Interconnection Challenges and Policy Pathways for New Mexico's Solar Future

Prepared by
Public Power of New Mexico

Acknowledgements

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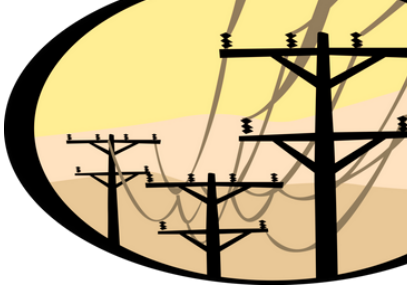

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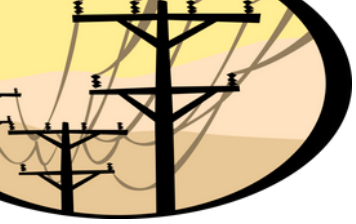


EXECUTIVE SUMMARY

Public Power New Mexico and the Initiative for Energy Justice undertook this research project as part of a larger toolkit in development to support community-owned renewable power. Through their advocacy in New Mexico, Public Power New Mexico has heard many anecdotes about how interconnection delays have stymied distributed solar power, a challenge echoed nationwide. Our exploration of this topic was rooted in our research and conversations with different stakeholders about their experiences .

Through the process of asking practitioners about equitable grid access and modernization, these themes emerged:

Uncertainty and Transparency

- **Uncertainty for Solar Developers, Customers & Disproportionate Risk:** Utilities, developers and customers have an imbalanced risk-reward relationship as they work to deploy distributed solar projects. Developers and customers invest heavily in grid upgrades despite not owning the infrastructure, and face regulatory and financial uncertainty. They shoulder more risk than utilities, who enjoy a guaranteed return on their relatively low-risk business. The Commission's reliance on utilities to make decisions regarding grid modernization further reinforces this imbalance. Developers argue for a fairer distribution of risk and reward with utilities and their shareholders.
- **Need for Transparency and data:** Everyone we spoke with agreed that transparent, consistent interconnection processes with clear timelines, easy access to information on hosting capacity, and clarity on cost structures are crucial for developers and consumers alike. Publishing hosting capacity maps and interconnection queue data would enhance project planning. Conversations with regulators and other advocates made it clear that utilities need to adopt best practices to enable this level of real-time reporting and transparency.
- **Consumer Protection:** New Mexico’s Utility Consumer’s sixteen point Bill of Rights was established by the PRC to ensure the right to fair rates for safe and adequate services, the right to question billing, and the right to receive information about rate changes and inquiry procedures.[1] It does not specifically mention interconnection and access to renewable energy programs. Nevada, New Jersey, New Hampshire and other states have similar policies, and some have used these to fine utility companies for failing to address interconnection challenges.

Delays, High Costs, Cost Sharing

- **Delays and unpredictably high costs** are considered to be major impediments to renewable energy deployment in New Mexico and beyond. These delays arise because of outdated grid infrastructure, supply chain issues for requisite equipment, and limited utility staff capacity.
- **Cost Sharing:** Developers and advocates tend to agree that more equitable mechanisms are needed for the sharing of costs for grid upgrades needed to accommodate interconnection–that is, those that do not place too large a burden on ratepayers or smaller projects.The cost-sharing mechanisms for grid upgrades should be streamlined and clear to avoid any inequitable cost distribution.
- **Grid Modernization:** Grid modernization is essential to advance our energy transition, and community-engaged distribution planning with transparency about costs and rate increases is essential to achieving this equitably.
- **Workforce Development:** Programs to advance clean energy workforce development will help develop the workforce needed to upgrade the grid and deploy more distributed renewable energy.

Implementation and Enforcement

- **A Golden, Unimplemented Rule:** Many agree that while New Mexico's interconnection rule is excellent on paper, none of the investor-owned utilities are yet compliant. The rule lacks enforcement mechanisms, and utilities need to upgrade the grid, and adopt technology and best practices that meet these requirements. Some believe that the utilities' lack of compliance is a strategy to delay the deployment of distributed energy resources and to maintain their monopoly on generation.
- **Enforcement Mechanisms:** Some feel that penalties should be imposed on utilities for noncompliance with interconnection rules. Others prefer less punitive approaches. Regulators actually have no enforcement power to levy penalties for lack of compliance, and addressing this would require a legislative fix to establish enforcement mechanisms or penalties for interconnection timelines and requirements in statute.

Performance-Based Incentives

- **Utility Incentives:** utilities have little financial incentive to expedite interconnection of projects that would reduce their revenue from sale of electricitySome suggest that performance-based incentives and penalties would better align utility interests with those of renewable energy developers, consumers, and advocates and encourage on-time interconnection and grid upgrades.

This report provides a window into a dynamic and complex issue that is changing even as we publish this research. We hope this provides insight for advocates, policymakers, and regulators to align policies and best practices for equitable grid modernization and renewable energy deployment.

Introduction

This report explores interconnection issues facing commissions, utilities and developers across the US, from the lens of practitioners navigating new interconnection and community solar policies in New Mexico.

Since updating interconnection procedures in 2022 and passing the Community Solar Act in 2021, New Mexico has not seen any of the 45 selected community solar projects begin construction. Among various factors that delay renewable energy deployment, this report documents ways that interconnection in particular has delayed renewable energy deployment.

New Mexico, with a population of just 2 million people, makes up less than 0.6% of the U.S. population. However, it is the nation's second-largest crude oil producer, contributing 14% of the total U.S. crude oil production in 2023, and is among the top 10 fossil gas-producing states.[2]

New Mexico's Energy Transition Act (ETA) goal to achieve 80% electricity from renewables by 2040 is equivalent to less than 0.5% of the United States' electricity from renewables, while New Mexico ranks second in the country for solar potential and eighth for wind. New Mexico is the second sunniest state in the United States, with an average of 300 days of sunshine per year and an amenable climate.[3]

Additionally, New Mexico is home to 22 federally recognized Native American tribes, with tribal lands covering about one-tenth of the state. Renewable energy projects developed with, by and for Tribes are essential to equitable energy access, affordability and reliability, particularly for communities on reservations, pueblos and/or in remote or rural regions.

Despite New Mexico's abundant solar resources, only 9.13% of the state's electricity comes from solar. New Mexico's renewable energy goals and implementation fall far behind its potential, and its investments in clean energy continue to be dwarfed by the influence of the fossil fuel economy.

What is interconnection and why is it important to a renewable energy transition?

Interconnection is the process that allows distributed energy resources (such as rooftop solar, energy storage, or electric vehicle charging stations) to connect and deliver energy to the grid without risking safety and reliability. Timeline delays and upgrade costs associated with the interconnection process have a critical impact on project economics and timeline and may ultimately determine how, which and where projects are constructed. These challenges may impede projects that diversify energy supply, decentralize power generation, and enhance resilience against disruptions in the centralized grid.

Prior to interconnection, hosting capacity analyses determine the amount of energy that can connect to a given location on a distribution circuit based on the load profile, and design of the circuit and energy facility. This diagram from Interstate Renewable Energy Council illustrates the role of Hosting Capacity Analyses (HCA) in connecting new distributed energy resources (DER) to the grid. [5]

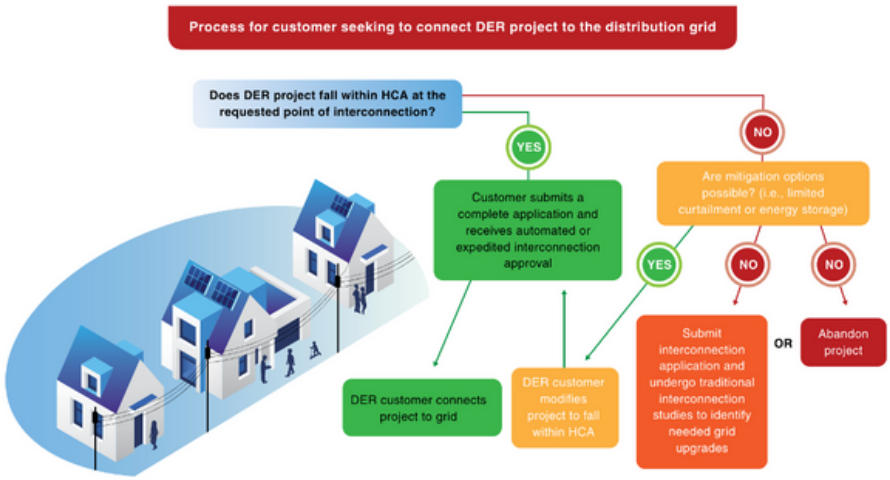


Figure 4. Illustrative Interconnection Use Case for HCA

Distributed Energy Resources (DERs) are smaller-scale energy resources usually situated near sites of electricity use such as rooftop or community solar arrays, EV charging stations and battery storage devices.

Before connecting any DER to the grid, utilities perform a Hosting Capacity Analysis (HCA). Hosting capacity is the amount of DERs that the electric distribution system can reliably accommodate without significant grid upgrades.

A thorough hosting capacity analysis considers voltage/power quality constraints, thermal constraints, protection limits, safety, and overall reliability to arrive at a capacity (kW, MW) of new generation or load which can be accommodated at a specific location on a distribution circuit.

An HCA results in a Hosting Capacity Map that illuminates where and how much energy can be added to distribution lines.

Access to hosting capacity analyses and fast, affordable interconnection processes are critical to timely implementation of state and federal energy goals such as greenhouse gas emission reduction plans and grid modernization plans.[6]

Additionally, underserved communities, such as those residing on Tribal reservations or areas that are predominantly rural, low-income, or households of color, disproportionately experience energy insecurity due to systematic underinvestment in grid infrastructure.[7] As a result, community investments in renewable energy often face higher costs to upgrade outdated infrastructure.[8]

In their report Upcharge: Hidden Costs of Electric Utility Monopoly Power, the Institute for Local Self Reliance (ILSR) states that utilities use interconnection as a gatekeeping tool to protect their market share. We can observe how gatekeeping manifests in the experiences of local energy developers, advocates and regulators in New Mexico. In New Mexico, interconnection delays have and/or will impact the community solar program, as facilitated by InClime[9], and Solar for All, as facilitated by New Mexico, Energy, Minerals and Natural Resources Department (EMNRD).[10]

This report synthesizes our research, exploring the shared experiences and opinions of those involved in regulatory and policy arenas, and in interconnecting solar projects of various sizes to the grid. Their experiences point to ways to address barriers to distributed renewable energy development in New Mexico and other states.

The Utility Landscape in New Mexico

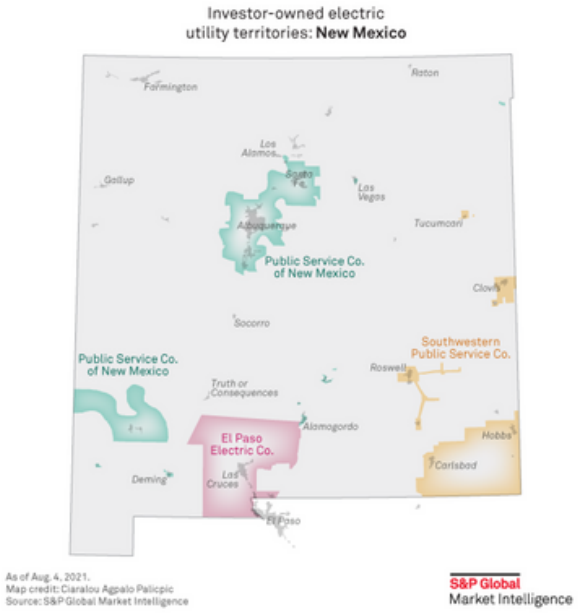
New Mexico is serviced by three investor-owned utilities (IOUs), 16 rural electric cooperatives, seven municipal utilities, and four tribal utilities.[11' This report focuses primarily on interconnection challenges within investor-owned utility territory which serves the majority of New Mexicans.

Investor-Owned Utilities in New Mexico

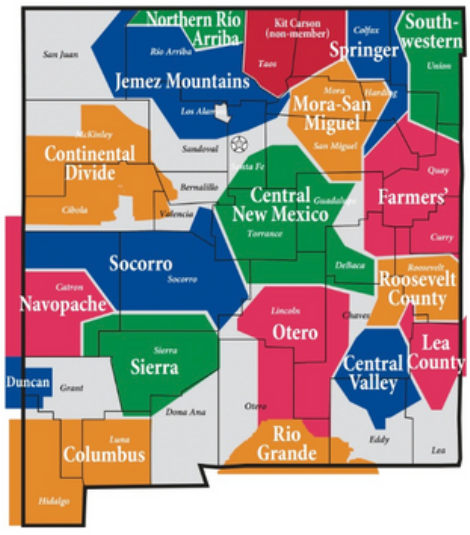
Public Service Company of New Mexico (PNM) is the state's largest energy provider, serving approximately 540,000 customers, including metropolitan areas of Albuquerque and Santa Fe. Of the 29 community solar projects selected for the Community Solar Program, none have yet been constructed.[12]

El Paso Electric (EPE) provides electricity generation, transmission and distribution to approximately 460,000 customers. Major cities in the service region include El Paso, Texas and Las Cruces, New Mexico.[13] As of April 2024, EPE had completed the study phase for all six community solar applicants in its territory within the mandated timeframes.[14]

Southwestern Public Service Company (SPS) is a subsidiary of Xcel Energy and serves approximately 125,000 customers in the Southeast corner of the state, and parts of the Texas panhandle. As a transmission operator, SPS requires interconnection applicants to complete additional transmission studies to assess impacts on Southwest Power Pool, the regional transmission organization.



Rural Electric Co-op Territory



Rural Electric Cooperatives

Rural electric cooperatives in New Mexico play a significant role in providing electricity to remote and less densely populated areas of the state. These cooperatives are member-owned and not-for-profit, meaning they are governed by the consumers they serve. Rural electric cooperatives in New Mexico cumulatively serve approximately 200,000 households. Member-owned cooperatives are regulated by the Public Regulation Commission, and frequently follow similar guidelines as IOUs.

In 2019, New Mexico mandated that rural electric cooperatives in the state must get 100% of their electricity from renewable energy sources by 2050. With operational autonomy, cooperatives vary in their approach to renewable energy deployment and interconnection. Some, like Kit Carson Electric Cooperative, have accelerated their renewable energy generation, while others remain consistent with the larger generation and transmission network.

Tribal Utilities and Solar

Navajo Nation, Acoma Pueblo, Jicarilla Apache Nation, and Picuris Pueblo all have their own Tribal utilities, and many others are looking at different ways to pursue their own energy sovereignty goals. In collaboration with PNM, Jicarilla Apache Nation's 50-megawatt solar farm became operational in April 2022, followed by a second 50-megawatt solar farm in August 2023. Of the 100 MW generation capacity, one of the largest on Tribal land in the nation, the project only delivers 2 MW to the Tribe. The U.S. Department of Energy (DOE) has also supported several Tribal solar projects in New Mexico, including a 2 MW community solar PV system for the Picuris Pueblo, 115-kilowatt solar PV systems with the Santo Domingo Tribe, and rooftop solar PV systems in four villages in the Pueblo of Laguna. [17]

It is important to note that the majority of this report covers interconnection challenges within IOU territories, and most of New Mexico’s tribes are serviced by rural electric cooperatives. Public Power New Mexico is continuing to research interconnection challenges in other utility territories.

Municipal Utilities

New Mexico has seven municipal utilities in Aztec, Farmington, Gallup, Los Alamos, Raton, Springer, and Truth or Consequences. Public Power New Mexico’s ongoing research and outreach to these entities has determined that most of them have deployed some solar. We do not have enough data yet on their interconnection policies, but we are conducting ongoing research to support communities’ exploration of this energy option.

Methodology

Much of the information publicly available regarding interconnection and community solar policy development in New Mexico (ex. on the public Regulation Commission (PRC) website, community solar website, E-Docket) is focused on utility procedures and timelines. The methodology used to generate this report explores personal observations and informed reflections regarding the systemic challenges affecting equitable grid access and modernization.

Between May and July of 2024, Public Power New Mexico (PPNM) and the Initiative for Energy Justice (IEJ) research analysts conducted a series of interviews with sixteen people representing thirteen organizations engaged in New Mexico's solar energy landscape, primarily in Investor Owned Utility (IOU) territories. Those interviewed included: Public Regulation Commission (PRC) staff, Interstate Renewable Energy Council (IREC) staff, solar developers, solar trade association affiliates, community solar advocates, and local government and nonprofit staff that have attempted to bring solar projects online in New Mexico.

Regulator	**3**
Private solar developer, Trade association	**5**
Low income advocate, service provider	**4**
Nonprofit or Tribal energy developer	**3**
Local government	**1**

Researchers identified stakeholders through PPNM's existing ecosystem of relationships, and solicited additional referrals through the interview process, a form of snowball sampling. An advantage to this method was quickly identifying practitioners known to have personal experience with interconnection policies and procedures, while a disadvantage was sampling bias, and excluding those that may have a different professional network or focus area.

Each semi-formal interview was an hour-long and followed a set of standardized questions that expand upon technical questions posed by the PRC in the community rulemaking docket 22-00020-UT. Two research analysts then independently reviewed interview transcripts and developed themes by which to code and categorize content. This content forms the basis of the findings and recommendations in this report. Some of the quoted comments in this report have been anonymized by request. Soliciting, documenting and applying this type of input is part of developing policies that promote transparency and accountability.

What we've heard...

The following sections document what we've learned from Interviews, correspondences and comments to PRC docket 22-00020-UT. Conversations, research and coordination on this topic are ongoing. We engaged in many deep and insightful conversations with knowledgeable stakeholders, illuminating a few perspectives on a complex subject.

- Failure to launch community solar
- Structural, supply chain & institutional limitations
- Lack of Transparency
- Utilities in non-compliance

Failure to launch community solar

The Community Solar Act of 2021 created a statewide program of 200 MW in the three Investor Owned Utility (IOU) service territories. The program reserved 30 percent of the annual statewide program capacity for low-income customers* and low-income organizations, and exempt Tribal community solar projects from certain requirements to allow a greater range of structures, subscription models and financing mechanisms. [18]

While these allocations and exemptions make the program more accessible, they do not in isolation accelerate project development, nor ensure alignment with community needs and energy independence.[19] Particularly for communities encumbered by energy poverty and generations of underinvestment, facilitating access to renewable energy also necessitates transparency around distribution system capacity, upgrade requirements and costs, timelines and equitable cost sharing.

To complicate the matter, shortly after the passing of the Community Solar Rule by New Mexico's Public Regulation Commission (PRC) in July 2022, all three investor-owned utilities appealed the rules to the New Mexico Supreme Court with objection to restrictions on the fees that could be included in customers' solar bill credits.[20,21] It was not until March 2024 that the New Mexico Supreme Court upheld the current rules in favor of the Public Regulation Commission (PRC) and other coalitions. This legal challenge caused significant delays to program implementation.

Three years after launching New Mexico's community solar program, no community solar projects have come online. PNM and SPS projects are still waiting for interconnection agreements, with some in the process of securing them as of June 2024. EPE has met interconnection timelines for five of its community solar projects but has not yet started construction.

Some developers speculate that utilities might be intentionally delaying community solar projects due to a conflict of interest. Utilities' revenue from capital investments and electricity sales might deter them from interconnecting non-utility projects that could reduce their revenue.

None of the state's rural electric cooperatives have opted into the community solar program, despite that FERC's recent approval of Tri-State's "Bring Your Own Resource" (BYOR) proposal should ease restrictions on cooperatives, and open the door for more community solar and distributed generation projects. [22,23] None of the co-ops have opted into the community solar program in New Mexico.

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* A low-income customer is defined as a customer of a qualifying utility with an annual household income at or below 80 percent of area median income, or is enrolled in one or more in a low-income program facilitated by the state or a low-income energy assistance program. - "New Mexico Community Solar Policy Guide for Asset Owners & Developers."

Structural, supply chain & institutional limitations

Regulators and developers alike lament that distribution circuits are frequently deemed “saturated” or in need of costly infrastructure upgrades. These limitations are ultimately determined by the utility itself, meaning the analyses and assumptions used to set these limits can vary significantly between utilities, and are not frequently verified independently.[24] In the worst cases, these decisions may be completely misaligned with national best practices and the current scientific and engineering understanding of these limits.

Procuring materials for grid upgrades is a major cause of interconnection delays. Equipment like transformers, switchgear, and production meter sockets often have lead times of up to a year. A regulator noted that the supply chain is further constrained because PNM, SPS, and EPE all require significant grid upgrades simultaneously, a common issue across distribution systems nationwide. While a developer suggested that utilities could mitigate delays by anticipating needs, ordering in advance, or allowing developers to handle procurement and installation, utilities are still responsible for engineering, procurement, and construction under community solar rules. Additionally, even when developers have the labor and expertise to speed up grid upgrades, utilities are reluctant to hire more personnel without certainty of cost recovery.

In addition to structural and supply chain limitations, regulators and developers alike referenced insufficient labor and expertise in the sector to alleviate the interconnection bottleneck. When Tribal energy developer Shaun Tsabetsaye developed an 84 kW array on his family-owned grocery store in Zuni Pueblo, his team had to educate co-op staff on current rules and policies. The co-op wanted to limit the array to 10 kW because staff were unaware that the co-op rules allow systems to offset up to 100% of the electric load on the property. He said that there’s a “gap in the deployment of solar and the readiness for it.” Tsabetsaye had the expertise necessary to see the project through, but expressed concern that many other projects are abandoned simply because co-op staff, members and developers simply are not aware of what is possible under current rules.

In the context of energy projects developed with or by Tribes, these structural, supply chain and institutional limitations compound with additional jurisdictional complexities and historic disinvestment. For example, Tribal trust land frequently spans multiple municipalities, states and/or utility territories, resulting in confusing procedures where they vary from one jurisdiction to another.[25]

As is, Tribes are already underserved by electric providers, as evidenced by energy burden and reliability. The energy burden of the average Tribal land resident is 28.3 percent higher than the average U.S. citizen[26], and as recently as 1990, 14.2 percent of Native American households on reservations lacked access to basic household electricity, compared to 1.4 percent of all U.S. households.[27] By these measures, Regional Transmission Operators, utilities, co-ops and Federal agencies have collectively failed to provide equitable

access to electricity, and reliable, safe, secure, and economically efficient energy services at a reasonable cost.

Compared with the resources of IOU's, utility commissions often have limited resources to inspect and enforce compliance. A former Commissioner shared that in some cases, this disparity results in an adversarial regulatory environment, in which limited resources are diverted to settling legal disputes rather than research and development of ambitious policies:

> **"It's a battle of resources, and the utilities have unlimited resources. They charge their community, and in their charges they fold in legal costs. And the agency just doesn't have those kinds of resources." - Stephen Fischmann, Commissioner from 2019-2023**

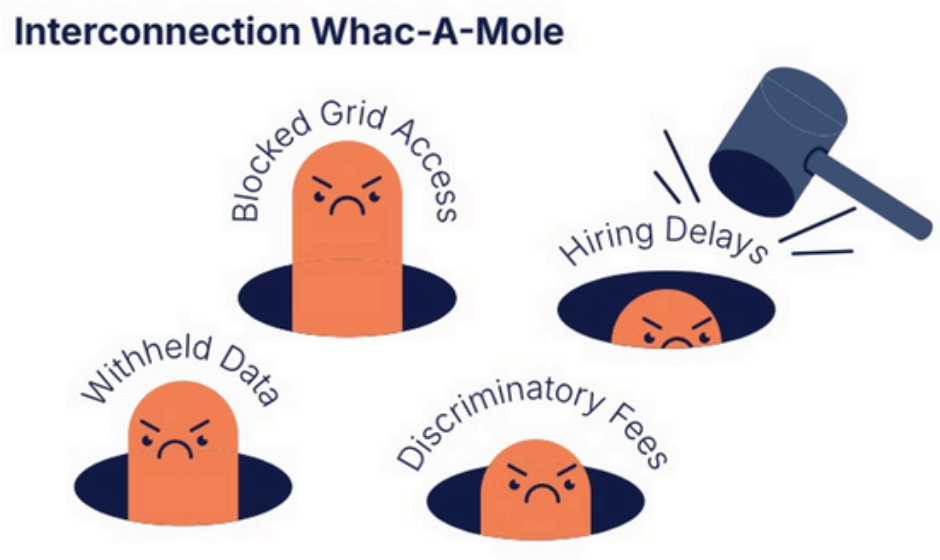


Image Credit: ILSR's Upcharge: Hidden Costs of Electric Utility Monopoly Power

Lack of Transparency

Interviewees noted that utilities often lack or withhold information that could accelerate the development of new energy projects and maximize benefits to the grid. This information includes hosting capacity, interconnection queue, transparent cost estimates, study methodologies, and equitable cost sharing opportunities for grid upgrades.

Consistent feedback from interviews pointed to a lack of information on where and how the grid can accommodate new energy facilities. Known as "hosting capacity," this data helps developers site new projects before proposal submission. In one case, a municipal solar installation was reduced by half after PNM determined the line did not have sufficient capacity. Staff expressed frustration with the lack of clear explanations for these decisions:

> **"It definitely feels like they don't ever have a very clear answer as to why you can't do certain things in certain parts of the city.... PNM doesn't explain the infrastructure upgrades or where they are in process. We don't know where to apply pressure."**
> **- Municipal government staff**

Without public hosting capacity maps, interconnection queues and transparent evaluations, customers, developers, local and tribal governments, and advocates cannot effectively challenge utility claims or enforce adherence to mandated timelines and data validation. One developer compared PNM's decision-making to a "black box." This may result in limiting rooftop solar, in addition to community scale installations.

When grid upgrades are needed for interconnection, the project developer typically covers the cost. Utilities are responsible for estimating, procuring, and completing these upgrades according to community solar rules. However, interviewees have raised concerns about the accuracy of these cost estimates, citing the lack of transparency in utility analyses and insufficient oversight.

One advocate noted that some utility assumptions and calculations appear questionable, but regulators do not have sufficient capacity or authority to scrutinize methodologies. It is rare for Commissions to have policing authority over interconnection because it is traditionally managed by utilities. The Commission lacks the staff capacity or skillset to oversee utilities' estimates, operating under the assumption that "utilities know best." A former Commissioner echoed this concern:

> **"How we determine what a fair quote for interconnection cost is a challenge that the current Commission has to deal with and come up with solutions. I can't say that the utilities are intentionally exaggerating those costs, but it would be a reasonable suspicion to investigate given their behavior in terms of putting the rule in place and their opposition to putting the community solar rules in place."**
> **- Stephen Fischmann, Commissioner from 2019-2023**

Uncertainty about hosting capacity, grid upgrade costs, and timeline delays can make projects financially unviable, causing developers to abandon them despite significant investments. This transparency gap increases risk for local and tribal governments, nonprofits, and businesses involved in renewable energy projects. Compounding this issue is the ongoing deliberation over the community solar credit rate in Docket 23-00071-UT,[28] which affects customer savings and project pricing. Consequently, entities advancing renewable energy face high risks, while utilities benefit from guaranteed returns.[29]

Utilities in non-compliance

According to IREC's Freeing the Grid report, New Mexico's interconnection policy stands out for its detail, scalability, and transparency compared to other states that lack statewide procedures. By contrast, every interviewee reported issues with utilities failing to meet timeline and transparency requirements throughout the interconnection process, resulting in significant delays and unexpected costs that jeopardize some projects.[30]

In Public Service Company of New Mexico (PNM) territory, the Bi-annual Interconnection Report revealed that from April 1 to August 31, 2023, 37% of the interconnection applications were returned for corrections, primarily due to exceeding the 15% maximum load calculation that triggers further study.[31]

El Paso Electric (EPE) has 39 projects in its over-10 MW interconnection queue, with application dates spanning from September 2017 to March 2024. These projects are expected to be in service between late 2025 and May 2027. The Generator Interconnection Queue indicates that some projects have withdrawn or reduced their output by up to 33%.[32]

In the Community Solar rulemaking docket 22-00020-UT, filed on February 1, 2022, stakeholders, including three investor-owned utilities, four solar developers, and the Renewable Energy Industries Association of New Mexico, voiced concerns about interconnection challenges affecting community solar projects and other scales of solar development.[33] The issues include:

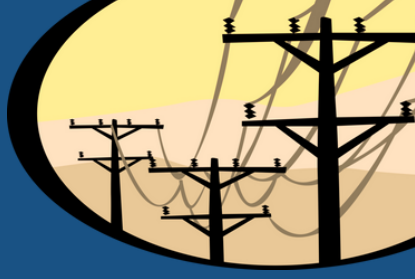
1. Delays in impact studies and upgrades that fail to meet Administrative Code timelines. Utilities report insufficient staff for reviewing applications and conducting studies, resulting in 18-24 months of lead time.
2. Equipment delays due to supply chain issues, leading to extended upgrade times.
3. High costs and additional steps for new line extensions and substation build-outs needed to handle increased loads (ex. acquiring rights of way or land rights)
4. Regulatory uncertainties, such as Supreme Court appeals by all three IOUs; Case No 23-00071-UT to determine community solar rate schedules and credit rates; Case No 23-00369-UT on Low Income Subscribership; Case by case cost sharing provisions.

Despite utility non-compliance, the Commission lacks enforcement mechanisms to ensure compliance with mandated procedures and timelines. A former Commissioner summed up the issue:

> **“It’s great to have those [interconnection] rules in place. Do we have enforcement to make sure that they get followed instead of gamed? Of course that’s always the challenge as a regulator.” Stephen Fischmann, Commissioner from 2019-2023**

On August 23, 2024, PNM filed an amended motion at the PRC in Docket No. 23-00072-UT that withdraws two of their requests for variance from interconnection rules. A third party study found that “of the 18 feeders at solar saturation that were studied, all but two feeders have enough remaining hosting capacity to successfully interconnect all pending customer applications.”[34] As a result, “PNM can immediately come into compliance with the fast-track provisions of the Rule and withdraw its prior request for a temporary extension of this variance.” In the same docket, Sandia National Laboratory also filed a report entitled "Options for Upgrading Low-Voltage Spot Network Protection to Increase DER Interconnection Capacity." The 298-page filing also reveals that distribution feeders have more hosting capacity than utilities have reported.

These studies suggest that utilities have not complied with interconnection timelines, despite having sufficient hosting capacity. It highlights the need for stronger oversight to ensure the accuracy and compliance of utility studies and reporting. Some solutions could include performance-based regulations, statutory empowerment of regulatory bodies, enforceable deadlines, and consistent reporting mechanisms .



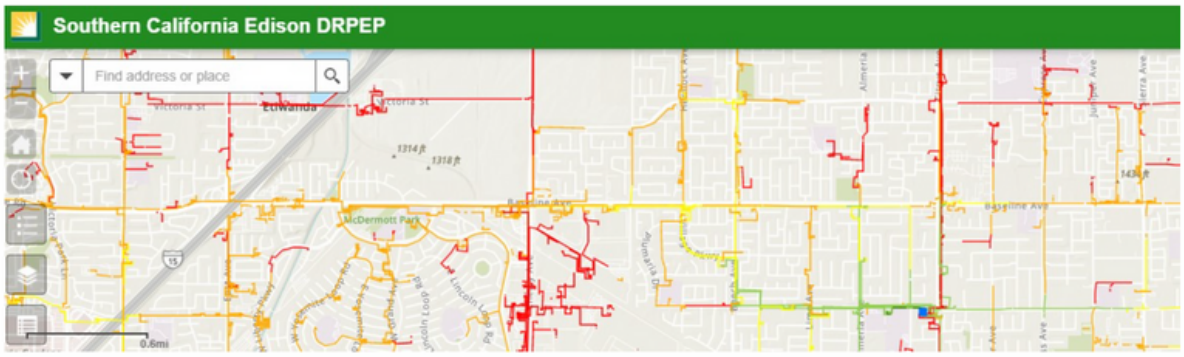
OPPORTUNITIES

- Improve transparency and consistency of interconnection process
- Diversify methods to ensure grid reliability
- Restructure the utility system
- Supplement and maximize capacity
- Enhance regulatory oversight
- Distribution System Planning

Improve transparency and consistency of interconnection process

Interviewees consistently highlighted the need for greater transparency and consistency in interconnection processes, advocating for public interconnection queues, hosting capacity maps, and streamlined methods for calculating and sharing interconnection costs. Implementing these tools could reduce project risk, lower costs, and speed up project completion. One suggestion was to use this information to proactively identify and resource priority areas with greater barriers to local generation.

Hosting capacity maps, increasingly recognized as a best practice, are still underutilized in New Mexico.[35,36] A trade associate pointed out that New Mexico utilities are falling behind and suggested using IREC's resources to integrate these maps into procedural requirements.[37]



Example of a hosting capacity map. *Source:* *Southern California Edison* [38]

Although hosting capacity maps are widely supported, many utilities lack the capacity or willingness to implement them. Most New Mexico utilities are not part of Regional Transmission Organizations (RTOs) or Independent System Operators (ISOs), which collect extensive distribution system data. Some interviewees noted that utilities already possess significant private hosting capacity data, crucial for grid management and determining feeder line capacity.

A regulator suggested using sensors and real-time grid measurements to improve energy flow monitoring, while a developer noted that SPS, a subsidiary of Xcel and member of Southwest Power Pool, already has the necessary data to develop hosting capacity maps. Xcel, serving several midwestern and mountain states, publishes hosting capacity maps in Colorado and Minnesota as required. During the completion of this report, PNM updated its public-facing interconnection map to reflect the current state of hosting capacity availability.[39]

Several interviewees emphasized the benefits of a public queue, which aids in distribution system management and reduces costly grid upgrades. Xcel's public queue in Minnesota, which includes project status, size, feeder location, substation, and costs, serves as an effective model.[40] This transparency supports cost-sharing across projects and promotes more equitable cost distribution.

According to one interviewee, 11 of 29 projects in the PNM service area have interconnection costs exceeding $4 million, often deterring developers unless they can share costs. Current rules allow for case-by-case cost sharing but lack detailed guidance.[41] Developers agreed that clearer guidelines and greater transparency could facilitate more cost-sharing. A trade associate articulated several opportunities for what cost sharing guidelines could look like:

- Cost sharing 1.0: Developers electively work together to share the cost of distribution upgrades, using interconnection queue data and hosting capacity maps;
- Cost sharing 2.0: Utilities coordinate cost-sharing between developers by evaluating proposals on the same feeder in groupings, rather than a one-off basis, and distributing costs proportionally;
- Cost sharing 3.0: Similar to 2.0, but includes a ratepayer element commensurate with equity indicators and benefits to the grid

This associate argued that utilities, with their information and financial mechanisms, are best positioned to manage cost-sharing. A developer agreed, suggesting that cost-sharing could encourage upgrades with community-wide benefits:

> **"I think that they [utilities] should have created some more criteria around if you're extending a line just to your project, [...] if you're the only one benefiting, you should pay for that. But if you're extending a line, and now all these other rural communities can have a better line, that's upgrading. That's a community benefit." – Community solar developer**

Another interviewee stressed that costs should be shared equitably among applicants, utilities, and customers to address energy burdens and compensate for historic underinvestment in certain neighborhoods.

Overall, interviewees supported a tiered cost-sharing model where developers pay a proportionate share based on capacity increases, potentially including a ratepayer component. Proper implementation of cost-sharing could reduce risk and mitigate the burden on historically underserved areas.

Ultimately, data transparency and availability help to alleviate the interconnection bottleneck by improving efficiencies and developing ways to distribute cost and risk fairly. Strategies should focus on:

- Increasing data collection to enhance hosting capacity analyses and long-term planning, potentially incorporating sensors and real-time measurements, and learning from other states' utilities, ISOs, and RTOs.
- Overcoming barriers to publishing hosting capacity maps and interconnection queue data.
- Codifying requirements for utilities to publish hosting capacity maps and interconnection queue data, including application status, proposed capacity, feeder location, substation, and associated costs.
- Requiring transparent calculations and justifications for interconnection cost determinations and significant changes to project designs.

Diversify methods to ensure grid reliability

Emerging themes from interviews highlighted the need for strategies that accommodate the diversification of energy generation while ensuring grid reliability. As energy generation becomes more decentralized and variable throughout the day, season, and year, local government staff emphasized the importance of a diverse approach:

> **"I'd just love to see a more diverse approach. I think there's the idea that there's a silver bullet type approach to solar. I think it needs to look like a lot of different things. There's community solar, and more rooftop and neighborhood scale stuff. We need more battery storage. We need just a lot of different scales of these types of projects"– Local government staff**

Similarly, energy consumption will evolve due to electrification, changing rate structures, and incentives. Interviewees proposed various solutions and pilot programs, such as battery storage and energy efficiency, to alleviate grid demand.[42,43] Despite that distributed storage systems may contribute to resilience at a local level, PNM resisted using certain storage solutions and zero backfeed systems as a way to avoid triggering hosting capacity limits.

However, several interviewees criticized current hosting capacity thresholds, arguing that they can be arbitrary and limit solar potential. For instance, states like Hawai'i have shown that much higher solar penetration is achievable.[44] The Interstate Renewable Energy Council (IREC), known for its best practices in hosting capacity analysis, assisted in designing New Mexico's new hosting capacity calculation method.[45] They oppose arbitrary "mitigation thresholds" that restrict distributed energy resources without technical justification. IREC challenged PNM's hosting capacity analysis, showing that the grid could support more decentralized energy than PNM had indicated. Their analysis is confirmed by studies completed by 1989 & Co and Sandia National Laboratories that found that PNM has sufficient hosting capacity to interconnect applicants that have been delayed in queue.[46]

The new rule for connecting new energy sources looks at how much energy is used during the day, instead of using the old limit of 15% of the total energy the distribution circuit can accommodate. This change aimed to maintain reliability while promoting solar generation. However, opinions on its effectiveness are mixed, with some interviewees observing that this screen change resulted in more projects undergoing expensive supplemental studies, and might disadvantage areas with lower daytime loads, potentially lowering the capacity threshold. Others posit that utilities, specifically PNM, have incorrectly interpreted daytime minimum loads.

Restructure the utility system

Restructuring the utility system emerged as a key theme in interviews, with a focus on delivering renewables, reliability, and efficiency more equitably. Key improvements involve addressing the limitations of the current monopoly utility structure and adopting proactive regulatory models.

Several interviewees highlighted the misalignment between traditional utility infrastructure and decentralized energy. A regulator noted that conventional systems, designed for one-way power flow, must evolve to support customers in managing their energy use. Utilities in New Mexico have been slow to adapt. An advocate pointed out that utilities' revenue models, focused on capital investment returns, conflict with goals to improve efficiency, manage demand, and support distributed generation. Issues such as "gold plating," where utilities receive a return on contractors they hire, also increase costs for developers and ratepayers.

Some interviewees suggested that restructuring the monopoly over generation, transmission, and distribution could improve long-term planning aligned with energy transition goals. They also emphasized the need for emergency centers with backup power and microgrids to ensure resilience and connectivity.

A former Commissioner observed that the regulated monopoly structure guarantees a customer base and return on investment, making it a low-risk endeavor. They recommended a proactive regulatory approach to ensure utilities deliver necessary services and penalize shareholders when they fail to meet standards. Several interviewees advocated for performance-based rates and performance incentive mechanisms (PIMs), which adjust utility revenues based on performance, citing Colorado's PIMs, which penalize utilities for negative behaviors while protecting also customers:

> **"Basically shifting risk away from the ratepayer onto the shareholder is going to be a key way to get the utilities more engaged and doing a better job from an interconnection standpoint." – Kevin Cray, Coalition for Community Solar**

In summary, interviewees advocate for a multifaceted approach to reforming utility systems, including stronger regulatory oversight, long-term planning, transparent interconnection practices, and legislative solutions to hold utilities accountable. However, limited regulatory capacity may hinder the implementation of proactive models and technical expertise development. Restructuring the utility system to prioritize climate and justice goals could reduce the need for oversight, freeing resources for effective implementation. Further research is needed to design policy transitions from the current energy system to a more modern alternative.

Policy recommendations include:

- Expanding opportunities for third parties to participate in the interconnection process.
- Adopting an Integrated Distribution System Planning process that includes proactive hosting capacity*, energy equity, and resilience.
- Restructuring generation, transmission, and distribution processes to align with energy transition and environmental justice goals.
- Increasing opportunities to disaggregate utility services.
- Designing systems to enhance community resilience and connectivity, with a focus on intentional distributed energy resource (DER) design and co-location with existing community hubs.

Community resilience hubs paired with solar and storage play an important role in improving resilience and reliability at a neighborhood scale. Take for example the Blue Lake Rancheria Tribe's microgrid– It not only generates renewable energy to offset their load on Pacific Gas and Electric Company (PG&E), it is also a critical community resource as one of the only places outside the tsunami zone with critical infrastructure and emergency power to operate for multiple days/weeks. The Tribe's facilities routinely serve as base camps for firefighters, and "fresh air respite" areas for residents when wildfires occur inland.[47]

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* Proactive Hosting Capacity involves using Hosting Capacity Analyses, based on both historical and projected load and DER conditions, to guide investment decisions in new infrastructure, with the goal of enabling more cost-effective, efficient, and equitable growth of DERs in the future.

Supplement and maximize capacity

Capacity constraints, including strained supply chains and insufficient staffing, are delaying the interconnection of numerous renewable energy projects. Addressing these constraints could improve interconnection timelines.

- To mitigate supply chain delays, establish guidelines such as maintaining utility inventories for common materials, procuring materials earlier, and expanding opportunities for developers to handle procurement.
- Use hosting capacity maps and interconnection queue data to strategically site distributed energy resources (DERs), which can increase their grid value and reduce the need for upgrades, thus alleviating supply chain pressures.
- Identify and address staffing bottlenecks by requiring utilities to use outside consultants or allowing developers to take on more tasks.
- Develop and codify guidelines for a tiered cost-sharing model among interconnecting projects, involving stakeholders in shaping these guidelines to improve equity, transparency and consistency in the interconnection process.
- Create methodologies to assess community benefits from interconnection upgrades and consider socializing some grid upgrade costs through a ratepayer component. Ensure that cost-sharing mechanisms do not disproportionately burden underserved communities.

Enhance regulatory oversight

The energy generation landscape is shifting as decentralized energy resources (DERs) increasingly supplement the grid and centralized fossil fuel assets decline. Historically, regulators have relied heavily on utilities' technical expertise, granting them significant discretion over interconnection and generation resource development. New Mexico, ranking second in solar potential and eighth in wind potential nationwide, is poised to benefit from this shift.[48] As the role of DERs and renewables expands, regulators need to enhance oversight of interconnection processes and develop tools to fully harness New Mexico’s renewable energy potential. This transition could transform New Mexico from a leading fossil fuel exporter to a top electricity exporter, fostering social and economic development across both rural and urban areas.

To support this transition, regulators should:

- Pass legislation to enforce utility interconnection timelines.
- Develop methods for fair distribution of interconnection costs, reducing reliance on utility estimates.
- Increase oversight of interconnection stages that lack timeline requirements and contribute to delays, such as detailed engineering.
- Adopt best practices in hosting capacity analysis, refining methodologies to address rural-urban variances and optimize DER development.

Distribution System Planning

New Mexico's grid is evolving to boost electrification, decarbonization, and resilience while ensuring affordable and reliable service and addressing historical inequities. However, outdated utility practices and legal challenges are causing bottlenecks that jeopardize compliance with the Energy Transition Act and hinder the rollout of programs like community solar. [49]

Distribution System Planning (DSP) will help to establish a roadmap for grid modernization, with an emphasis on increasing the grid's ability to accommodate renewable energy, while maintaining reliability and increasing resilience.[50] DSP would present a pathway for requiring hosting capacity maps

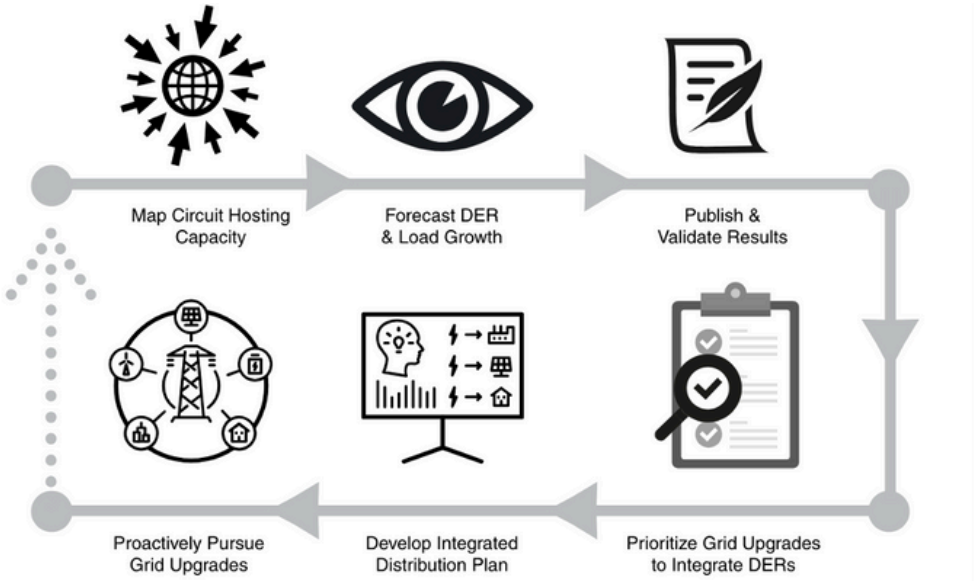

Figure 7. Integrated Distribution Planning (IDP) [51]

New Mexico's Energy Grid Modernization Roadmap Act, passed in 2020, sets a foundation for this transition. It directs the Energy, Minerals and Natural Resources Department (EMNRD) to develop a comprehensive plan for modernizing the grid. This includes infrastructure improvements necessary for integrating renewable energy sources and updating interconnection rules to manage the increasing volume of requests.[52] The Community Solar Act and recent updates to the interconnection rule are steps toward this modernization.

Several interviewees pointed to DSP legislation that recently passed in Colorado under SB 24-218. This legislation mandates utilities to propose alternatives to expensive interconnection upgrades, such as flexible interconnection tariffs or phased agreements. It also requires a streamlined interconnection process and identifies hosting capacity for underserved communities.

In summary, adopting proven DSP strategies and continuing to refine local regulations will enhance New Mexico's grid readiness, support renewable energy integration, and promote equitable development across the state.

Conclusions

The transition to renewable energy often highlights the generation of electricity, with much less attention to the critical infrastructure necessary to transmit and distribute the electricity to households. In many parts of the country, such infrastructure suffers from deferred maintenance and neglect, particularly those in remote, rural areas or Tribal reservations.[53] As such, it is critical to develop strong standards and clarity around the process of calculating the cost of necessary upgrades, sharing and allocating those costs, and evaluating the impact on vulnerable customers.

Efficient, accessible interconnection at fair cost to customers and developers is a fundamental step to achieving New Mexico's renewable energy goals under the Energy Transition Act of 2019.[54] Despite having some of the best interconnection policies in the country, as evaluated by the Interstate Renewable Energy Council, New Mexico, like other states, is struggling to keep up with necessary improvements to infrastructure, policy and capacity.

With limited staff and enforcement mechanisms, utility commissions across the country struggle to hold utilities responsible for providing reliable, affordable, and most importantly equitable, electric service. This entails not only servicing the most vulnerable communities, but closing the health and wealth gap in the process.

Challenges in interconnection and deploying community solar highlight a conflict of interest between generating private profit and providing efficient, equitable delivery of essential goods and services. These competing priorities become evident in inconsistent implementation of mandated procedures, insufficient capacity and authority, and delays in program deployment.

The complexity and dynamism of these issues requires greater accessibility for the public to understand and engage in these issues. Even during the completion of this report, new developments and regulatory rulings have shifted the landscape around interconnection, and this landscape will continue to evolve and adapt.

We hope that this research helps to align policies, regulatory oversight and utility best practices to expedite renewable energy deployment and grid modernization while safeguarding equitable and accessible, community-driven renewable development. Public Power New Mexico will continue researching and engaging with communities in other service territories including co-ops, municipal, and tribal utilities to better understand opportunities and challenges facing communities who wish to adopt renewable energy.

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