1.2; NPV > 0 at 8%)	✓ YES	☑ VIABLE AND BANKABLE	✗ NO	⚠ VIABLE WITH MITIGATORS	Revenue = OPEX + replacement DSCR ≥ 1.2 NPV > 0 at 8%
BOTTOM LINE		**☑ VIABLE AND BANKABLE — Proceed with financial structuring**		**⚠ VIABLE WITH ADJUSTMENTS / MITIGATORS — Review structure**		**✗ NOT VIABLE — Exit from the process**

Source1: developed by Amplo Kaya

The tool functions as a sequential decision filter that allows for an orderly evaluation of whether an energy community has the minimum conditions to move towards a financial structuring process.

In Stage 1 – Entry Conditions, the basic enabling criteria of the territory and the community are reviewed, such as its location within a Non-Interconnected Zone (NIZ), the existence of a minimum organizational and legal structure, an identifiable demand base and source of payment, and potential access to public resources or support mechanisms. In this phase, if the community meets the required conditions, it can continue in the evaluation; if it does not, it is determined whether the case falls outside the scope of the instrument or requires prior support to strengthen capacities and enabling conditions.

Stage 2 – Operational Viability and Economic Model analyzes whether, once the entry conditions are met, the project has a sufficient foundation to operate sustainably. This stage evaluates elements such as the existence of income streams or economic benefits, the community's demand for sustainable energy, governance and social responsibility, the income stream or benefits from the production side, and the sustainable energy demand associated with the economic activity. Unlike the previous stage, in this phase the project is not necessarily discarded if it presents gaps, but rather it can be classified as viable with adjustments. This indicates that the underlying conditions exist, but modifications to the technical, commercial, organizational, or economic design are required to strengthen its sustainability.

Finally, stage 3 – Bankability and Financial Closure, determines whether the project, in addition to being operationally viable, has the conditions to access formal financial structuring. This stage reviews aspects such as operational continuity, debt service capacity, and financial closure, verifying whether projected revenues cover operating costs, replacement costs, and financial obligations below minimum sustainability thresholds. Based on the cumulative evaluation of the three stages, the tool yields a final result: a viable and bankable project, which can proceed to financial structuring; a viable project with adjustments or mitigating factors, which requires a review of its structure; or a non-viable project, when the identified conditions prevent the process from continuing.

III. Current state of the ecosystem in Colombia

Colombia has made significant progress in the regulatory recognition of energy communities and in the creation of instruments for their development, including regulatory frameworks for distributed generation, collective self-consumption, and operation in the National Interconnected System (NIS) and Non-Interconnected Zones (NIZ), in line with instruments such as the National Development Plan and Decree 2236 of 2023. However, the country presents a heterogeneous territorial context, where gaps in access and quality of service persist, especially in dispersed rural areas and NIZ territories. These areas, representing approximately 52% of the national territory and encompassing more than 1,700 localities distributed across around 110 municipalities, face high operating costs, a historical dependence on diesel, and institutional limitations. This environment demands differentiated implementation models that consider the specific technical, financial, and social conditions of each territory.

The institutional ecosystem involves multiple entities with complementary functions, such as the Ministry of Mines and Energy, the CREG (Energy and Gas Regulatory Commission), the UPME (Mining and Energy Planning Unit), the IPSE (Institute for Petroleum and Energy Services), and FENOGE (National Federation of Petroleum and Energy Entities). Coordination among these entities reduces transaction costs and facilitates project structuring by (i) clarifying applicable rules and regulatory frameworks (CREG), (ii) centralizing project planning and prioritization with standardized technical information (UPME), (iii) coordinating implementation in territories with different conditions, especially in Non-Interconnected Zones (IPSE), (iv) channeling and managing financial resources and incentive schemes (FENOGE), and (v) aligning public policy and the sector's strategic guidelines (Ministry of Mines and Energy). Taken together, this coordination reduces regulatory uncertainty, avoids duplication of processes, improves resource traceability, and facilitates project bankability.

Although national and international sources of financing exist, the current landscape is focused on capital investments, while gaps persist in financing for operation, maintenance, and risk mitigation, limiting project scalability. Overcoming these challenges requires strengthening institutional coordination, developing financial instruments appropriate to the project lifecycle, and consolidating community capacities to ensure operational sustainability. In this context, it is crucial to incorporate blended finance schemes that combine public, concessionary, and private resources, as well as guarantee mechanisms and performance-based payments that cover operational risks, improve bankability, and ensure long-term project continuity.

Pilot projects in Colombia demonstrate the potential of energy communities when they integrate productive uses and governance models tailored to the territory. Experiences in Natagaima, Mingueo, and Bahía Málaga—real-world examples of energy communities in Non-Interconnected Zones (NIZ) and National Interconnected Systems (SNI)—show how solar energy and hybrid systems have strengthened local economic activities, extended service continuity, and reduced dependence on diesel. These examples confirm that sustainability depends not only on technological installation but also on the integration of community capacities, productive uses, and financial mechanisms that ensure long-term operation and maintenance.

STRUCTURAL BARRIERS TO FUNDING MOBILIZATION

Mobilizing financing for energy communities in Colombia faces structural barriers that limit its scalability and long-term sustainability. These barriers are not limited solely to the availability of resources. External financial resources are not the primary source of funding for these projects; they are also subject to regulatory, institutional, and territorial factors that affect their structuring, access, and bankability. Understanding these limitations is essential for designing financial instruments and operational models that enable the transition from isolated pilot projects to replicable and sustainable solutions.

I. Regulatory and Normative Challenges

Although Colombia has made progress in formalizing energy communities through recent resolutions from the CREG (Energy and Gas Regulatory Commission) and guidelines from the Ministry of Mines and Energy, the regulatory framework is still being consolidated. The issuance of regulations to enable collective self-generation, the registration of energy communities, and their integration into the electrical grid demonstrates progress, but also reflects an evolving regulatory process that creates uncertainty for investors and developers. This regulatory transition hinders financial structuring because there are no fully stable and consolidated rules for all operating models.

Although Colombia has made progress in legally recognizing energy communities, regulatory gaps persist in key areas such as the allocation of energy benefits, mechanisms for remunerating surplus energy, the definition of responsibilities among stakeholders, and certification and grid integration procedures. This lack of clarity generates legal and operational ambiguities that increase transaction costs and hinder the estimation of long-term risks and revenue streams. Consequently, these gaps affect bankability and delay the implementation and replicability of projects.

Additionally, the lack of specific guidelines for rural and non-international zones limits the adaptation of models to diverse territorial realities. The absence of clear policies regarding network deployment, asset compensation, and tariff schemes increases the risk of stranded assets and reduces investment appetite. Overcoming these gaps requires differentiated regulatory frameworks that provide legal certainty and facilitate the financial structuring of projects.

Internationally, evidence shows that energy communities face legal barriers related to permits, grid integration, and institutional frameworks designed for centralized systems. The lack of regulations adapted to local distributed generation models can delay projects, increase costs, and limit citizen participation in the energy transition. Overcoming these challenges requires simplified regulatory processes, clear operational definitions, and differentiated policies that recognize the community-based nature of these schemes.

II. Financial System Restrictions

The traditional financial system faces structural limitations in financing energy communities due to a lack of collateral, credit histories of beneficiaries at the individual or collective level (such as associations), and formal business structures within communities. Financial institutions typically require collateral and predictable cash flows, conditions that are difficult to meet in vulnerable territories or those with community governance models. This situation restricts access to credit and perpetuates a high dependence on public subsidies and international cooperation to make projects viable.

Additionally, the financial sector's perception of risk is reinforced by gaps in technical and market knowledge regarding distributed energy projects, resulting in higher interest rates or the denial of financing. Regional studies indicate that the lack of information and capacity within the financial system generates unjustified risk perceptions that increase the cost of capital for sustainable energy projects. This knowledge gap limits the participation of financial intermediaries and reduces the scale of investment in community-based renewable energy.

The high cost of initial capital and the lack of well-structured projects also constitute significant barriers to accessing climate finance. In Colombia, investments in new energy technologies face difficulties related to the perception of business risk, the lack of preferential interest rates, and the scarcity of financial instruments adapted to community projects. These conditions reduce bankability and hinder the participation of micro and small organizations in the energy transition.

Furthermore, available financing tends to be concentrated on capital expenditures (CAPEX), without adequate instruments to cover operating, maintenance, and asset replacement costs, which are crucial for the sustainability of the service. The absence of risk mitigation mechanisms, such as guarantees, insurance, or performance-based payment schemes, increases the perception of risk and raises the cost of capital. To effectively mobilize climate finance, financial instruments adapted to the project life cycle and community conditions are required.

From a systemic perspective, the reliance on initial subsidies and the absence of self-sustaining business models hinder the transition to market-financed schemes. Evidence shows that the lack of an entrepreneurial culture and energy consumption-based billing mechanisms weakens revenue streams and discourages private investor participation. Overcoming these constraints requires strengthening community capacities, designing tailored guarantee schemes, and promoting sustainable business models that reduce the risk perceived by the financial system. As part of this process, the adoption of mixed and innovative financing mechanisms is recommended.

III. Institutional and Governance Limitations

Institutional fragmentation and the lack of formal coordination mechanisms between public, private, and community actors. The existence of multiple entities with complementary roles, but without standardized interaction processes, constitutes a significant barrier to the mobilization of financing in energy communities. The lack of clear inter-institutional coordination pathways and standardized processes among these entities increases approval times, generates duplication, and raises project structuring costs. This complexity reduces investor confidence and limits the scalability of replicable models.

At the community level, the limited governance structure, evidenced by the lack of adoption of protocols, standards, and procedures for decision-making and alignment, as well as insufficient administrative capacity, affects project sustainability and perceived risk. The absence of clear agreements on roles, responsibilities, and benefit-sharing can generate internal conflicts, undermine payment discipline, and disrupt the system's operation. Strengthening community governance through transparent structures and co-responsibility processes is key to improving bankability and attracting financing.

Furthermore, evidence shows that delivering energy assets without clear operating and governance models can turn them into liabilities for communities. A lack of capacity to manage systems as socio-business units limits their sustainability and perpetuates dependence on external operators. To overcome these limitations, it is necessary to integrate governance mechanisms, community business models, and progressive technical support from the design stage.

IV. Technical, Organizational and Territorial Gaps

Colombia's geographical conditions, especially in dispersed rural areas and non-international zones (NIZ), increase the operational and logistical costs of community energy projects. Factors such as geographic dispersion, limited access, climatic conditions, and historical dependence on diesel fuel raise installation, operation, and maintenance costs. These conditions hinder the standardization of models and require technical solutions tailored to each specific region.

Technical limitations also relate to the need for designs suited to specific environmental conditions, such as pollution levels, humidity, or vandalism, which affect the performance of solar systems. Evidence shows that underestimating operating and maintenance costs, especially in dispersed installations, can compromise the project's profitability and sustainability. Incorporating realistic technical criteria from the design stage is essential to ensure operational viability.

From an organizational perspective, gaps in the technical, administrative, and business capacities of communities limit the sustainable operation of energy systems. A lack of technical training, a culture of payment, and management experience can lead to dependence on external operators and compromise the sustainability of the service. Strengthening local capacities and providing ongoing training are essential to ensuring community ownership and operational continuity.

Finally, the lack of productive uses for energy and community-based business management models limits the generation of income to sustain the system's operation. National and international experiences show that integrating productive activities improves payment discipline, strengthens the local economy, and reduces financial risks. Overcoming these gaps requires comprehensive approaches that combine technical solutions, organizational strengthening, and territorial economic development.

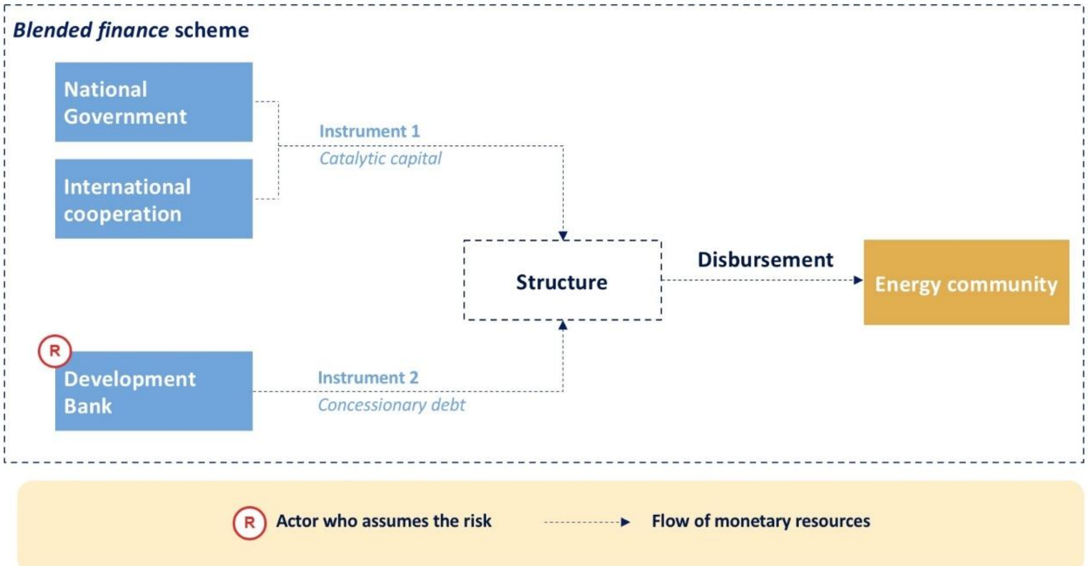
ENABLING CONDITIONS AND OPPORTUNITIES FOR TRANSFORMATION

The analysis of the proposed financial instrument demonstrates that Colombia possesses the enabling conditions to transform energy communities into a scalable mechanism for energy transition and climate finance mobilization. These conditions are based on the possibility of combining mixed financing, performance-based incentives, and flow-based architectures that redistribute risks and strengthen operational sustainability. The consolidation of these elements can make energy communities a replicable solution that aligns climate objectives, territorial development, and financial stability.

I. Actors and Instruments with Mobilization Potential

The instrument demonstrates the existence of an ecosystem of actors capable of mobilizing resources for energy communities through mixed financing schemes that combine catalytic capital, concessional debt, and community contributions. This combination allows for a phased distribution of risk, improves bankability, and enables projects that lack traditional guarantees. The flow-based architecture replaces physical collateral with collection discipline, financial governance, and clear rules for resource allocation.

Catalytic capital from international cooperation, climate funds, and public entities can absorb initial risks, improve creditworthiness, and attract additional investment. Concessional debt channeled through development banks allows for financing assets with terms and rates compatible with the project's gradual revenue generation. Community participation strengthens ownership, improves payment discipline, and consolidates the governance of the energy system.



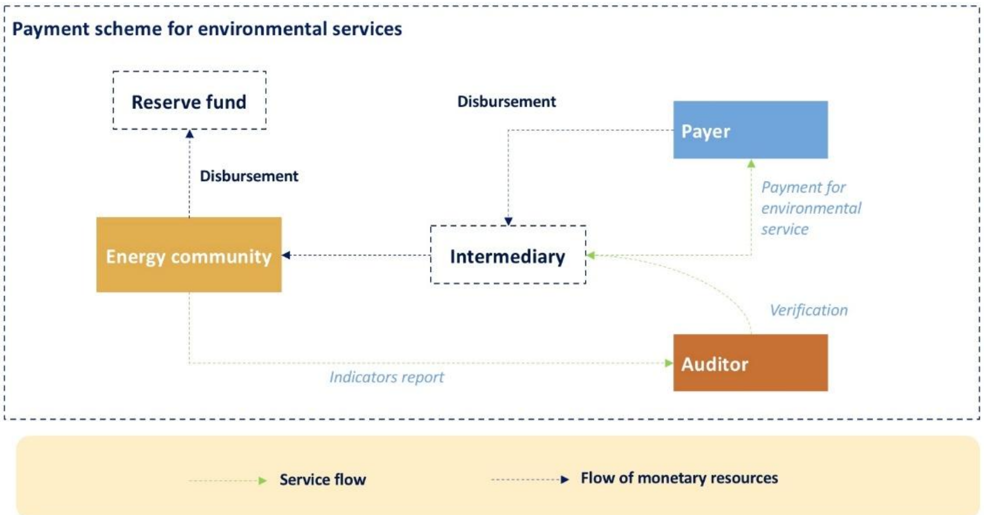
The instrument proposes a mixed financing scheme that combines catalytic capital, concessional debt, and community contributions to distribute risks in a staggered manner and enable projects without guarantees. Catalytic capital absorbs initial losses and improves the risk profile, allowing concessional lenders to participate under conditions compatible with the project's gradual revenue generation. Where applicable, specific guarantees may be defined according to the ownership, tenure, or legal availability of the land where the project will be developed. However, the mechanism is designed so that financial viability does not depend primarily on these types of real guarantees, but rather on a cash flow-based structure and the reinforcement that a results-based payment scheme can provide, insofar as it contributes to reducing risk and strengthening lender confidence. This approach reduces the average cost of capital, increases bankability, and facilitates the mobilization of climate resources to territories with high energy vulnerability.

Mixed financing allows for the structuring of projects where initial subsidies do not replace system revenues but rather act as temporary enablers to stabilize cash flows. As the project consolidates its revenue collection, achieves operational stability, and meets predefined financial thresholds (e.g., minimum levels of DSCR and revenue predictability), its reliance on concessional resources decreases, enabling a gradual transition to private financing. This transition follows a phased approach, in which the initial stages rely on public or concessional capital to absorb initial risks, followed by the entry of impact investors and secured debt, and subsequently the participation of commercial financiers or private capital as the project demonstrates financial viability.

II. Public-Private Partnership Opportunities

The instrument reveals concrete opportunities for public-private partnerships through schemes where the public sector provides catalytic capital and concessional financiers mobilize repayable resources. This model allows for risk sharing, reduces the average cost of capital, and improves affordability for end users. Private sector participation, through energy operators and technology providers, strengthens technical stability and reduces operational risk.

Results-based payment mechanisms create a space for collaboration between public entities, international cooperation agencies, and private actors interested in financing verifiable climate impacts. These conditional incentives align financial resources with targets for emissions reductions, energy efficiency, and productive local development. Corporate participation based on ESG criteria can broaden funding sources and strengthen the instrument's sustainability.



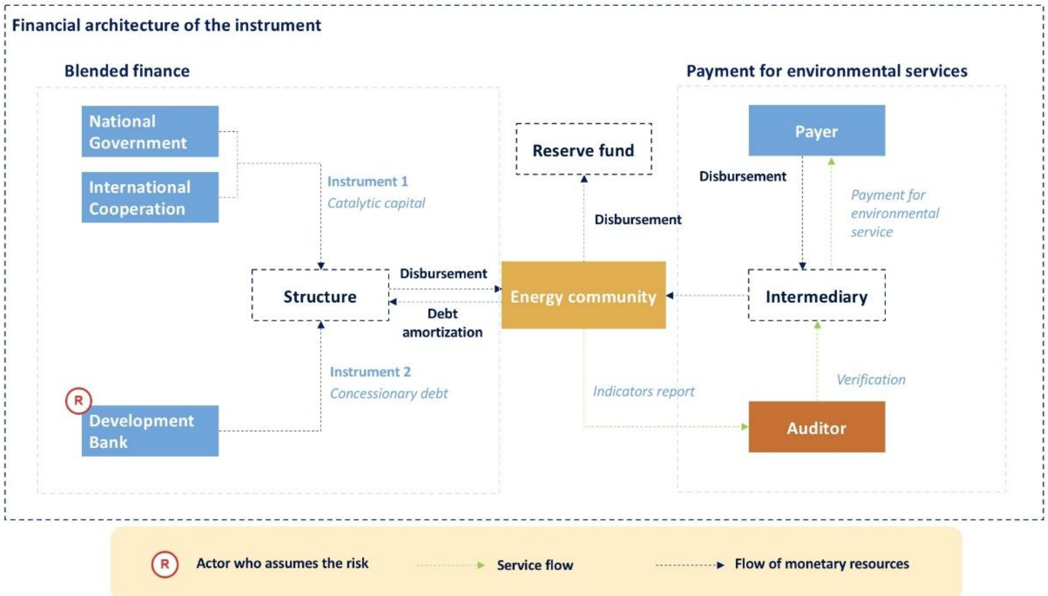
The pay-for-results mechanism introduces financial incentives conditioned on compliance with verifiable technical, financial, and climate indicators. These incentives can come from international cooperation, climate funds, or public programs, and are disbursed only when the project demonstrates performance in areas such as emissions reduction, service continuity, or collection discipline. This structure aligns financial flows with the project's actual impact and reduces risk for funders.

The resources derived from performance-based payments can be allocated to early debt repayment, strengthening reserves, or financing system expansion. This strategic use progressively improves the project's credit profile, reduces risk exposure, and increases financial resilience to operational shocks. In this way, the instrument transforms operational performance into a mechanism for continuous solvency improvement.

III. Conditions for Strengthening Bankability

The instrument has high potential for national scaling because it is structured as a replicable, modular architecture rather than an isolated fund. Standardization of financial rules, verifiable indicators, and governance mechanisms reduces transaction costs and maintains homogeneous risk profiles across different territories. This replicability facilitates sustained capital mobilization and the territorial expansion of the model.

Scaling up is strengthened by the possibility of combining catalytic, leveraged, and income-stable structures tailored to local conditions. Integrating anchor customers, demand-side agreements, and productive energy uses improves flow stability and facilitates access to financing for new projects. Under this approach, energy communities can evolve from pilot projects to national programs for a just energy transition and sustainable territorial development.



The instrument's financial architecture is based on a flow management scheme that establishes a dedicated account, mandatory payment priority, and the creation of operating reserves. This design ensures that system revenues are prioritized for operation, maintenance, and debt service, reducing the risk of disruptions and strengthening service sustainability. The structure replaces physical collateral with financial discipline, traceability, and clear rules for resource allocation.

The payment priority system protects critical system costs, while operating reserves act as a financial buffer against fluctuations in revenue or unforeseen expenses. This approach enhances funder confidence by ensuring that project resources are managed according to predefined and transparent rules. As a result, the flow-based architecture becomes the cornerstone of the instrument's bankability and a replicable mechanism for community projects.

IV. Potential for scaling up to the national level

<u>The proposed financial instrument has a high potential for national scaling by being structured as a replicable modular architecture, designed to adapt to different territorial contexts without altering its fundamental financial principles.</u> In this sense, the instrument is conceived as a centralized facility or platform that defines standardized guidelines, financial structures, and governance mechanisms, and that channels resources to multiple Energy Communities, avoiding the need to structure independent schemes for each project. The standardization of flow rules, performance indicators, and governance mechanisms reduces structuring costs, facilitates risk assessment, and maintains homogeneous financial profiles, while at the implementation level, each project adopts this framework under a modular approach with specific adjustments according to its territorial context.

Scaling up is strengthened by the instrument's flexibility to combine catalytic, leveraged, or income stability-based structures according to the characteristics of each territory. In areas with high energy vulnerability, catalytic capital can absorb initial risks, while in territories with greater repayment capacity, more leveraged schemes with private sector participation can be implemented. This adaptability allows for the assignment of different risk profiles without modifying the instrument's basic design, facilitating the evolution from pilot interventions to regional and national just energy transition programs.

The integration of anchor customers, demand-side agreements, and productive energy uses is a key factor in ensuring stable revenue streams and facilitating access to financing for new projects. These elements improve revenue predictability, strengthen payment discipline, and generate local economies that reinforce the sustainability of the energy system. Furthermore, the ability to aggregate multiple projects under a single structure facilitates their joint evaluation and reduces the perceived risk for investors, thus strengthening the portfolio's bankability.

The potential for scaling up also depends on integrating the instrument with public policies on energy transition, rural development, and climate finance. Incorporating the model into national programs can facilitate the channeling of resources, the standardization of processes, and the generation of economies of scale in implementation. This approach positions the instrument as a structuring vehicle for multiple projects, enabling a shift from isolated projects to a national strategy that contributes to closing energy gaps, reducing emissions, and strengthening local economies.

Finally, systematizing lessons learned and creating knowledge platforms will allow for the replication of successful models and reduce risks in future implementations. Documenting best practices, contractual structures, and financial mechanisms will facilitate the participation of new actors and the expansion of the community climate finance market. This process consolidates a scaling logic based on standardization, aggregation, and continuous learning, enabling the progressive entry of private capital as a portfolio of bankable projects is built.

STRATEGIC LESSONS

The strategic lessons presented below synthesize the insights gained from the diagnostics and structuring exercises developed in previous deliverables, as well as from the financial analysis applied under the TCF approach. Their purpose is to identify structural patterns and replicable criteria to guide decision-making by public actors, funders, and community organizations, beyond specific cases. Taken together, the analysis demonstrates that the viability and scalability of energy communities depend less on technological infrastructure and more on the coherence between institutional capacities, cash flow stability, regulatory certainty, risk allocation, and integration with the financial system.

I. Institutional maturity and governance as a condition for sustainability

Investment alone does not solve the structural and systemic constraints of Energy Communities. In most rural and semi-urban contexts, the main gap is not only access to CAPEX, but also the community's actual capacity to manage an energy system as a socioeconomic unit throughout the project's life cycle. In other words, the "maturity" of an Energy Community is not measured solely by its level of organization or territorial legitimacy, but by its ability to sustain planning, management, revenue collection, operation, and decision-making processes under clear and verifiable rules. When these capacities are not consolidated, investment resources tend to face greater implementation risks and, especially, a higher probability of deterioration during the operational phase, where service continuity and the system's sustainability are defined.

In this context, prior technical assistance should be understood as an enabling requirement for mobilizing climate finance and building bankability. Its objective is not only to provide training, but also to establish functional capacities that allow the project to operate under minimum standards of traceability, accountability, and financial discipline. This includes, at a minimum, strengthening the community's capacity to:

- (i) to consistently record and project income and costs;
- (ii) manage common funds and operating and replacement reserves;
- (iii) implement simple mechanisms for collection, monitoring and handling of overdue payments;

(iv) operate with defined roles and basic internal controls; and
(v) comply with administrative requirements associated with public resources or external funders.

In projects where the economic benefit materializes as savings (e.g., RCSG), collection discipline becomes even more critical, because the scheme depends on users converting those savings into regular contributions to cover operating expenses and replacements. In schemes where income comes from sales (e.g., CDG), the community must be prepared to manage more complex contractual, accounting, and cash flow management obligations.

Technical assistance is also crucial for consolidating the economic governance of the system, understood as the set of rules that allows for the transformation of an energy asset into sustainable collective benefits. This involves establishing verifiable agreements on who makes decisions, who manages resources, how benefits are distributed, how common costs are covered, and how conflicts are managed. In practice, many failures of community projects are not explained by technology, but by ambiguities in responsibilities, discretion in the allocation of benefits, or the absence of formal mechanisms for social control. Maturity is strengthened when the community has a minimum governance structure (minutes, roles, decision-making mechanisms, transparency) and financial management tools that reduce discretion and increase trust among members and third parties. This is precisely the capacity-building role that Technical Assistance provides for the community, which, moreover, cannot be a one-off action, but must be sustained over time to ensure the community's proper appropriation of these capacities.

Finally, this lesson has a direct implication for the design of financial instruments under the TCF approach: technical assistance should not be treated as a marginal component, but as a structural layer of financing, especially in the early stages. Its role is to reduce transaction costs, improve information quality, decrease operational risk, and prepare the community to interact with the financial system and the energy sector. Consequently, scaling up Energy Communities requires progressive maturation pathways, in which climate finance combines investment resources with technical support and institutional strengthening, allowing a transition from schemes dependent on external support to sustainable, replicable, and eventually market-financeable structures.

II. Bankability and relationship with the financial system

The relationship between Energy Communities and the financial system is marked by a structural gap between the community-based logic of these schemes and the traditional financial evaluation criteria used for infrastructure projects. In practice, many Energy Communities operate as multi-stakeholder arrangements where energy is not an end, but a means to reduce costs, stabilize productive activities, and generate collective benefits. However, the financial system tends to evaluate them using parameters geared toward isolated assets, independent cash flows, and conventional business structures, favoring metrics such as internal rate of return (IRR) and traditional guarantees, which limits access to credit and increases transaction costs.

In this context, community projects face recurring barriers such as a lack of collateral, limited financial history, cash flow volatility due to seasonal production, and complex governance structures that hinder revenue discipline. Additionally, funders perceive greater risk in schemes where income is expressed as savings rather than direct sales, or where demand depends on local dynamics that are difficult to verify. This reinforces a cycle in which available financing is concentrated in concessional resources for capital expenditures (CAPEX), while gaps persist for operating expenses (OPEX), replacement costs, and risk mitigation, which are crucial for sustainability.

In response to these limitations, the bankability of Energy Communities requires financial approaches tailored to their nature, particularly in the early stages. The use of mixed financing schemes and flow-based architectures allows for risk reduction, replaces the traditional guarantee logic, and enables conditions for sustainable debt, while broadening the evaluation framework to incorporate indicators such as tariff stability, community LCOE, service continuity, and productive strengthening. In this sense, the relationship with the financial system should be understood as a progressive process, in which projects evolve from structures supported by concessionary capital toward more sophisticated schemes as they consolidate their governance, revenue stability, and institutional maturity.

III. Risk Management, Mitigation and Allocation in Community Projects

The sustainability of Energy Communities depends less on "reducing" risk and more on its management, allocation, and governance throughout the project life cycle. In community projects, risks are not concentrated solely in the technological component; they are distributed across productive, social, regulatory, and institutional dimensions that interact with each other. This implies that bankability is not built solely on sound technical design or guaranteed CAPEX, but rather on concrete mechanisms that allow for anticipating, absorbing, and managing operational deviations without compromising service continuity.

First, community-based projects present a cash flow risk that is particularly sensitive to the local context. When the economic benefit materializes as savings (for example, in RCSG), the central risk is not energy generation itself, but rather the ability to translate that benefit into a cash flow through collection, payment discipline, and clear rules for community contributions. The seasonality of productive activities, fluctuations in household or association income, and limitations in administrative capacity can generate temporary liquidity gaps even if the project is viable on an annual basis. In sales schemes (for example, CDG), the risk shifts toward the stability of the buyer and the contractual structure (PPA)[3], the ability to meet commercial conditions and price exposure when there is no stable offtaker. In both cases, financial risk is expressed as cash pressure in specific periods, rather than as structural unviability of the project.

Secondly, there is a regulatory and system integration risk that directly affects financial structuring. Connection procedures, measurement, approval times, surplus treatment, and profit distribution rules are elements that, when not fully consolidated or subject to uncertainty, increase transaction costs and affect the confidence of funders. This risk is particularly relevant in projects that depend on surpluses for their sustainability or that may face changes in context (for example, the arrival of the grid in a non-interconnected zone), introducing the risk of stranded assets and affecting the ability to project long-term revenues.

Third, community projects face operational risks associated with operation and maintenance (O&M) and replacement costs, which are often underestimated. Evidence shows that frequent failures are explained by a lack of maintenance provisions, a shortage of critical spare parts, dependence on external suppliers, and weak lifecycle management schemes. In dispersed rural areas, these risks are amplified by logistics, climate, and security conditions, raising the true cost of operating the system. Therefore, mitigating operational risk requires that projects integrate from the design stage: realistic OPEX budgets, mandatory reserves, service level agreements, performance indicators, and an explicit replacement plan.

[3]PPA - Power Purchase Agreement

Based on these conditions, a key lesson is that risk mitigation in Energy Communities requires flow-based management architectures and simple yet enforceable institutional mechanisms. Tools such as dedicated accounts, payment priority, reserve funds for O&M and replacement, and verifiable resource allocation rules reduce discretion and strengthen sustainability. Complementarily, instruments such as partial guarantees, insurance, catalytic capital, and performance-based payment schemes allow for the redistribution of risks to actors with greater absorption capacity, especially in early stages. Efficient risk allocation implies that the community does not assume risks it cannot manage (for example, regulatory changes or catastrophic events), and that the financial design recognizes the need for external support and mitigation to stabilize the project's life cycle.

Finally, risk management in community projects is inseparable from governance. Clarity regarding roles, responsibilities, social control mechanisms, and financial transparency is a mitigation component in itself: it reduces internal conflicts, strengthens payment discipline, and improves the trust of funders and partners. Consequently, the bankability of Energy Communities is not built solely on financial instruments, but rather on a comprehensive design where operational rules, economic governance, and mitigation mechanisms converge to ensure continuity of service and long-term sustainability.

IV. Integration between energy and economic activity as a condition of sustainability

One of the most relevant lessons from the modeling and analysis process is that the financial sustainability of Energy Communities is substantially strengthened when the energy component is linked to a productive activity.[4]In the scenarios evaluated, projects whose economic rationale depends exclusively on residential tariff savings exhibit limited financial margins, high sensitivity to revenue fluctuations, and a reduced capacity to absorb operating expenditure (OPEX) or replacement deviations. In contrast, when energy generation supports economic processes, the energy system becomes integrated into an economic dynamic that generates additional revenue and stabilizes collective cash flow.

This integration alters the nature of financial risk. Energy ceases to be merely a cost-cutting mechanism and becomes a strategic productivity input, capable of increasing revenue, reducing operating losses, and improving local competitiveness. In terms of modeling, Productive Activity allows for a broader cash flow generation base, the distribution of fixed energy system costs, and improvements in indicators such as EBITDA, operating margin, and debt service coverage. Furthermore, it strengthens payment discipline, as members perceive direct economic benefits linked to their core business, not just diffuse savings on their electricity bills.

From a climate finance perspective, this integration also increases the project's alignment with territorial development goals. Energy is not conceived as an isolated asset, but rather as an enabler of economic resilience, productive diversification, and local job creation. This reduces the likelihood of the energy system becoming an underutilized asset or an oversized infrastructure relative to actual demand. Conversely, by being anchored to productive processes, the project tends to consolidate a more predictable structural demand, less exposed to seasonal variations in domestic consumption.

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[4]Productive activity – the set of processes by which a person, organization, or community transforms inputs into goods or services that generate economic value. In the context of energy communities, this includes activities such as fishing, agriculture, agro-industry, local commerce, community tourism, or product processing, the performance of which influences energy demand and the generation of income associated with the project.

Additionally, the integration of energy and productive activity improves the bankability narrative with the financial system. A model that combines energy generation with productive income presents a more robust cash flow profile than one based solely on tariff savings. This robustness facilitates the structuring of mixed financing schemes and reduces exclusive dependence on initial subsidies. In contexts where there are anchor customers or demand agreements linked to productive activity, cash flow stability is further strengthened, enabling progressively more sophisticated financing structures.

Consequently, the strategic lesson is that the sustainability of Energy Communities should not be evaluated solely from the perspective of the energy asset itself, but rather from the integrated economic model that underpins it. Projects with the greatest potential for longevity and scalability are those where energy is aligned with a clear production dynamic, defined governance rules, and a financial structure that recognizes the complementarity between energy savings and the generation of local economic value.

The strategic lessons presented above summarize the main findings of the analysis, identifying structural patterns that affect the viability and scalability of Energy Communities. These lessons focus on highlighting the critical factors that influence their bankability, operational sustainability, and replicability in different territorial contexts. Based on these elements, the following section translates these findings into concrete recommendations aimed at specific stakeholders, with the goal of transforming the identified barriers into enabling conditions for mobilizing financing and the sustainable implementation of these schemes.

RECOMMENDATIONS

The following section presents recommendations aimed at transforming the identified barriers into enabling conditions for mobilizing financing for Energy Communities in Colombia. These recommendations are structured around five complementary areas: public policy, regulation, the financial system, territorial capacities, and international cooperation. They are aimed at key stakeholders such as policymakers, sectoral public entities, regulatory authorities, financial institutions, community organizations, and international cooperation actors. The goal is to incorporate lessons learned from previous assessments and evidence observed during structuring processes.

Rather than proposing isolated measures, this chapter outlines a roadmap for strengthening the bankability and operational sustainability of these schemes by reducing transaction costs, clarifying rules, allocating risks more efficiently, and consolidating local capacities. Taken together, the recommendations aim to enable replicable and scalable models capable of linking public and private investment with climate and territorial development objectives.

I. Strengthening the Public Policy Framework

Strengthening the public policy framework is a structural condition for consolidating Energy Communities as a scalable instrument for a Just Energy Transition and the mobilization of climate finance. While there has been significant progress in regulations and sectoral programs, evidence gathered in previous assessments reveals a gap between policy intentions and the actual conditions for structuring and implementation on the ground. Closing this gap requires moving from fragmented or pilot initiatives toward a programmatic vision with clear guidelines, coordinated instruments, and predictable operational pathways for the stakeholders involved.

In this context, it is crucial to consolidate a public policy that recognizes Energy Communities as territorial socio-economic schemes, and not only as energy infrastructure projects, in line with the territorial, productive and Just Energy Transition approach promoted by the National Development Plan and the prioritized interventions in PDET areas[5]. This entails integrating its development within agendas for rural development, local productivity, social inclusion, and climate resilience, ensuring coherence between energy and territorial development objectives. This integration is crucial, as modeled scenarios show that financial sustainability improves when energy is linked to productive uses that stabilize flows and strengthen payment discipline.

Furthermore, it is essential to adopt a differentiated implementation approach tailored to the context, particularly between the National Interconnected System (NIS) and Non-Interconnected Zones (NIZ). The differences in technical, logistical, and risk conditions are substantial, so a homogeneous framework could create inefficient incentives and compromise sustainability, especially in NIZ where operating and replacement costs are higher and there are risks associated with network deployment and potential stranded assets. Consequently, this approach must translate into clear prioritization criteria, technical design guidelines, and financing pathways adapted to each territorial reality.

Furthermore, a public financing policy that goes beyond the initial investment is needed. Evidence shows that many community projects face sustainability risks not due to a lack of capital expenditures (CAPEX), but rather the absence of stable mechanisms to cover operating expenses (OPEX), replacement costs, and administration over time. In this regard, public programs should incorporate lifecycle support components, such as replacement funds, operating reserves, and transitional support schemes that are gradually reduced as the project consolidates its revenue collection and operational performance.

In addition, it is necessary to institutionalize technical assistance as a mandatory and fundable component of public policy for energy communities. This support must go beyond technical aspects and include strengthening financial and governance capacities, such as resource management, traceability, revenue collection, social oversight, and contract management. Under this approach, technical assistance should be conceived as a phased development path that enables bankable projects and reduces transaction costs for both the State and the funders. These guidelines are a prerequisite for the participation of the financial system, as they reduce regulatory uncertainty and facilitate the structuring of appropriate financial instruments.

II. Regulatory and Normative Compliance

Regulatory and normative adaptation must be consolidated as a priority to reduce uncertainty, lower transaction costs, and enable investment decisions in Energy Communities. It is recommended to strengthen the operational clarity of the regulatory framework for modalities such as RCSG and CDG, through verifiable definitions regarding the allocation of benefits, the treatment of surplus energy, responsibilities among stakeholders, and marketing conditions. This adjustment will reduce legal ambiguities, improve revenue projections, and increase investment appetite for community projects.

Additionally, it is recommended to simplify and standardize the procedures associated with connection, metering, and paperwork with the network operator, incorporating defined timelines, clear requirements, and differentiated pathways for community projects. Implementing mechanisms such as one-stop shops, specific protocols, and

[5]PDETs (Development Programs with a Territorial Approach) – A public policy instrument created within the framework of the Final Peace Agreement in Colombia, aimed at promoting the comprehensive development of territories most affected by armed conflict, poverty, and institutional weakness. PDETs prioritize long-term interventions in 170 municipalities, through the coordination of investments in infrastructure, productive development, access to basic services, and community strengthening, with a participatory and territorial approach.

standardized formats will reduce structuring costs, shorten approval times, and improve cash flow predictability. This will facilitate community access to regulatory processes and lower barriers for funders and project developers.

Furthermore, a differentiated regulatory approach tailored to each territory is recommended, particularly for non-interconnected zones (NIZ) and dispersed rural areas, recognizing their specific technical, logistical, and risk conditions. This entails developing specific guidelines that address grid access, continuity of operation and maintenance, and remuneration schemes compatible with the actual costs in these territories. This approach will mitigate the risk of stranded assets and strengthen the financial viability of projects in areas of greater energy vulnerability.

Finally, it is recommended to strengthen regulatory coherence between energy regulations and the requirements associated with public resource management and climate finance. This includes establishing clear rules on traceability, flow management, and the allocation of responsibilities in schemes involving subsidies, guarantees, or performance-based instruments. Regulatory clarity is a critical input for risk assessment by financial institutions and cooperation actors, directly impacting the bankability of projects.

III. Transformation of the Financial System Approach

Mobilizing financing for Energy Communities requires transforming the approach of the financial system, given that the structural characteristics of these projects do not fully align with traditional infrastructure evaluation and structuring criteria. Consolidated evidence indicates that the main limitation is not the lack of capital interested in the energy transition, but rather the misalignment between the community-based and integrated logic of these schemes—where benefits are expressed as savings, resilience, and increased productivity—and conventional bankability frameworks based on collateral, isolated cash flows, and maximizing financial returns. Closing this gap involves adapting risk mitigation instruments, metrics, and structures to the realities of small- and medium-scale community projects.

In this regard, it is crucial to promote blended finance structures as the standard approach for early-stage Energy Communities. These types of projects require combining catalytic capital (donations, grants, or first losses), concessional debt, and, where applicable, community contributions, in order to reduce the average cost of capital, absorb initial risks, and enable sustainable levels of leverage. Since cash flows are typically gradual and sensitive to operational variations, commercial debt without mitigation mechanisms tends to be incompatible with the cash profile of these schemes.

At the same time, it is necessary to systematically incorporate risk mitigation and redistribution instruments, shifting the emphasis from collateral alone to flow- and performance-based mechanisms. This includes partial guarantees, operating reserves, dedicated accounts, payment priority, insurance, and pay-for-results schemes. Together, these tools prevent the risk from falling disproportionately on the community and strengthen funders' confidence by establishing verifiable rules for managing and protecting the flow of funds.

On the other hand, the financial evaluation framework applicable to Energy Communities needs to be broadened to incorporate indicators that reflect their logic and purpose. Although metrics such as IRR or NPV remain useful in certain contexts, in these projects the objective is usually to ensure affordability, continuity, and sustainability rather than maximizing financial returns. Consequently, it is recommended to complement traditional indicators with metrics such as effective tariff reduction, community, energy cost stability, service continuity, flow resilience, and effects on local productivity.

Additionally, it is pertinent to promote a progressive structuring approach, in which the relationship with the financial system evolves according to the project's maturity. Not all Energy Communities are in a position to adopt project finance or SPV schemes from the initial stages; however, in larger-scale projects with stable demand or an offtaker, incorporating more conventional structures may be viable. Under this approach, the path involves first consolidating governance and operational sustainability, and subsequently enabling more sophisticated schemes when cash flows, institutional frameworks, and the regulatory environment allow.

Private equity participation is structured using a phased approach, contingent upon risk reduction and the consolidation of the project's operational and financial stability. In early stages, public and concessional financing absorbs initial risks through instruments such as catalytic capital, grants, or partial guarantees, allowing for the stabilization of cash flows and strengthening the scheme's governance. As the project reaches minimum performance thresholds, such as revenue stability, compliance with financial indicators (e.g., DSCR), and cash flow traceability, private equity is enabled through instruments such as secured debt, portfolio financing, or, in more mature stages, refinancing or equity participation schemes.

Transforming the financial system's approach requires recognizing the hybrid nature of Energy Communities, where energy, production, and governance dimensions converge. Based on this understanding, it becomes necessary to design instruments that efficiently allocate risks, reduce transaction costs, and adequately value the benefits generated. This adjustment is essential to mobilize climate finance at scale and consolidate Energy Communities as a sustainable and replicable mechanism for a Just Energy Transition in Colombia.

IV. Development of Territorial Capacities

Developing local capacities is a prerequisite for the operational and financial sustainability of Energy Communities and one of the most crucial factors for their scalability. Evidence gathered in previous assessments shows that, even when investment resources are available, projects face significant risks when communities and local stakeholders lack the minimum capacity to manage the system, sustain operations, and ensure resource traceability. In this context, the gap is not only technological but primarily institutional and socio-economic, requiring the consolidation of technical assistance as a structural component of the model, with progressive development pathways and ongoing support.

Under this logic, it is essential to institutionalize technical assistance programs prior to financial close, aimed at strengthening financial, accounting, and governance capacities before investment is implemented. This involves training and support in budgeting, recording and controlling income and expenses, managing accounts and common funds, collection mechanisms and handling of delinquency, as well as complying with requirements related to public resources or funding sources. Experience demonstrates that collection discipline and financial traceability are crucial for covering operating expenses, ensuring replacement costs, and maintaining service continuity.

In parallel, it is necessary to develop local technical capabilities related to operation and maintenance, using models that combine community training, service contracts, and tiered technical support schemes. In dispersed rural areas and non-international zones (NIZ), O&M costs and response times are critical for sustainability, making it essential to ensure the availability of spare parts, preventive maintenance protocols, performance indicators, and service level agreements. While local training does not replace the need for specialized support, it does reduce total dependence on external providers and strengthens operational resilience.

Likewise, it is crucial to strengthen community management and economic governance capacities, understood as the ability to define clear and verifiable rules for the allocation of benefits, decision-making, social control, and conflict resolution. The sustainability of these projects depends largely on internal agreements that reduce discretion and strengthen trust among members and third parties. In this regard, it is essential to establish clarity regarding roles, transparency mechanisms, and rules for the distribution of benefits and the coverage of common costs.

In turn, it is advisable to strengthen local capacities that allow Energy Communities to be integrated with local development strategies and productive uses of energy. Evidence indicates that projects with associated productive activity exhibit greater demand stability and a more robust energy flow. Therefore, capacity-building programs should include the identification of key customers, value chains, and productive opportunities where energy acts as an economic enabler.

Overall, the development of territorial capacities should be conceived as a progressive maturation process that accompanies the entire project cycle, from pre-investment to implementation and operation. Without this component, Energy Communities tend to depend on ongoing external support and face a greater likelihood of operational failures that undermine their credibility. Strengthening territorial capacities is a prerequisite for the effective implementation of financial instruments, as it improves the traceability of flows and reduces the operational risk perceived by funders.

V. Coordination with International Cooperation and Climate Finance

Collaboration with international cooperation and climate finance presents a strategic opportunity to accelerate the deployment of Energy Communities in Colombia, particularly in areas with the greatest access gaps, high climate vulnerability, and limited access to traditional financing. However, for this collaboration to be effective and scalable, climate resources must be designed as catalysts for sustainability, not as permanent substitutes for project cash flow. The evidence analyzed indicates that cooperation can play a decisive role in the early stages, absorbing initial risks, funding technical assistance, and enabling financial structures compatible with community projects.

In this context, it is crucial to direct cooperation resources toward closing structural gaps that limit bankability, prioritizing components that are often underfunded. These include technical assistance, strengthening governance, financial structuring, designing revenue collection mechanisms, and establishing operating reserves and replenishment funds. Incorporating these elements as an explicit part of climate investment contributes to improving long-term sustainability and reduces the risk of operational deterioration.

In turn, it is recommended that climate instruments be structured under blended finance schemes, in which development cooperation provides catalytic capital, such as first losses, guarantees, or conditional grants, that reduce risk for repayable funders and facilitate the mobilization of concessional debt or private investment. This approach is particularly relevant for small- and medium-scale community projects, where transaction costs are high and financial margins are limited. In this sense, the role of climate capital should focus on improving the risk profile and enabling additional financing, without replacing the project's internal financial sustainability.

In addition, it is important to strengthen the use of performance-based payment (PBR) mechanisms and other incentives conditioned on verifiable performance. These instruments allow for aligning resource disbursements with results in critical variables such as service continuity, collection discipline, emissions reduction, operational efficiency, and financial sustainability. Furthermore, resources derived from PBR can be strategically allocated to early debt amortization, strengthening reserves, or expanding the system, progressively improving the project's credit profile.

On the other hand, it is important to promote the development of replicable portfolios and programs, rather than funding isolated projects that lack scalability. International cooperation can play a key role in standardizing models, documenting best practices, developing contractual templates, and creating knowledge and monitoring platforms. This approach helps reduce structuring costs, improve comparability between projects, and attract climate finance on a larger scale.

Finally, it is essential to align climate cooperation and finance with national priorities for a just energy transition, rural development, and reducing energy inequalities. This alignment requires institutional mechanisms that channel resources, coordinate roles, and ensure traceability and monitoring among public entities, cooperation agencies, and funders. Cooperation resources can play a catalytic role by complementing the financial structures designed by the financial system, facilitating the mobilization of repayable capital.

Board1- Summary of recommendations

Strategic axis	Key recommendation	Specific actions
Public policy	Consolidate a programmatic and territorial approach to Energy Communities	• Integrate CE into rural development, productivity, and inclusion agendas (PDET) • Differentiate strategies between NIS and NIZ • Incorporate life-cycle financing (CAPEX, OPEX, replacement) • Institutionalize technical assistance as a fundable component
Regulation and norms	Reduce uncertainty through clear, simple rules adapted to the territory	• Clarify definitions for RCSG and CDG (benefits, surpluses, roles) • Standardize connection, measurement, and permitting processes • Implement one-stop shops and specific protocols • Develop differentiated regulations for NIZ and rural areas
Financial system	Adapting financing to community and small-scale logic	• Promote blended finance (catalytic equity + concessional debt) • Incorporate cash flow-based risk mitigation (not just collateral) • Expand metrics: LCOE, affordability, resilience, productivity • Implement progressive structuring according to project maturity
Territorial capacities	Strengthening capabilities as a basis for operational and financial sustainability	• Technical assistance before and throughout the project cycle • Strengthening financial, accounting,

		and governance capacities • Developing local O&M capacities (with phased support) • Linking energy to productive activities and local development
Climate cooperation and finance	Using climate resources as catalysts for sustainability and scaling up	• Prioritize closing structural gaps (not just CAPEX) • Structure blended instruments with catalytic capital • Implement pay-for-results (PBR) schemes • Promote replicable portfolios and alignment with national priorities

CONCLUSIONS

Energy Communities represent a strategic opportunity to advance the Just Energy Transition in Colombia, by linking climate objectives with territorial development, social inclusion and productive strengthening. Its potential is not limited to the adoption of renewable technologies, but also to the possibility of democratizing energy and turning it into an enabler of economic resilience in rural and semi-urban territories with historical gaps in access, quality and affordability of the service.

However, mobilizing financing for these schemes faces structural barriers that go beyond resource availability. Regulatory and procedural challenges persist, increasing uncertainty and transaction costs; financial system constraints are associated with traditional bankability criteria and a lack of adapted instruments; institutional and governance limitations affect operational sustainability; and technical and territorial gaps raise operating and replacement costs, especially in dispersed rural areas and non-international zones. These barriers explain why many projects focus on capital expenditures (CAPEX), while critical lifecycle components such as operating expenses (OPEX), replacement, and scheme management are neglected.

The analysis shows that the sustainability and scalability of Energy Communities depend on specific enabling conditions. These include: prior and ongoing technical assistance as a requirement for organizational maturity; the development of flow-based financial architectures (dedicated accounts, payment priority, and reserves) as a substitute for traditional guarantees; the integration of energy and productive activity to stabilize demand and strengthen repayment capacity; and inter-institutional coordination and multi-level governance as a mechanism to reduce transaction costs and enable replicable implementation pathways. Together, these elements allow for a transition from isolated pilot projects to sustainable schemes with greater potential to attract repayable financing and consolidate scalable portfolios.

Within the framework of the TCF approach, it is concluded that climate finance can play a decisive catalytic role if it is geared towards closing structural gaps and not just financing initial investment. The combination of catalytic equity, concessional debt, risk mitigation instruments, and results-based payment mechanisms allows for a reduction in perceived risk, an improvement in the project's financial profile, and the alignment of resources with verifiable performance. This approach is particularly relevant for small- and medium-scale community projects, where margins are narrow and transaction costs are proportionally high.

Finally, this deliverable concludes that consolidating Energy Communities as a scalable instrument for energy transition and climate finance in Colombia requires a coordinated agenda encompassing public policy, regulation, the financial system, territorial strengthening, and international cooperation. Transforming the ecosystem depends on recognizing the hybrid nature of these schemes—energy, production, and organizational—and on designing instruments and processes that allow for the progressive development of bankability, ensuring operational sustainability throughout the life cycle and conditions for replicability at the national level.

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