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# A Community Guide to Regulatory Barriers Affecting Microgrids

## Report No. 2: Single Property Microgrids

**Jason Ball and Peter A. Cappers**

Updated April 2026

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Prepared for the
Office of Strategic Programs in the Office of Critical Minerals and Energy Innovation
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Principal Authors
Jason Ball
Peter A. Cappers

Lawrence Berkeley National Laboratory
1 Cyclotron Road, MS 90R4000
Berkeley CA 94720-8136

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# Acronyms and Abbreviations

| | |
|---|---|
| ADN | Advanced Distribution Network |
| AHJ | Authority Having Jurisdiction |
| BESS | Battery Energy Storage System |
| BLR | Blue Lake Rancheria |
| BTM | Behind-the-meter |
| CAISO | California Independent System Operator |
| CHP | Combined heat and power |
| DER | Distributed Energy Resource |
| DOE | U.S. Department of Energy |
| FERC | Federal Energy Regulatory Commission |
| FS | Feasibility Study |
| ICE | LBNL’s Interruption Cost Estimate Calculator |
| IEEE | Institute of Electrical and Electronics Engineers |
| ISO | Independent System Operator |
| NJ BPU | New Jersey Board of Public Utilities |
| NYSEG | New York State Electric and Gas |
| PCC | Point of Common Coupling |
| PG&E | Pacific Gas and Electric |
| PPA | Purchase Power Agreement |
| PUC | Public Utility Commission |
| PURPA | Public Utility Regulatory Policies Act of 1978 |
| PV | Solar Photovoltaic |
| QF | Qualifying Facility |
| ROW | Right-of-way |
| RTO | Regional Transmission Organizations |
| UL | Underwriters Laboratories |
| VPP | Virtual Power Plant |

# Executive Summary

In response to growing risks of power outages from extreme weather and aging infrastructure, communities are increasingly exploring the potential for microgrids to enhance the reliability of access to energy. Microgrids, a type of localized energy system capable of operating independently from the main power grid, offer promising solutions to meet this challenge but face a complex landscape of non-technical barriers, particularly regulations concerning the provision and distribution of energy. Most existing legal and regulatory frameworks were designed for a centralized, one-way power system, and are often poorly suited to handle systems that independently balance distributed energy resources with local load, like microgrids.

This report is part of a series that provides a strategic analysis of existing regulatory and legal factors affecting microgrid deployments to help community leaders and decision-makers better understand the feasibility of a microgrid in their community. This report, the second in the series, discusses the single-property microgrid model. The single-property microgrid is confined to a single location and single customer, such as one serving a hospital, a municipal complex, or an industrial facility, thus reducing but not eliminating the regulatory challenges it faces. This report focuses on three key characteristics of the single property microgrid:

1) Direct asset ownership and management.
2) No property boundaries are crossed by the microgrid's infrastructure.
3) Operating as a Private, Self-Service Energy System, NOT as a Public Utility.

The primary implication of this analysis is that a successful microgrid strategy requires a comprehensive approach that integrates technical planning with the navigation of financial and regulatory complexities. This includes engaging the local utility as a key stakeholder. This report also provides a list of strategies to address existing regulatory challenges across the different phases of a microgrid project.

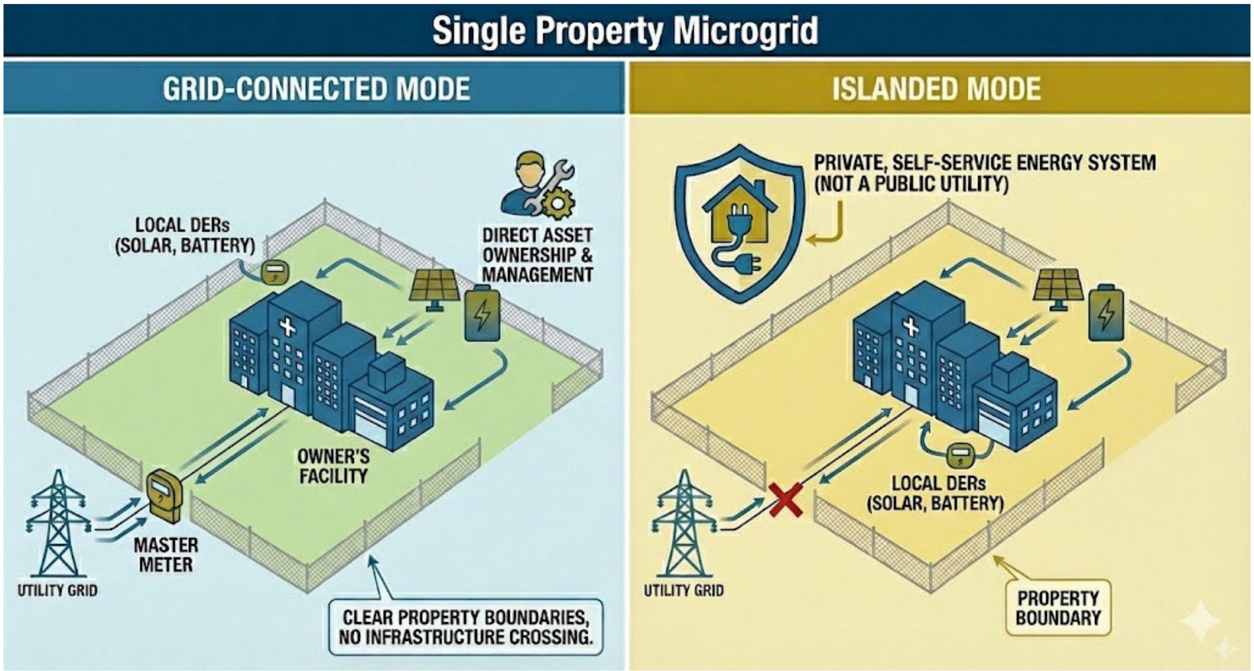
The analysis in this report is intended to equip non-technical community leaders and decision-makers with a foundational framework to evaluate the feasibility of a single-property microgrid as a component of a comprehensive energy security strategy. Community leaders can use the considerations and phased framework in this report to identify key drivers that may determine the ownership or financing models which make a microgrid viable, understand the legal and regulatory risks they face, and overcome some of the real-world barriers that challenge many single-property microgrid deployments.

# 1. Key Regulatory Considerations for Community Leaders and Decision-Makers

This report provides a detailed examination of the single property microgrid model, focusing on tangible regulatory and financial considerations for community leaders and decision-makers. The single-property microgrid model offers a relatively direct path to implementation that can bypass direct oversight by key authorities having jurisdiction (AHJs).[1] This is because the single-property microgrid is a self-contained physical and operational structure defined by three important characteristics as illustrated in the graphic below:

1) Uses direct asset ownership and management.
2) No property boundaries are crossed by the microgrid's infrastructure.
3) Operates as a Private, Self-Service Energy System, NOT as a Public Utility.

*Figure 1 – Illustration of Single Property Microgrid Characteristics*[2]



Identifying how, and if, these characteristics apply to the microgrid project that community leaders and decision-makers have in mind will help (and potentially dictate) how to navigate key future decisions, including the ownership and the financial structure of the project.

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[1] AHJs include federal and regional bodies, state Public Utility Commissions (PUCs), and local governments. For a more detailed description of each AHJ and its relevant authority see section 2.1 of the first report in this series, Foundational Issues Facing Microgrids

[2] Image generated by Nanao Banna Pro, Google, February 17, 2026.

## 1.1 Use Direct Energy Asset Ownership and Management

Who owns and operates the single property microgrid can directly impact the level of oversight by AHJs. For single property microgrid projects which rely on third-party financing, the central question is not simply who owns the generation assets, but rather what is being sold: the physical equipment itself, a lease for the equipment, or the electricity produced by that equipment (via a Purchase Power Agreement or PPA). This distinction can determine whether the microgrid is classified as a public utility or in some cases, whether the project is outright prohibited.

This challenge is particularly relevant in jurisdictions with laws designed to protect public utility service territories, such as the state of Oklahoma. For example, under the Oklahoma framework, if a third party owns and operates a microgrid and sells the power to a host customer through a PPA, that third party is deemed to be "furnishing retail electric service" (Oklahoma Attorney General, *Opinion No. 2018-5* 2018). This classifies them as a retail electric supplier, making it illegal for them to operate within the certified unincorporated territory of an established utility. This means a standard PPA model is generally impossible in these areas.

However, structuring the same project as a “true lease agreement” may circumvent this issue depending on the specific terms of the lease; for example, if the third party retains asset ownership but transfers the right of possessions and use of the equipment to the customer with limited provisions on the nature of their use (Oklahoma Attorney General, *Opinion No. 2018-5* 2018).[3] Legally, the customer is using the leased equipment to produce their own power, and the third-party owner is not considered to be selling electricity, thereby avoiding classification as a retail electric supplier in Oklahoma.

In this situation, the specific characteristics and terms of the ownership and management agreements will likely be a determining factor in whether the microgrid is subject to direct oversight by an AHJ or whether the project is outright prohibited. Community leaders and decision-makers may want to consider at the inception step of a project how such terms can impact the viability and risk of the various ownership models they are willing to use.

## 1.2 Establish Clear Property Boundaries and Ensure the Microgrids Infrastructure Does Not Cross Them

A fundamental characteristic of a single-property microgrid is that its entire infrastructure is contained within the defined boundaries of a single, contiguous parcel of land. This physical containment is arguably the most critical factor in simplifying a project's regulatory journey. By not crossing public rights-of-way (ROWs), the microgrid avoids a direct conflict with the local public utility's exclusive franchise rights to deliver power.

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[3] The importance of specific terms cannot be understated here. The specific terms of the contract are crucial in determining whether an agreement is a genuine lease or a disguised PPA. Contracts should clearly define the allocation of residual managerial authority and the possessory interest, including the scope and duration of the entitlement, which directly affects the feasibility and legality of the deployment.

Projects that require crossing a public street can face administrative hurdles, including applying for municipal consent to use the ROW. Some states, like California, may even require a project owner to transfer ownership of any energy infrastructure built across property lines to the regulated utility, which can trigger transfer fees and other charges (Aczel and Peffer 2023; Clean Coalition 2021; Flores-Espino, Giraldez Miner, and Pratt 2020).

However, what exactly constitutes a property boundary is not always clear, though some AHJs have attempted to provide guidance. For example, in New Jersey geographically contiguous properties are considered a single property for the purposes of a microgrid even if they have one ROW between (New Jersey Board of Public Utilities 2016). However, if the microgrid property is intersected by two roads and thus split diagonally, do the intersecting streets count as one right-of-way or two? The NJ AHJ in 2021 found that "the intersection created is fundamentally one single thoroughfare” thus allowing microgrids to cross intersections and still be considered a single property (*In the Matter of the Petition for DCO Energy, LLC for a Declaratory Ruling* 2021). Other jurisdictions likely face a similar issue but may not have the case law or existing interpretations to rely upon that allow projects in those locations to use such a simplification.

## 1.3 Operate as a Private, Self-Service Energy System, NOT as a Public Utility

There is no single, widely adopted definition of what constitutes a public utility. Instead, the relevant AHJ in every jurisdiction establishes the explicit characteristics of a public utility and thus determines whether a microgrid qualifies as one (DuVivier 2023; Stanton 2012; Bronin 2010). One characteristic that is present in almost every jurisdiction is that public utilities exclusively provide electricity to the public in exchange for regulated rates that provide appropriate compensation for the opportunity to recover costs.[4]

Unlike a public utility, a single property microgrid is a self-contained energy system without public access. Its primary function is to generate and distribute electricity exclusively for its own on-site needs, operating its power generation systems independently from the broader grid (i.e., without selling or exporting power to the public). This operational model generally exempts the single property microgrid from being considered a conventional public utility as defined in law (In the Matter of the Investigation into the Regulatory Framework of Microgrids in the District of Columbia 2022; *PW Ventures, Inc. v. Katie Nichols, Chairman of Florida Public Service Commission and Florida Public Service Commission* 1988).

The variety of definitions for what constitutes a public utility means that exemptions from utility regulation are assessed differently based on the jurisdiction. Some jurisdictions rely on

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[4] Some states operate under a deregulated model which enables some market-based prices for generation (i.e., the energy) but the delivery of that energy remains regulated with the prices set by tariff instead of a market. Depending on the jurisdiction, the level and type of regulation covering a microgrid may be differentiated by the asset type, further complicating the overall implementation process (New Jersey Board of Public Utilities 2018; Michalski 2019).

imprecise statutory criteria rather than clear-cut rules. In New York State, for example, the non-utility pathway often hinges on whether the microgrid qualifies as a qualified facility (QF) based on its generation type (e.g., cogeneration) and proximity (i.e., whether the generation is located “at or near the project site”) (New York State Energy Research and Development Authority (NYSERDA), New York State Department of Public Service, and New York State Division of Homeland Security and Emergency Services 2014).

A practical solution in situations like this is to seek a declaratory order from the relevant AHJ (usually a state PUC or local government) that determines whether the specific project qualifies as a public utility. While the definition of a public utility is a matter of statute, the application of that statute to novel microgrid configurations is often ambiguous; thus, a ruling provides necessary legal certainty (Jones et al. 2014). However, this strategy may require a significant amount of upfront investment to define project details before approval is guaranteed.

For example, the New York Public Service Commission (NYPSC), despite ruling on several cases about the classification of microgrids as public utilities, has explicitly refrained from establishing "firm guidelines that can be followed to ensure a microgrid project will be exempt” (New York State Energy Research and Development Authority (NYSERDA), New York State Department of Public Service, and New York State Division of Homeland Security and Emergency Services 2014). Instead, the Commission employs a fact-intensive process to tailor regulatory oversight to the specific attributes of the microgrid model, intending to reduce the regulatory burden faced by individual projects. Yet the NYPSC’s reliance on subjective interpretations of proximity and generation types—rather than unambiguous criteria such as a single property line or meter—means that the regulatory status of individual single-property microgrids remains uncertain. This makes it challenging for community leaders and decision-makers to predict the level of scrutiny a microgrid project will face without conducting feasibility studies beforehand.

## 1.4 Working with AHJs to Advance a Microgrid Project

As the three previous sections discuss, most AHJs provide guidance that is applicable to only a specific microgrid project. This challenge is particularly acute for single-property microgrids, which are typically treated as novel and unique systems by AHJs because they have rarely adopted unique rules or procedures specific to microgrids (Zinaman et al. 2022; Flores-Espino, Giraldez Miner, and Pratt 2020; Vanadzina et al. 2019).

However, the interconnecting utility often functions as a primary and critical stakeholder whose approval is non-negotiable. Its technical and interconnection requirements represent a major project hurdle. To navigate this landscape, a proactive, education-oriented strategy is essential:

- **Integrate Local Regulatory Evaluation Early:** Community leaders and decision-makers can evaluate local permitting requirements, zoning ordinances, building codes, and land use constraints during the initial feasibility phase. This ensures that fundamental infrastructure choices, such as battery chemistry, generator siting, or fuel storage, are aligned with local limitations, preventing costly redesigns or fatal barriers.

- **Establish Collaborative Relationships:** Community leaders and decision-makers should engage with local officials and the interconnecting utility well in advance of formal applications. For many local AHJs, a single-property microgrid with islanding capability is far more complex than approving a simple backup generator (New York State Energy Research and Development Authority (NYSERDA), New York State Department of Public Service, and New York State Division of Homeland Security and Emergency Services 2014; Twitchell, Powell, and Paiss 2023). Early engagement allows the project team to educate stakeholders on the project's technology and energy security benefits, framing the review process as a collaboration rather than a simple permit application.
- **Submit Comprehensive Preliminary Documentation:** To facilitate educational and technical discussions, community leaders and decision-makers should consider providing the utility and relevant AHJs with preliminary documentation as soon as possible. Key elements of this package will include a preliminary site plan (detailing the location of all assets for review by planning and fire officials), a one-line diagram (illustrating the electrical design and point of interconnection for the utility), a brief controls narrative (explaining *how* the microgrid will operate, island, and reconnect), and the preliminary ownership or operational structure (after consideration of the constraints laid out in the previous three sections, unique to the local AHJ) (Portilla et al. 2024; *In the Matter of the Town Center DER Microgrid Incentive Program Authorization of Incentive Funding to the Borough of Highland Park for Phase I Feasibility Study* 2017; Ropp et al. 2020).

This early, detailed, and collaborative engagement is critical for making an informed assessment of the project's initial feasibility and its ability to ultimately meet community leaders and decision-makers' established goals.

# 2. Case Study: The Blue Lake Rancheria Microgrid

The Blue Lake Rancheria (BLR) microgrid, a tribal-owned system in Humboldt County, California, provides a practical case study in navigating the specific regulatory and financial barriers discussed in this report that relate to a single-property microgrid.[5] The BLR microgrid was a complex collaboration between the tribal leadership (as the asset owner and site host), the Schatz Energy Research Center (as prime contractor and technology integrator), Pacific Gas and Electric (PG&E) (the interconnecting utility), and key technology vendors including Siemens (microgrid controller) and Tesla (battery system). Despite this complexity, the project successfully addressed the utility interconnection process, utility rate structures, and economic dispatch, offering a replicable model for other community-scale projects.

## 2.1 Overview of the BLR Microgrid

The decision to develop the BLR microgrid as a private, self-service system was a response to severe, location-specific risks, elevating the project's goal from economics to public safety. The project's rationale was driven by three main factors:

- **Geographic and Grid Vulnerability:** Humboldt County is a geographically isolated region served by limited transmission infrastructure. This makes it highly susceptible to frequent and long-duration power outages, which have historically lasted from days to weeks.
- **Specific Hazard Profile:** The region's power supply is threatened by multiple, concurrent risks. These include tsunamis (which could disable coastal power plants) and annual landslides, which frequently close main road access to the area. A diesel-only backup system is insufficient, as fuel deliveries could be cut off for extended periods.
- **Critical Lifeline Function:** The Tribe explicitly developed its strategy around strengthening five key "lifeline sectors" (i.e., energy, water, food, transportation, and communications/information technology) and identified energy as the first priority because it supports and enables all the other sectors during emergencies.

The overall hazard profile, an unreliable grid and an unreliable fuel supply chain, made a private microgrid that combined various technologies, as shown in the table below, the optimal solution.

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[5] Unless otherwise noted, the data and analysis in this section are drawn from Carter, David, Doug Saucedo, Jim Zoellick, Charles Chamberlin, Marc Marshall, Steve Shoemaker, Greg Chapman, Jana Ganion, Peter Lehman, and Pramod Singh. 2019. *Demonstrating a Secure, Reliable, Low-Carbon Community Microgrid at the Blue Lake Rancheria.* CEC-500-2019-011. Sacramento: California Energy Commission.

*Table 1 - Overview of Blue Lake Rancheria Microgrid Components*

| Component | Specification | Purpose |
|---|---|---|
| **Solar Photovoltaic (PV) Array** | 420 kW | Provides clean, renewable electricity to serve campus loads and charge the battery system, reducing grid energy purchases and operational costs. |
| **Battery Energy Storage System (BESS)** | 950 kWh / 500 kW | Provides frequency and voltage support for seamless islanding and serves as the primary tool for economic optimization, enabling energy arbitrage and peak demand shaving. |
| **Existing Diesel Generators** | Existing backup units | Serve as a deep emergency backup power source, ensuring long-duration resilience during extended grid outages when solar and battery resources are depleted. |

This case study dissects the key strategies that underpinned the BLR microgrid's success by examining how the project navigated complex challenges, from interconnection to optimizing financial viability through peak demand shaving and primary-voltage tariff restructuring with PG&E.

## 2.2 Direct Ownership and Clear Boundaries

A foundational decision for the project was its ownership structure and physical layout, designed to avoid classification as a public utility. A key lesson from this project is that the single property boundary was a strategic creation rather than a pre-existing condition.

The tribe formally purchased the end of PG&E's distribution circuit. This maneuver, combined with the service rearrangement, physically consolidated the BLR microgrid’s connection to the grid to a single point. All electrical distribution after that point was legally on the tribe's private property.

By taking this step, the project was structured as a "single end-user [microgrid] with multiple facilities on one parcel of real estate owned by that end-user... with no intervening public streets" (Bronin 2010). This legal and physical containment was the project's primary method for avoiding regulatory complications. It ensured the project did not need to distribute or sell power across public ROWs, thereby avoiding infringement on the local public utility's exclusive franchise rights and bypassing the legal triggers for public utility classification.

## 2.3 Overcoming the Interconnection Hurdle

Navigating the utility interconnection process is a critical early gateway. The BLR project utilized a successful, multi-part strategy for managing this barrier. The process involved three parallel components:

1) **Service Rearrangement:** The project consolidated three separate secondary-voltage

service accounts (the typical "retail" service) into a single, new primary-voltage (12.5 kV) service. This was a foundational decision for two reasons.

   a. This consolidation was necessary to create the "single end-user" model required to avoid public utility classification
   b. Consolidating the service created one clear Point of Common Coupling (PCC), making it technically feasible to control and island the entire campus as a unified system.

2) **Purchase and Sale Agreement:** To create a clear boundary, the BLR tribe purchased the end of PG&E's 12.5 kilovolt (kV) distribution circuit, which required approval from the relevant AHJ, the CPUC.
3) **Interconnection Agreement:** The project team presented PG&E with pre-vetted protection schemes and engaged in persistent, detailed coordination with the utility's engineering and legal teams. This entire process culminated in a formal Interconnection Agreement, which required rigorous pre-energization testing and a pre-parallel inspection to validate the microgrid's protection settings and seamless transition capabilities before PG&E granted final permission to operate.

## 2.4 Opportunities to Improve Financial Viability

A microgrid's financial success often depends on strategically navigating utility rate structures. The BLR project's most pivotal financial decision was directly tied to the interconnection strategy: migrating from three expensive secondary-voltage retail tariffs to a single, lower-cost primary-voltage tariff.

This regulatory and engineering decision made the tribe a primary-voltage customer, which more closely reflects wholesale electricity prices. This single change was responsible for approximately 39% of the microgrid's total annual energy cost savings. The project realized total annual savings between $160,000 and $200,000, demonstrating that a deep understanding of utility tariffs and wholesale markets is a key component of a successful microgrid business model.

While a microgrid's primary purpose is providing resilience, its economic viability can also be enhanced by its ability to generate utility bill savings during "blue sky" (normal) conditions.[6] The

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[6] It is worth noting that microgrid projects can further improve their financial viability by generating revenues through participation in organized wholesale markets. Although the BLR microgrid did not take advantage of this opportunity, a similar microgrid project also located in Humboldt County has done so. When the Redwood Coast Airport Microgrid is grid-connected, it can place bids to supply energy to CAISO. However, when a grid outage occurs, its primary duty is to island and serve its own critical load, meaning it can no longer fulfill those market bids. This non-performance would normally trigger significant financial penalties. The project leveraged a pragmatic procedural mechanism to solve this; during an islanding event, the microgrid's scheduling coordinator submits an "outage card" to CAISO. This notification formally tells the grid operator that the resource is unavailable due to an outage. This action provides two benefits: first, it shields the operator from non-performance penalties. Second, this pragmatic rule unlocks a potential revenue stream by allowing the power it generates internally (to serve its own load) to be financially settled in the energy imbalance market at the real-time price. This allows the

BLR project achieved this by implementing an economic dispatch model. Specifically, the software supporting the microgrid uses an optimization module that automatically dispatches the battery and local generation assets to minimize the bill from PG&E via peak demand shaving and through energy arbitrage (storing low-cost grid power for use during high-cost peak periods).

## 2.5 Key Takeaways

The Blue Lake Rancheria microgrid illustrates a deployment strategy centered on aligning asset ownership and operational boundaries with existing regulatory frameworks. The project achieved viability by structuring the technical and legal scope of the system to fit within the current utility definitions. The following mechanisms were central to this approach:

- **Alignment of Physical and Legal Boundaries:** The project avoided public utility classification by consolidating service points and purchasing utility distribution assets. This effectively created a "single end-user" status, ensuring the microgrid did not distribute power across public rights-of-way or infringe on the local utility's franchise rights.
- **Utilization of Bilateral Agreements:** To address technical complexities of islanding the project executed a formal Interconnection Agreement. This bilateral contract codified operational rights and protection schemes, mitigating interconnection disputes through rigorous technical standards.
- **Integrate Rate Strategy with Engineering:** Financial viability was significantly enhanced by the engineering decision to interconnect at primary voltage (12.5 kV). This transition from secondary-voltage retail tariffs reduced operating costs by approximately 40%, demonstrating that electrical interconnection design is a critical variable in financial modeling.
- **Operational Mechanisms to Improve Financial Viability:** The project demonstrated that resilience assets can create utility bill savings during nominal grid operations by shaving peak and engaging in energy arbitrage.

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microgrid to prioritize its resilience function without incurring financial punishment from the market operator (Portilla et al. 2024).

# 3. A Phased Framework for Project Development and Engagement

Microgrid development is a complex, multi-year process that requires systematic planning, stakeholder collaboration, and disciplined financial management to mitigate regulatory, technical, and commercial risks. A phased approach ensures that key decisions regarding feasibility, regulatory compliance, and financial viability are addressed sequentially, minimizing uncertainty. The framework below is tailored for a single-property microgrid, which typically faces minimal PUC-level hurdles (like resale and public right-of-way crossings) and focuses instead on utility interconnection, local permitting, and financial structuring.[7]

## 3.1 Phase 1: Foundational Planning & Risk Assessment

This initial phase focuses on establishing a clear project definition, determining technical and economic viability, and identifying all potential regulatory and financial obstacles before significant capital commitment.

- **Define Core Project Goals and Scope:** Clearly articulate the primary use case (e.g., resilience for critical loads, cost reduction), as this will guide all subsequent technical decisions. Project leaders and decision-makers should precisely define the project's objectives to ensure a microgrid is the optimal approach to meeting those objectives and, if so, that the technical design aligns with customer needs and avoids investment in superfluous capabilities. If the ability to island is not necessary (i.e., the key defining characteristic of a microgrid), community leaders and decision makers may wish to consider alternatives.[8] It is also critical to define the project boundaries and identify the PCCs with the utility grid early in the process. For a single-property owner, this generally focuses on behind-the-meter (BTM) cost savings and/or resilience for a specific facility.
- **Conduct a Comprehensive Feasibility Study:** The feasibility study is the first stage of development and must assess the project's technological, financial, and societal viability. This requires defining critical electric and thermal loads, collecting baseline energy data, and determining resource adequacy to run the microgrid in island mode. A key component of the feasibility study is to quantify the *value of resilience*. Because this value is not a traditional revenue stream, it can be difficult to capture in cost-benefit analyses. Project teams can leverage emerging analytical tools, such as Lawrence Berkeley National Laboratory's Interruption Cost Estimate (ICE) Calculator, to help quantify the social and economic value of avoiding outages.[9]

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[7] Many of the phases listed here will likely apply to all types of microgrids with additional steps or phases needed depending on the unique type of microgrid (e.g., a multi-property, multi-tenant microgrid).

[8] Several alternatives to microgrids are discussed in *Report No. 1: Foundational Issues Facing Microgrids* including smart grids, advanced distribution networks, virtual power plants, and energy communities (Zinaman et al. 2022; Nanavati and Gundlach 2016).

[9] The latest version is available at https://icecalculator.com/.

    - **Example:** New York's microgrid initiatives often use Stage 1 funding (e.g., capped at $100,000) for these feasibility assessments, which help define core requirements like energy use, boundaries, and ownership models (New Jersey Board of Public Utilities 2016).
- **Identify Technical and Regulatory Barriers:** Perform an inventory of anticipated legal, regulatory, and technical obstacles. This includes an initial assessment of potential grid impacts (Section 3.1) and utility rate structures (Section 3.2). Regulatory and procedural uncertainty can obstruct development; the feasibility study should explicitly outline all barriers to completion, such as securing funding or obtaining utility agreements. This should also include a preliminary evaluation of ownership model constraints given state-level rules (as discussed in Section 4) that may prohibit third-party PPAs, as this will fundamentally constrain the project's financing and ownership model.
- **Assemble and Empower the Core Project Team:** A microgrid project team requires diverse expertise. In addition to engineering talent, the core team should include legal counsel with experience in state utility law, a financial advisor familiar with energy project finance and incentives, and a local permit expediter who understands the nuances of municipal planning and approval processes.

## 3.2 Phase 2: Strategic Engagement with AHJs

Once foundational viability is established, this phase focuses on collaborative, transparent, and proactive engagement with the key AHJs whose approval is mandatory, especially the local utility and regulatory bodies.

- **Cultivate a Cooperative Utility Relationship:** Engage the utility representative very early in the development process. The utility is a critical partner. A primary dependency for project completion is securing the utility's agreement on the interconnection (Section 3.1). Since utilities have a high degree of influence, especially with the interconnection process, project teams should be prepared to advocate for their project directly with the utility, share preliminary documentation (one-line diagrams, controls, objectives, etc.), and be willing to consider bilateral agreements or other practical accommodations that will support the viability of the overall project. Utility involvement and direct support for the project will greatly improve the likelihood of its ultimate deployment.
- **Prioritize Interconnection Studies and Technical Reviews:** Request relevant utility departments to meet early with the project team to identify and resolve potential technical and construction issues. This addresses the risks of cost uncertainty and delays identified in Section 4.1. Execute a Scoping Meeting with the utility to secure agreement on the PCC and generator size.
    - **Example:** Advocates for reform of the PG&E interconnection process, for instance, emphasize a Mandatory Field Meeting (around Week 8) to verify facility upgrade requirements and obtain all information needed to finalize design, costing, and protection (Portilla et al. 2024).

- **Proactively Address Regulatory Ambiguities:** Identify known, anticipated, or potential regulatory hurdles early and develop a plan to resolve them. For complex legal questions, such as those related to PPA structures (Section 3.2) or utility rate qualification (Section 4.2), seeking guidance from the PUC is a necessary step.
    - **Example:** The BLR microgrid addressed the major regulatory ambiguity of distribution asset ownership by securing CPUC approval for the direct purchase of a segment of the PG&E distribution network necessary for its microgrid installation (Carter et al. 2019).
- **Implement Robust Stakeholder and Community Engagement:** Foster trust and cohesiveness among consumers, stakeholders, and utility partners. For a single-property project, stakeholder engagement is often more focused. It involves building consensus with *internal* stakeholders (e.g., a hospital's facilities team and its financial officers) and *local* AHJs (e.g., the planning department, the local utility, and the fire marshal). Fostering trust and cohesiveness among these groups is beneficial.
    - **Example:** The Blue Lake Rancheria project, by design, served as a critical community hub. Its success during a 2019 Public Safety Power Shutoff event, where it provided power to ~10,000 people, demonstrated the value of aligning the project's technical goals with broader community resilience needs (Ganion, 2020).

## 3.3 Phase 3: Financial and Technical Structuring

This phase involves locking in the detailed design, securing necessary financial commitments (debt and equity), negotiating contracts, and obtaining final approvals, with a strong focus on technical risk mitigation.

- **Lock in Financial Structure and Contracts:** Defining the ownership model early (e.g., Utility, Private/Third-Party Ownership/PPA, or Public-Private Partnership) can help determine financing pathways. This decision should be informed by the findings from Phase 1 regarding state-level PPA prohibitions (Section 3.2). It can also include a comparison of financing through debt, equity, or public funding (e.g., bonds, state grants like the NY Prize).
    - **Example:** A Microgrid-as-a-Service or PPA model allows customers (like Montgomery County, MD) to stabilize energy costs and ensure energy security without requiring a large upfront capital investment, thereby transferring financial and operational risks to a third-party owner (Zinaman et al. 2022).

## 3.4 Using the Phased Framework

While presented sequentially above, community leaders and decision-makers may find their starting point varies. For instance, a community that has already completed foundational planning and secured a grant for a specific energy security goal may enter the process at Phase 2. A recommended first step is to validate that existing plan by re-examining it against the specific regulatory context, such as utility interconnection rules, state energy laws, and local zoning codes, within their jurisdiction.

In addition, navigating the complexities of microgrid development can be a daunting task. Community leaders and decision-makers are not alone in this endeavor. A growing ecosystem of support, including sophisticated planning tools, expert guidance, and direct technical assistance, is available from entities like DOE.

*Table 2 - Overview of DOE Resources for Supporting Microgrid Deployments*

| Resource | Primary Function | URL |
|---|---|---|
| **Community Microgrid Assistance Partnership (CMAP)** | Provides technical assistance and guidance to communities exploring microgrid options. | https://www.energy.gov/oe/community-microgrid-assistance-partnership |
| **Renewable Energy Integration and Optimization (REopt)** | A techno-economic decision support platform for optimizing energy systems, including microgrids. | https://reopt.nrel.gov/ |
| **Distributed Energy Resources Customer Adoption Model (DER-CAM)** | A microgrid planning and optimization tool for finding the lowest-cost combination of DERs. | https://dercam.lbl.gov/ |
| **DOE Microgrid Program** | The main DOE program page, providing research, funding opportunities, and publications. | https://www.energy.gov/oe/services/technology-development/grid-modernization-and-grid-scale-storage/microgrids |
| **Interruption Cost Estimate (ICE) Calculator** | Tool to estimate outage costs and the benefits (avoided costs) of reliability improvements. | https://icecalculator.com |

By leveraging these resources, community leaders and decision-makers can transform the development process from a series of obstacles into a manageable, strategic pathway. Success requires a realistic assessment of internal capacity and a commitment to building partnerships. Collaborating with State Energy Offices, local utilities, universities, or non-profit organizations working in this space can provide the necessary support to navigate the complex, multi-stage process toward enhanced local energy security.

# 4. Conclusion

For many communities seeking to take their first steps toward greater energy security, the single property microgrid model currently represents one of the most pragmatic and legally defensible approaches. By deliberately structuring a project to serve a single customer on a single parcel of land, communities can avoid some of the most significant and contentious legal battles over public utility status and exclusive franchise rights. This allows community leaders to focus their resources on managing the more predictable challenges of interconnection and rates.

Ultimately, a community's ability to enhance its energy security is not solely dependent on access to technology or funding. It is inextricably linked to its commitment to proactive planning and strategic, informed engagement with the key regulatory stakeholders who shape the energy landscape. By understanding the motivations and requirements of the state PUC, the local utility, and municipal permitting authorities, and by engaging them early and collaboratively, community leaders can transform the regulatory environment from an obstacle course into a navigable pathway. The future of community resilience will be built not just with microgrids, but with well-crafted feasibility studies, strategic partnerships, and a clear-eyed approach to the institutional realities of the energy system.

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