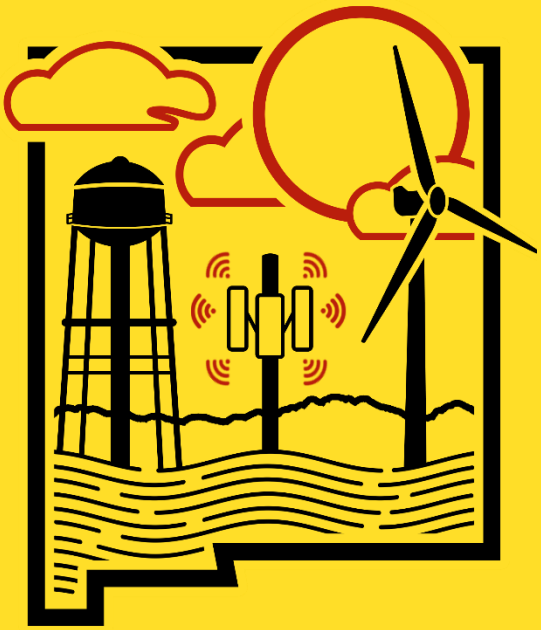
Rural Infrastructure Needs Study | 2021

New Mexico



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New Mexico Rural Infrastructure Needs Study

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EXECUTIVE SUMMARY

The past 13 years have been challenging for New Mexico's rural areas. First came the Great Recession of 2008-2009, from which New Mexico had only barely recovered when 2020's COVID-19 pandemic and related economic devastation hit. The effects of these economic shocks are felt most acutely in rural communities, which are often left with few resources to address urgent needs like infrastructure.

To be sure, the price tag to address major infrastructure projects across New Mexico is significant: the high-level estimate of **costs to bridge the broadband gap in New Mexico is $2-$5 billion, $1.4 billion for water, and $350 million to $800 million wastewater**. While pinpointing exact costs can be difficult, these numbers give a sense of the magnitude of need. Chapters contained within this report delve into more specifics on project-level considerations for broadband, electrical, water, and wastewater. While there are hurdles, in-hand and expected resources from grants, loans, reserves, and various State revenues, can go a long way to closing these gaps.

This Rural Infrastructure Needs Study ran from late May through early December, 2021. A team of area experts reviewed recommendations and best practices, analyzed costs, and researched funding opportunities. This report represents a synthesis of existing research and state and regional reports, supplemented with dozens of interviews with local, state, and regional government officials as well as academics and policy experts. Recommendations contained in this document are drawn from these expert sources. The high-level takeaway from this research is that the **State and local communities do not have the planning and technical support resources to be successful in addressing rural infrastructure needs**. Local communities often lack necessary capacity, and high staff turnover drains the limited institutional knowledge required to approach planning and funding projects. Even at the state government level, there is often insufficient planning to support competitive grant and loan applications. For instance, the 2021 federal Infrastructure Investment and Jobs Act has allocated a total of $42.5 billion nationally via the Broadband Equity, Access, and Deployment Program. It is estimated that New Mexico could expect to see up to $400 million of this funding. However, before

KEY TAKEAWAYS

In addition to detailing statewide gaps in infrastructure service provision, this report identifies a variety of programmatic and policy recommendations to better address gaps and community needs. Key takeaways include:

- *Technical resources and navigation supports are needed to help communities steer through complex infrastructure planning and funding structures.*
- *Some communities need help connecting to experts in engineering and planning.*
- *Small communities and utility systems can struggle to meet grant technical requirements, including financing match.*
- *Programs funded through Severance Tax Bond Revenues are, in current form, inefficient mechanisms for funding major infrastructure projects*
- *The State anti-donation clause can slow project progress because of the prohibition on benefitting private entities.*
- *The state should set high level priorities to guide regional and local project planning efforts.*
- *High-quality data across all infrastructure areas are limited.*

seeking out these competitive funds, the State must first have a five-year action plan that meets federal specifications and details its investment priorities.

Complicating planning processes at the state or local levels is a general lack of high-quality data across infrastructure areas. For instance, the State lacks an apparatus to track and measure household and business internet access and speeds. The New Mexico Public Regulation Commission does not collect or publicly report on electrification by customer type and census tract, meaning that detailed data are not available on the number of households that are unelectrified or where these households are located. Finally, there is no systematic monitoring or reporting on the water supply and usage data that is critical to making accurate plans. The burden for data collection and tracking often falls to the local level, typically tied to a specific grant request. This means that data collection is piecemeal and intermittent across infrastructure areas; by contrast, many peer states in the region conduct widespread data tracking on the consumer side of infrastructure use.

Because New Mexico does not have a central office to support infrastructure projects, small communities report feeling overwhelmed and unaware of the full range of resources available to them. Many jurisdictions would benefit from technical assistance to better support strategic planning, engineering and environmental assessments, data collection and monitoring, project design and feasibility, and accurate budgeting and timelines.

FINDINGS FROM STAKEHOLDER INTERVIEWS

A major component of the study was outreach to local and regional agency staff to understand the challenges related to infrastructure provision and accessing existing funding sources. Below is a selection of the limitations identified by interview subjects:

- **Planning funding is too limited** in both amount available and how it can be used;
- **Loan funds are not a viable solution for small systems** with limited debt capacity;
- **Matching funds are a struggle** in communities that have already committed all available internal resources;
- **Both grant and loan funds need to be more flexible** in their allowable uses and in their deployment timelines to fit the needs of communities. Financing requirements should not force communities to alter projects to fit requirements;
- A state-level on-call **engineer and planner fund to support work in under-resourced communities** would be beneficial, so that the community staff need not to seek out their own engineers, determine scopes of work, pricing agreements, etc. in order to fulfill state and federal grant and loan requirements;
- **The state's anti-donation clause has had a chilling effect** on a wide range of infrastructure projects via its prohibition on allocating state funds to private entities or to benefit individuals.

BEST PRACTICES FROM OTHER STATES

Other states have been successful in establishing systems and processes that ease completion of infrastructure projects. These examples are featured throughout the report. Below are highlights.

- **Consolidate oversight and communications channels.** New Mexico features a range of agencies that are responsible for various aspects of infrastructure planning, financing, construction, and oversight. Other states, by contrast, consolidate these services.

  - The Arizona Corporation Commission is in charge of regulatory oversight for all utilities, including electric, gas, telephone, water, and wastewater.
  - The Colorado Department of Local Affairs is that state's primary entity for handling infrastructure projects, simplifying processes for rural communities.
  - Montana's Wastewater and Solid Waste Action Coordinating Team (W2ASACT) is a group of professionals from state, federal, and non-profit organizations that finance, regulate, or provide technical assistance for community water and wastewater projects. It seeks to improve environmental infrastructure and simplify funding processes.
- **Set high-level priorities and review criteria to help inform local decision making on priority projects.** Other states set priorities that inform project prioritization across departments to better allocate scarce resources where they are most needed.
  - The Colorado Together We Build Report (2020), prioritizes projects using three criteria: 1) Immediate, 2) Enduring, and 3) Equitable.
  - In Kentucky's Better Kentucky Plan (2021), three areas are highlighted for investment: 1) Education, 2) Water, and 3) Internet.
  - To finance broadband efforts while not forcing small communities to compete directly with larger ones, Montana prioritizes "frontier, unserved, and underserved areas."
- **Improve data collection**. New Mexico's data methods lag behind other states, which puts the State and communities at a disadvantage for funding resources and inhibits planning efforts.
  - Georgia has been a leader in broadband data, developing its own robust data collection system and mapping capabilities over the past three years.
  - The state of Florida makes extensive use of Geographic Information System (GIS) and Light Detection and Ranging (LIDAR) to map water resources and inform planning.
- **Revise the anti-donation clause.** While many states have anti-donation clauses on the books, they tend to either be less strict or to allow for exceptions in certain cases.
  - New Mexico has among the nation's strictest and least flexible anti-donation clauses, which hinders public-private partnerships in infrastructure projects.
  - Colorado also has an anti-donation clause, but the Colorado Supreme Court found that if the legislature deems the project is for a public good, then the anti-donation clause does not apply.

CRITICAL ACTION STEPS

Research shows that dollars spent on infrastructure projects can generate significant returns from increased productivity, tax revenue, and improved livability attracting new residents to communities. Money spent on infrastructure is an investment in the future. To address the issues elaborated on throughout this report, the state can take some immediate steps, as follows:

1. **Empower the Director of the Office of Broadband Access and Expansion to work with the Department of Information Technology to adapt a 5-year strategic broadband plan** from the existing Broadband Strategic Plan, published in 2020.
2. **New Mexico's seven Councils of Governments are on the front lines of infrastructure deployment and would benefit from sufficient funds to hire technical support positions** that can help communities navigate complicated and technical financing processes.
3. **Begin work immediately with data experts in relevant departments to develop a plan to improve statewide data collection methods and approach**. Without quality data to inform decision making, the state cannot accurately determine project priorities, areas of local need, or project costs.

INTRODUCTION

WHY INVEST IN INFRASTRUCTURE?

Infrastructure is much more than just extending cables, pipes, and wires. It is also an investment in public health and economic development–improved quality of life, new jobs, and increased resiliency. While the upfront costs can be high, the returns can be far greater. A 2017 study by the Georgetown University Center on Education and the Workforce looked at the impact of a hypothetical trillion-dollar infrastructure package and estimated that it would **create over 11 million jobs nationally over ten years**. The study also found a major infrastructure program could "revitalize the blue-collar economy," as approximately 55% of the jobs would go to workers with a high school diploma or less.[1] Further, investing in infrastructure tends to pay for itself over time. The Business Roundtable, in its own infrastructure study, found that **every $1 invested in infrastructure delivers $3.70 in economic growth over 20 years**, when factoring in household income and other economic indicators.[2] These findings are newly relevant, given the $1.2 trillion Infrastructure Investment and Jobs Act (Infrastructure Bill) that passed in November 2021.

High levels of investment leading to improvements in economic outlook are crucial for New Mexico's development, and even for public health. Many studies have established a relationship between gaps in infrastructure, such as availability of clean and reliable water and electricity, with health outcomes. Inadequate infrastructure can also hurt businesses and people's economic prospects. For instance, according to a 2021 Small Business Development Center (SBDC) New Mexico Small Business Infrastructure Survey, which was specifically conducted for this report, a sizable proportion of small businesses report infrastructure issues.[3] Fully 26% say that broadband internet access (or lack thereof) has a negative impact on their business, 6% say the same for drinking water, 5% say for electricity, and 4% said for wastewater. These infrastructure gaps are reported by businesses across the entire state, but are the most acute in smaller communities. Survey respondents cited that infrastructure issues slow business growth and cut into profits. If infrastructure barriers were removed, 19% of survey respondents believed they would be more profitable, 18% would expand services, and 15% would lower their prices for their customers. Importantly, 13% stated that improved infrastructure would allow them to keep their business in New Mexico over the long term. Inequitable infrastructure can lower the quality of life and slow economic growth, contributing to persistent poverty, poor health outcomes, and low income that disproportionately affect rural areas.

[1] Trillion Dollar Infrastructure Proposals Could Create Millions of Jobs," Georgetown University Center on Education and The Workforce, 2017, https://cew.georgetown.edu/wp-content/uploads/trillion-dollar-infrastructure.pdf.
[2] "The macroeconomic impacts of reinvesting in America's infrastructure systems," Business Roundtable, Delivering for America, January 2019, https://www.businessroundtable.org/delivering-for-america.
[3] Small Business Development Center New Mexico, "2021 Small Business Infrastructure Survey," November 12, 2021.

REPORT TIMELINESS

This report comes out of a recognition by State legislative leaders of the importance of an approach to infrastructure that overcomes rural challenges. In early 2021, leaders created the Rural Economic Opportunities Task Force– a bipartisan, bicameral committee with the mission to evaluate and address the needs of New Mexico's rural communities. Crucial to the success of that effort is a baseline analysis of rural infrastructure and an understanding of the costs required to close the gaps in broadband, electric, and water/wastewater. The timing of this Rural Infrastructure Needs Study is fortuitous, as it coincides with historically high levels of federal infrastructure investments, coupled with larger-than-average state revenues, allowing New Mexico more financial freedom to support communities than in a typical year. The 2021 Federal Infrastructure Bill follows previous investments from the CARES Act and ARPA COVID-19 relief funds. Together, along with the state's current budget surplus, this represents an unprecedented opportunity for New Mexico to turn the tide and close gaps. Relevant to this report, the Infrastructure Bill includes the following:

- **Clean water**. $55 billion to expand access to clean drinking water for households, businesses, schools, and child care centers nationwide. The legislation will invest in water infrastructure and eliminate lead service pipes, including in Tribal Nations and disadvantaged communities.
- **Broadband access**. $65 billion to help ensure that Americans have access to reliable high-speed internet. The legislation will also help lower prices for internet service. New Mexico must complete a five-year action plan, with highlighted investment priorities, in order to be eligible for much of this funding.
- **Electric grid improvements**. $65 billion for clean energy transmission and grid upgrades, building thousands of miles of new, resilient transmission lines to facilitate the expansion of renewables and clean energy, while lowering costs. It will finance programs to develop, demonstrate, and deploy cutting-edge clean energy technologies to accelerate transition to a zero-emission economy. The legislation will also invest $7.5 billion to build out a national network of electric vehicle chargers, including along highway corridors to facilitate long-distance travel and convenient travel within communities.
- **Climate change, cyberattacks, and extreme weather**. $50 billion to protect against droughts, heat, floods and wildfires, in addition to a major investment in weatherization.

While some of these dollars will come to New Mexico via formula funds, much of the funding will require that New Mexico compete with other states. To prepare for these competitions, the State of New Mexico, regions within the state, and local communities must be organized with plans in place and priority projects in high need areas identified.

ADDRESSING STATEWIDE INFRASTRUCTURE NEEDS

To set the state and its communities up for short- and long-term success, New Mexico would be wise to consider regional approaches to infrastructure planning and funding. For the most part, infrastructure challenges do not stop at a municipal, tribal, or county boundary. Thinking in more collaborative terms will help position the state for larger federal awards, achieve economies of scale, and address the needs of more people across multiple communities. Collaboration also has the potential to offset weaknesses and highlight New Mexico's diverse and unique places, which include tribal, Colonias, and frontier communities.

In researching for this report, it has become clear that having strong planning and data mechanisms in place are core to developing effective strategies around infrastructure. Historically, efforts on both these fronts have been and remain disjointed. The last time the state government engaged in a holistic infrastructure planning exercise was during Governor Bill Richardson's administration in 2003. The Richardson-era report, written by the Governor's Finance Council, highlights a number of issues, many of which have not progressed in the past 18 years. The report cites the following:

- Lack of a unified state-level infrastructure prioritization process, leading to funding that is haphazard, politicized, and unstable.
- Funding decisions are not made with state-level priorities in mind, and often do not involve cooperation between government agencies and the private sector to ensure buy-in and success.
- New Mexico has a "deferred maintenance crisis" across infrastructure areas, which means that communities are stuck in crisis response mode and prevents forward thinking.
- The capital outlay system is "uncoordinated; demonstrates weak planning and lack of identification of priorities; and is highly political."
- There should be more regional thinking on infrastructure, and more planning efforts to ensure that projects actively anticipate future needs and are not merely reacting to what is breaking.

Other states have integrated their infrastructure decision making and response capacity to a great degree, an effort that was accelerated by COVID-19 in some places. These states engage in high-level infrastructure planning, prioritization, and technical assistance. Their more centralized approaches have allowed for easier navigation for communities in need of help, better oversight of the full spectrum of state projects, and greater ability to combine financing in order to start the project quickly. While state economies are complex and a number of factors contribute to prosperity, taking a more coordinated approach to infrastructure development has likely helped communities in these states to access funding for projects. Further, many states encountered in this study already had the infrastructure and organization in place to mobilize quickly to develop a coordinated COVID-19 recovery response in order to deploy funds in a transparent and strategic way.

It is never too late for New Mexico to improve its systems, processes, and funding mechanisms, and now is an opportune time. Leadership from the top levels of state government, supplemented by regional technical assistance supports will help communities to prioritize and plan out their needs, navigate funding resources, and successfully carry out and manage projects. This will require adequate staffing at all levels of government to ensure that rural communities are supported and successful. Investing in infrastructure is about believing in the state's future—improving New Mexico's quality of life and economic productivity while simultaneously increasing resiliency and preparedness.

REPORT SCOPE OF WORK

The aim of this study was to research four infrastructure areas: 1) Broadband, 2) Electric, 3) Water, and 4) Wastewater. Across these sectors, this work identified the areas of highest need in rural areas across New Mexico and attempts to highlight resources and put forth strategies to close gaps by 2030. Work was carried out from late May through early December 2021, with an interim report published in July, and four in-person progress reports. The report that follows seeks to summarize the best practices, recommendations, and field knowledge of experts and stakeholders working in the field, not to produce new scholarship. It draws on existing studies, such as the 2020 Broadband Strategic Plan, the State Water Plan; data from the Infrastructure Capital Improvement Plan, the U.S. Census, and

the FCC; and research from entities including the Legislative Finance Committee, the Southwest Environmental Finance Center, the Utton Transboundary Resources Center, and many others.

Before we get further into the report, it is important to note that different agencies define "rural" differently. In order to assemble data and make appropriate comparisons, we required a general definition, which is contained in the following text box. When consulting the funding opportunities resources contained later in this report, please note that individual agencies and departments may use varying definitions and population cutoffs for what qualifies as a "rural" area.

DEFINITION OF RURAL

This report employs a broad definition of rural. For the purposes of data collection, we have included any county-level region of under 50,000 people, which largely conforms to the United States Department of Agriculture (USDA) cutoff for what constitutes rural. This broad treatment of the term "rural" encompasses the U.S. Census designations of "nonmetro noncore" and "nonmetro micropolitan areas," which include "small urban clusters."

Individual funding sources may apply more specific definitions. Those seeking funding should always read eligibility criteria closely before applying. Funders that define rural by population may have a threshold of anywhere from 2,500 to 50,000. To be certain an area is eligible, read the notes in the Funding Opportunities chapter of this report and consult the funder website where available.

The report is broken into the following topic areas:

1. **Infrastructure Areas**: With subsections for *Broadband*, *Electrical*, and *Water* and *Wastewater*, this chapter shows the level and location of highest need, summarizes best practices, and provides cost estimates and scenarios for narrowing and closing gaps.
2. **Financial Opportunities**: This chapter includes contact information for *technical assistance and general support*, strategies and resources of *reducing costs to consumers*, and provides summary information on the *major grant and loan resources* available under each infrastructure area.
3. **Recommendations and action steps**: To tie together all research and findings, this report offers *actions and recommendations* for how the state can become more effective at fully funding infrastructure projects and related policy recommendations to help close the state's infrastructure gaps by 2030.
4. **Appendices**: This section includes *reference resources* for each infrastructure area, comparison states, and notes and resources that provide further context to the project.

CONSIDERATIONS AND LIMITATIONS

The contracted scope of work for this report was extremely broad and the timeline was short. Over the course of the summer and fall 2021, the project leads at Pivotal New Mexico were able to update the Legislative Council Services staff and members of the Rural Economic Opportunities Task Force on progress, process, and specific topic areas at four meetings held around the state. Deep dives into the workings of individual departments, how the state might restructure or realign resources, or specific

dollar amounts needed for individual action items were beyond the scope and time limitations of this study. Nevertheless, it is this team's sincere hope that the maps, facts, numbers, and other resources contained within this document prove useful for financing projects in the short term while setting up more efficient structures for the longer term. For a broader audience, we hope that this report and the information contained herein can become a useful reference document for planning, grant funding, and other purposes.

PROJECT PARTNERS

This study is the result of coordination and support from a strong partnership of local experts. Pivotal New Mexico (Pivotal), in partnership with the University of New Mexico's Bureau of Business and Economic Research (BBER), Bohannon Huston, Inc. (BHI), and The Grant Plant (TGP), encompassed broad and relevant competencies for this multi-faceted project, with experience ranging from engineering design and costing infrastructure projects, to identifying funding and developing sustainability plans, to research and policy advisement. Pivotal has experience with designing and executing complex projects, conducting in-depth funding research, developing plans to sustain projects, and drafting recommendations for policy and practices. BBER brings well-regarded data and policy analysis competencies. The support provided by BHI ensures that estimates and recommendations are rooted in experience designing and constructing major infrastructure projects across the state and western region. TGP is a state leader in finding and securing funding for public entities and nonprofits. Below is a summary of the project team.

Summary of Project Team Partners and Roles	
PIVOTAL new mexico	• Planning, project oversight; • Contractually obligate funds, track and report on budget expenditures; • Schedule and conduct interviews; • Oversee and conduct research, and supplement partner work as needed; • Lead data collections; keep team on task and on schedule; • Support funding research and recommendations; • Provide insights on braiding funding streams for initial project construction, and resources of supporting long-term affordability; • Lead development of recommendations and action steps to achieve 2030 infrastructure goals; and • Prepare deliverables to be shared with the legislature, including reports and presentations.
BUREAU OF BUSINESS & ECONOMIC RESEARCH	• Oversee demographic data collection and analysis; • Weigh in on policy considerations as needed; and • Assemble data tables, explanatory text and annotations, and additional context.

Bohannan Huston	• Oversee infrastructure cost estimate development; • Share relevant information from project experience on funding considerations, infrastructure systems design/ implementation, and life cycle and maintenance costs; • Provide insight on project feasibility from an engineer's perspective; and • Graphic design and mapping.
THE GRANT PLANT INC.	• Conduct prospect research on available funding sources for infrastructure construction, and to support long-term affordability; • Create tables and overviews of findings, organized by funder type (public, private, debt instrument, etc.); and • Offer recommendations on which funding sources to prioritize.

This report also would not have come to fruition without the financial support and ongoing recommendations and guidance from the State of New Mexico, most specifically the Legislative Council Services and the Rural Economic Opportunities Task Force. Further, findings were enhanced by interviews with dozens of state staff, researchers, and leaders at the local, regional, state, and national levels. We thank those who generously shared their time and expertise, and whose insights and knowledge factored into the information and recommendations presented in the document that follows.

1. INFRASTRUCTURE AREAS

The state of New Mexico covers a vast geographic area marked by distinct differences across regions. Rural and remote communities, depending on their location in the state, may face specific challenges due to geography and resource availability. This situation calls for nuanced decision-making at the state level and strong engagement and supports at the regional level. To bring clarity to economic and demographic data in this report, this study uses the State's seven Council of Government (COG) districts as a means of showcasing New Mexico's distinct sub-regions. The COGs are well-established entities in the state, staff have knowledge of their regions, and maintain community awareness and trust.

WHAT IS A COUNCIL OF GOVERNMENT?

Councils of Government (COGs) are quasi-governmental regional planning agencies and economic development districts. Most regions in the United States are served by COGS, although their specific organization and functions vary by location.

The State of New Mexico is divided into seven COG districts. The structure of each COG office varies based on the local economic development needs of each region. The most common areas of focus are economic development, workforce training, transportation, water, and land-use. The COGs offer planning, coordination, and technical assistance to entities within their region. They can also administer regional programs and act as intermediaries between local government members and communities and the state or federal government.

Comparing the characteristics of COG districts underscores the different opportunities and challenges that each region faces. The charts below highlight the differences between regions in demographics (Figure 1), urban/non-urban composition (Figure 2), and poverty levels (Figure 3).

Figure 1 highlights the racial and ethnic differences between COG districts. While much of the state has a high population of Hispanic and Latino residents, the Northwest New Mexico COG, which includes the Navajo Nation, is an outlier in terms of the proportion of residents who are Native American. This population makeup has ramifications in terms of eligible funding sources, communities' abilities to take on debt, and the most appropriate entities to deliver technical assistance supports.

Figure 1: COG Region Demographic Composition

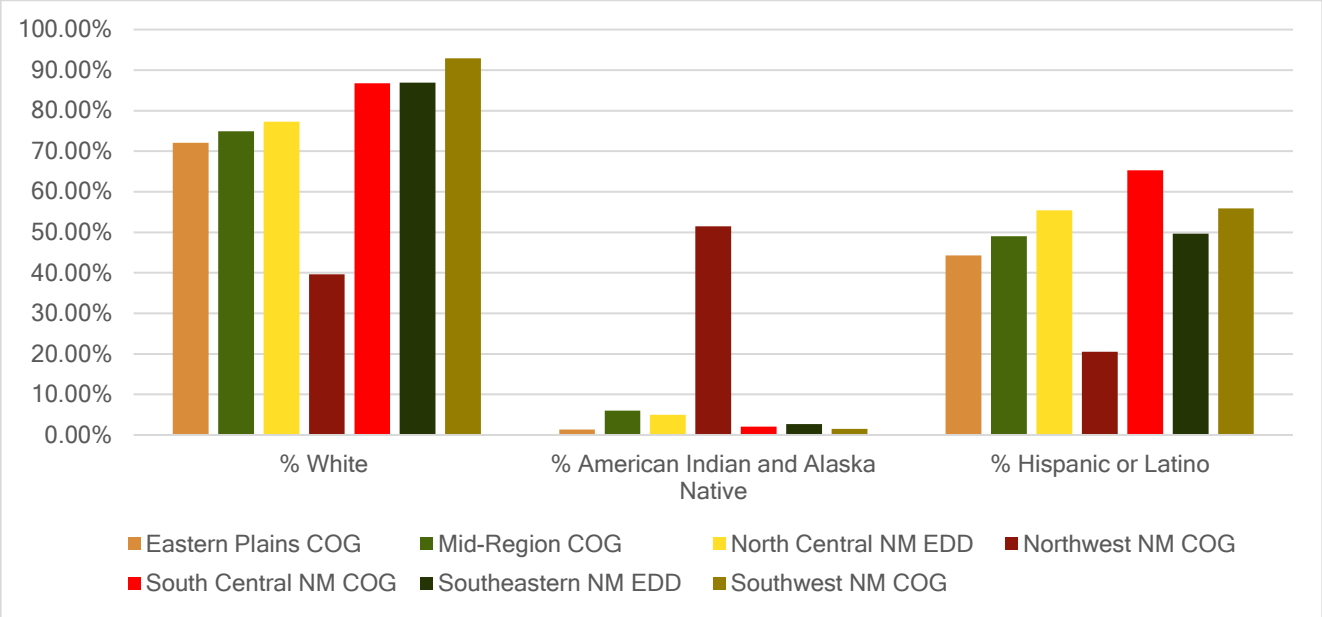


Figure 2 shows just how much of the state's population lives outside of a major urban area. Only the Mid-Region COG, which encompasses Albuquerque, is majority urban. Three of the seven COGs are entirely non-urban. This reality creates challenges for approaching infrastructure gaps, as these areas of the state are more sparsely populated. The difficulty and expense of serving these numerous outposts of small, remote populations will be explored in the infrastructure area subsections below.

Figure 2: Share of Population that Lives Outside an Urban Area, by COG District

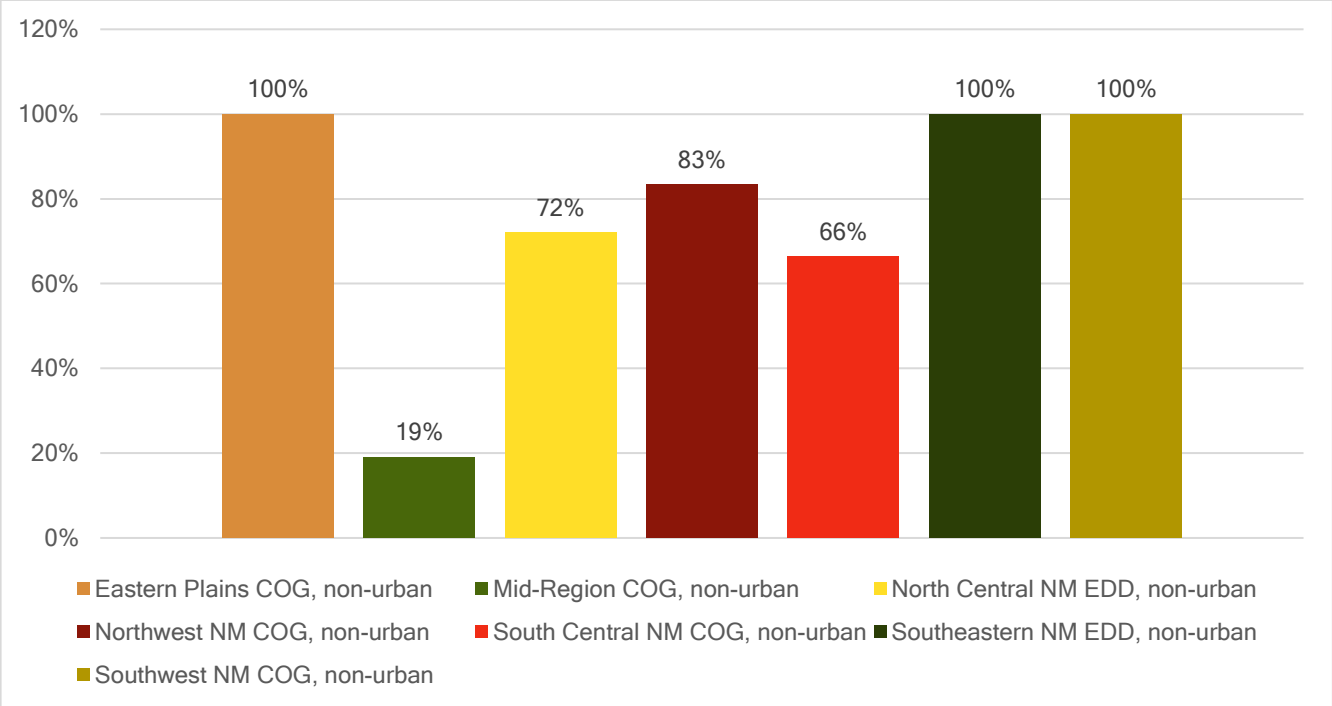
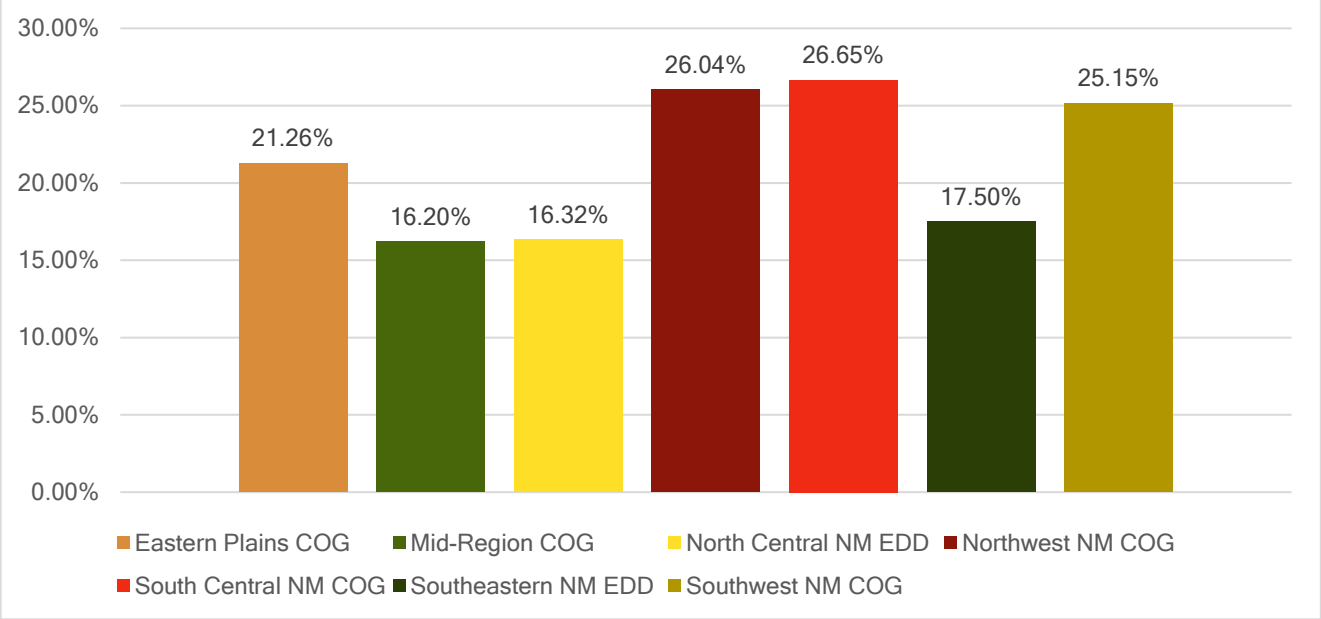


Figure 3 uses poverty as an illustration of the economic condition of each COG district. Every region has a poverty rate well above the national average of 12.3%.[4] However, three regions have a poverty rate of more than 25%. These high rates signal the challenges of not only funding infrastructure projects, but also ensuring that services are affordable to residents. In the Funding Opportunities chapter later on in this report, we will discuss programs to support consumer affordability.

Figure 3: Percent of Population Below Poverty, by COG District



What follows are sub-sections on each of the infrastructure areas reviewed as part of this study: 1) Broadband, 2) Electrical, 3) Water, and 4) Wastewater. In each of these sections, we will discuss the gaps in service, locations of highest need, recommendations and best practices, and estimated costs to close or narrow these gaps.

BROADBAND IN NEW MEXICO

Access to broadband has never been more important. A reliable internet connection is integral to economic productivity, political and civic engagement, educational attainment, and access to quality health care. Recent studies show that New Mexico lags behind its neighbors in broadband access. In fact, Broadbandnow.com ranks New Mexico 49th in the nation for state broadband access.

Broadband is provided largely by the private sector, but can be increasingly thought of as a public good, as quality internet access has become so critical to many who rely on it for business, school, and healthcare. Unequal access to broadband means unequal access to communications and opportunities, hampering the state's economy and well-being and community member's education and economic opportunities.

The economic benefits of broadband are clear. A recent Deloitte study found that a **10-percentage point increase in broadband penetration led to an average job growth of 269,000 jobs per year at the**

[4] American Community Survey 2019, one-year estimates, U.S. Census.

national level.[5] Deloitte found diminishing returns on job gains with speed increase, signaling that internet access, not increasing speeds, should be the primary first objective in a place like New Mexico where so many remain unserved. The section that follows discusses internet access in New Mexico, best practices and emerging technologies, funding needs and gaps, and the potential role of the public sector in expanding access.

BACKGROUND

"Broadband" refers to telecommunications technology that provides a high-speed connection to the internet, with speeds measured in megabits per second (Mbps). The Federal Communications Commission (FCC) has set the nationwide broadband threshold at a 25 Mbps download speed and 3 Mbps upload speed; this is the level below which the FCC has determined connection speeds cannot not convey the full economic and social benefits of internet access. A broadband network can employ either wireline technology networks, which transmit data using wires or cables, either laid underground or strung aerially, or wireless networks, which transmit data through the air via antennas and radio waves.[6] New Mexicans rely on a combination of wireline and wireless technology for their internet connections.

Five-year 2015-2019 American Community Survey (ACS) data estimates indicate that approximately 20% of New Mexico households do not have an internet connection of any kind, with the lowest rates of access in rural communities. For these places, simply getting internet at all, much less high-speed internet, would be a massive accomplishment. The 2021 FCC Broadband Deployment Report found that **rural communities in New Mexico have the lowest access to broadband in the nation**.[7] Most of the homes and businesses in question are in sparsely populated regions where high capital costs often prevent infrastructure deployment.

Even households that have some type of internet connection may not have sufficiently fast speeds to work, learn, or access services from home. A 2020 analysis of internet usage data found that **more than 70% of New Mexican households do not have an internet connection at broadband speeds of 25 Mbps / 3 Mbps**.[8] These homes might be able to use the internet for some tasks, but cannot join work

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[5] Deloitte, Broadband for All: Charting a path to economic growth (April 2021), https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-broadband-for-all-economic-growth.pdf.

[6] Wireline technology types: 1. Digital subscriber lines (DSL) transmit data over copper telephone lines and offer the slowest connection speeds. 2. Cable connections use the same cables that transmit television signals and offers speeds greater than DSL. 3. Fiber optic connections offer the fastest broadband speeds. Fiber optic cables transmit signals through small glass filaments and are not susceptible to weather corrosion or outside signal interference.
Wireless technology types: 1. Fixed wireless uses antennas on poles or towers to transmit data through to air individual homes and businesses, offering speeds comparable to DSL and cable. 2. Satellite broadband connections transmit data between antennas on the ground and orbital satellites with speeds comparable to cable. 3. Mobile wireless service uses a different portion of the radio spectrum to send signals directly to consumers and is commonly used in cellphones, like 4G.

[7] FCC Fourteenth Annual Broadband Deployment Report, 2018, https://www.fcc.gov/document/fcc-annual-broadband-report-shows-digital-divide-rapidly-closing. The FCC collected data on broadband availability from ISPs nationwide on their service territories, coverage, speed, and technology. The data are self-reported by ISPs on the Form 477. This data source typically exaggerates actual coverage because if one subscriber can be served in an area, the service provider can declare the entire area served even if there are no other households that receive service.

[8] Data on broadband usage speed was estimated by Microsoft's Airband Initiative and published by the U.S. Department of Commerce National Telecommunications Information Administration (NTIA). Microsoft gathered

meetings, attend class, or receive telehealth care due to low connection speed. The combination of lack of broadband infrastructure, unavailable high-speed connections in some places, and high subscription costs means that many New Mexicans are not experiencing the full economic and productive benefits of broadband.

Complicating planning efforts to get internet service to communities is the fact that the data available on the presence of high-speed internet is notoriously unreliable. This is because the most common large-scale assessments of broadband access rely on a survey conducted by the FCC, which asks the Internet Service Providers themselves to describe the areas they serve and their levels of access. According to the FCC, 14.5 million people nationally did not have broadband in 2020. However, Microsoft, which collects its own data, estimates that the number of people who do not use the internet at broadband speeds was 120.4 million in 2020, a disparity of nearly 106 million people.[9] Broadbandnow.com, which also seeks to provide more accurate data, estimates that 482,345 New Mexicans do not have access to high-speed internet, while the FCC puts the number at 270,000. The U.S. Congress passed legislation in early 2020 requiring the FCC to collect more accurate data, but implementation has been slow and new FCC maps are not expected until late 2022. Unreliable federal data puts the onus on states to improve their data collection methods. Those states that do improve their data will be in a stronger position to win federal awards.

In spite of their shortcomings, FCC reports and U.S. Census data will be used in this study, as they are still the best currently available. This report focuses where internet connections exist, first and foremost, as simply connecting to the internet and ensuring that it is affordable are crucial first steps in a state where lack of access is widespread. Determining internet speeds in New Mexico's rural communities is difficult, and developing a system to collect this data statewide was outside of the scope of this report.

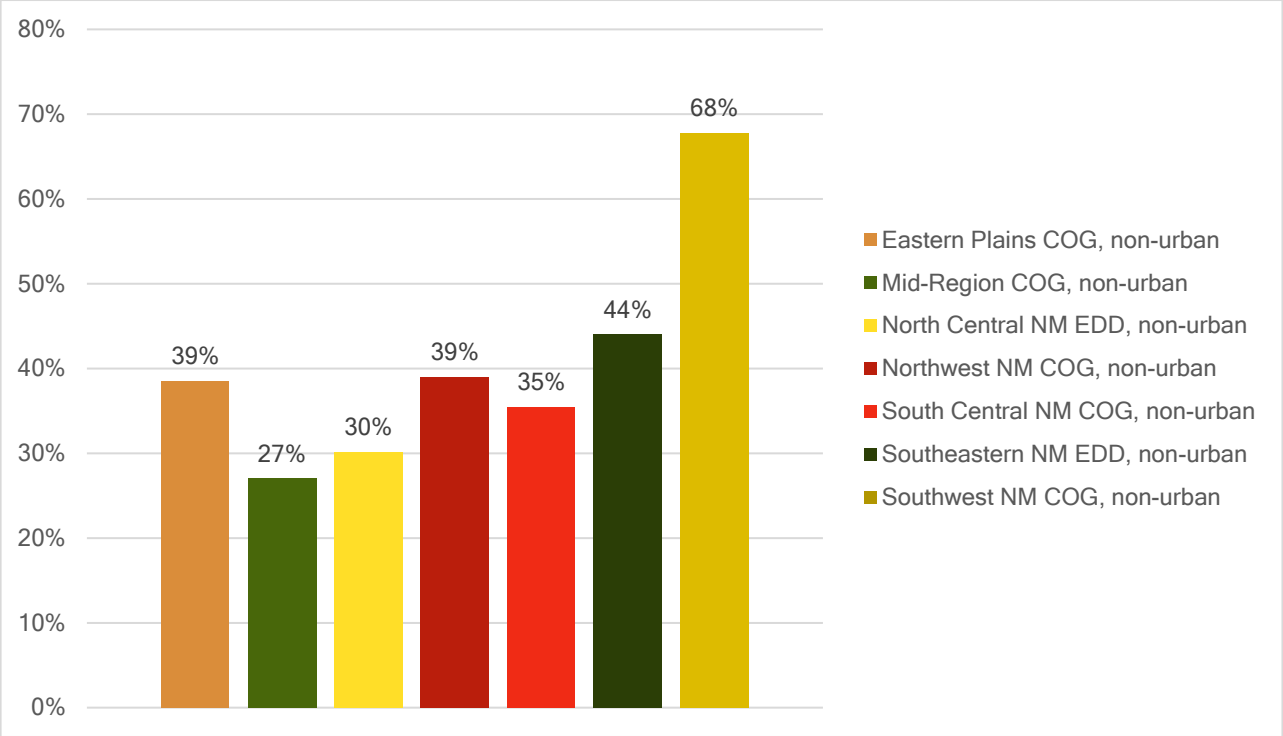
PROFILE OF NEED

New Mexico's poor internet access is in part a problem of geography—New Mexico is a large, mountainous state with a small, widely dispersed, population. This makes it more difficult to bring the basic infrastructure required to communities needing reliable internet access or faster speeds. Figure 4 shows the proportion of residents in each COG district that live in census tracts with low levels of internet access. This chart does not show the proportion of people who lack internet, but rather those who live in areas with poor internet infrastructure. This chart illustrates the variability and relative concentration of need across the COG districts.

usage information each time a device receives an update or connects to a Microsoft service. This allows insight into the percentage of people in an area that use the internet at broadband speeds based on the FCC definition of 25 Mbps/3 Mbps.

[9] United States Broadband Usage Percentages Dataset," Microsoft, 2021, https://github.com/microsoft/USBroadbandUsagePercentages.

Figure 4: Share of Non-Urban Households That are in Census Tracts with Limited Internet Infrastructure, by COG Region



The following pages include maps showing census tracts outside of cities and urban areas, which illustrate clearly where New Mexico is behind in deploying internet to its residents. Figure 5 shows the proportion of households without an internet connection across census tracts. This map has removed urban areas from the dataset in order to show more clearly the level of access in rural communities. The largest concentrations of households without internet access are in sparsely populated areas most distant from the state's high-speed internet backbone, which runs from Albuquerque to Las Cruces.[10] However, there are census tracts with low access throughout the state.

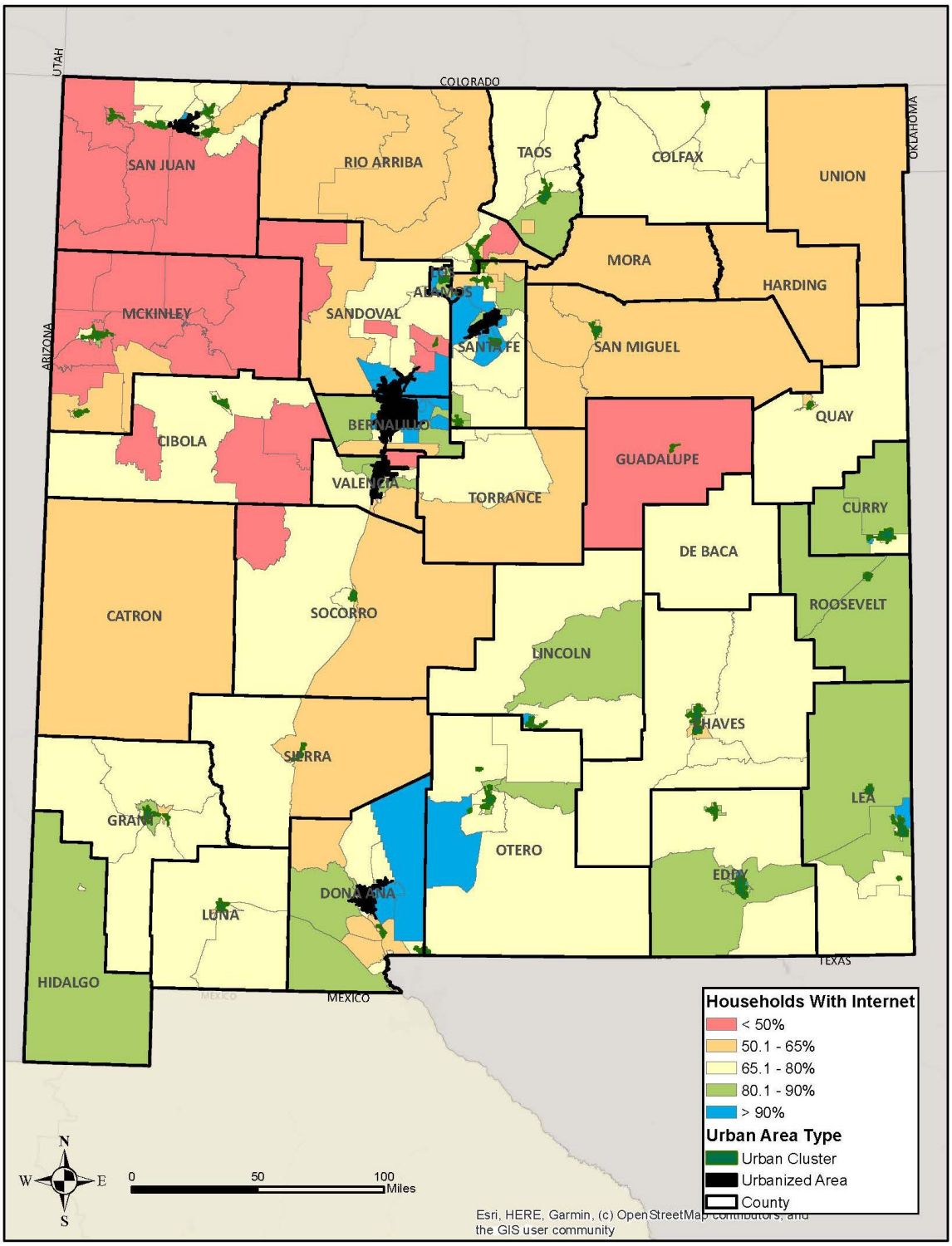
Following the state-level map in Figure 5, Figures 6-12 show census tract-level detail for each COG district. These maps include a tribal boundary overlay to show the overlap between lower levels of access and tribal lands. This relationship is particularly strong where a tribal area is remotely located. These maps also illustrate that proximity to an urban area benefits rural census tracts, as they can capitalize on nearby telecommunications infrastructure.

A notable bright spot in internet access is centered around Santa Fe and Los Alamos, in the North Central EDD region. In addition to benefitting from resources such as the state capital and Los Alamos National Lab, communities in this area also can join into a middle mile network, Redi-Net. Redi-Net is owned and operated by a consortium of Northern New Mexico local and tribal governments, including Los Alamos, Rio Arriba, and Santa Fe Counties; North Central New Mexico Economic Development District; and the Pueblos of Ohkay Owingeh, Pojaque, Santa Clara, and Tesuque; Los Alamos National Lab, the city of Española, and Jemez Mountains Electric Coop. This network provides high-speed internet to anchor institutions such as schools, libraries, and hospitals. It emerged out of a planning exercise in response to the last major federal stimulus funding in 2008, the American

[10] A backbone is broadband infrastructure that makes it less expensive to expand service along a corridor.

Recovery and Reinvestment Act. The recovery and infrastructure funding currently flowing from the federal government are opportunities to replicate this approach more broadly. While Redi-Net does not bring internet to people's homes, it has formed a middle mile network that brings infrastructure and access to communities more broadly. It also partners with last mile providers to connect households.

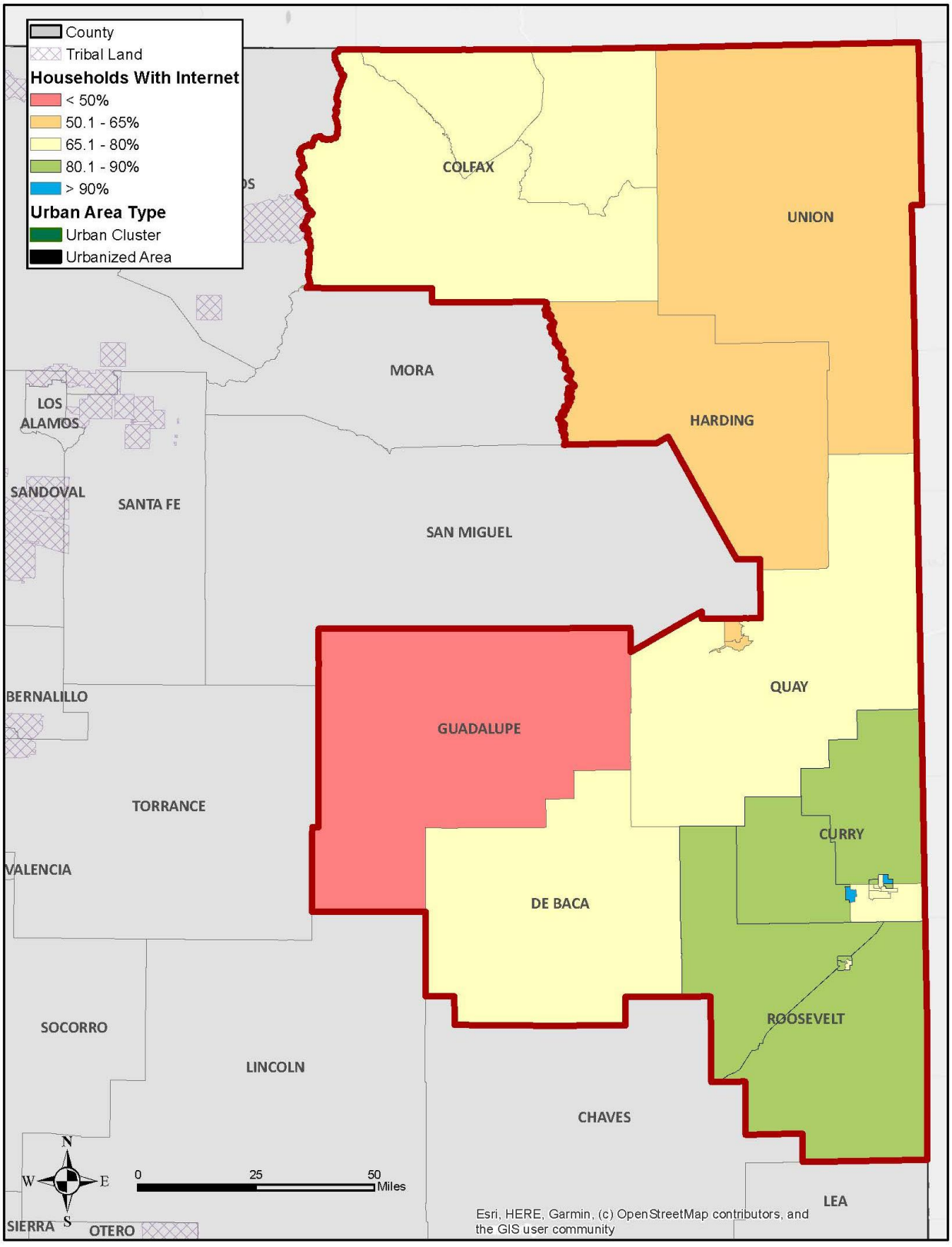
Figure 5: Internet Access by Census Tract[11]



[11] Map data source: NTIA and U.S. Census. All maps created by Bohannon Huston, Inc. using GIS.

Figures 6-12: Internet Access by COG District, with Tribal Areas Shown[12]

Figure 6: Internet Access in the Eastern Plains COG



[12] Map sources: NTIA and U.S. Census.

Figure 7: Internet Access in the Mid-Region COG

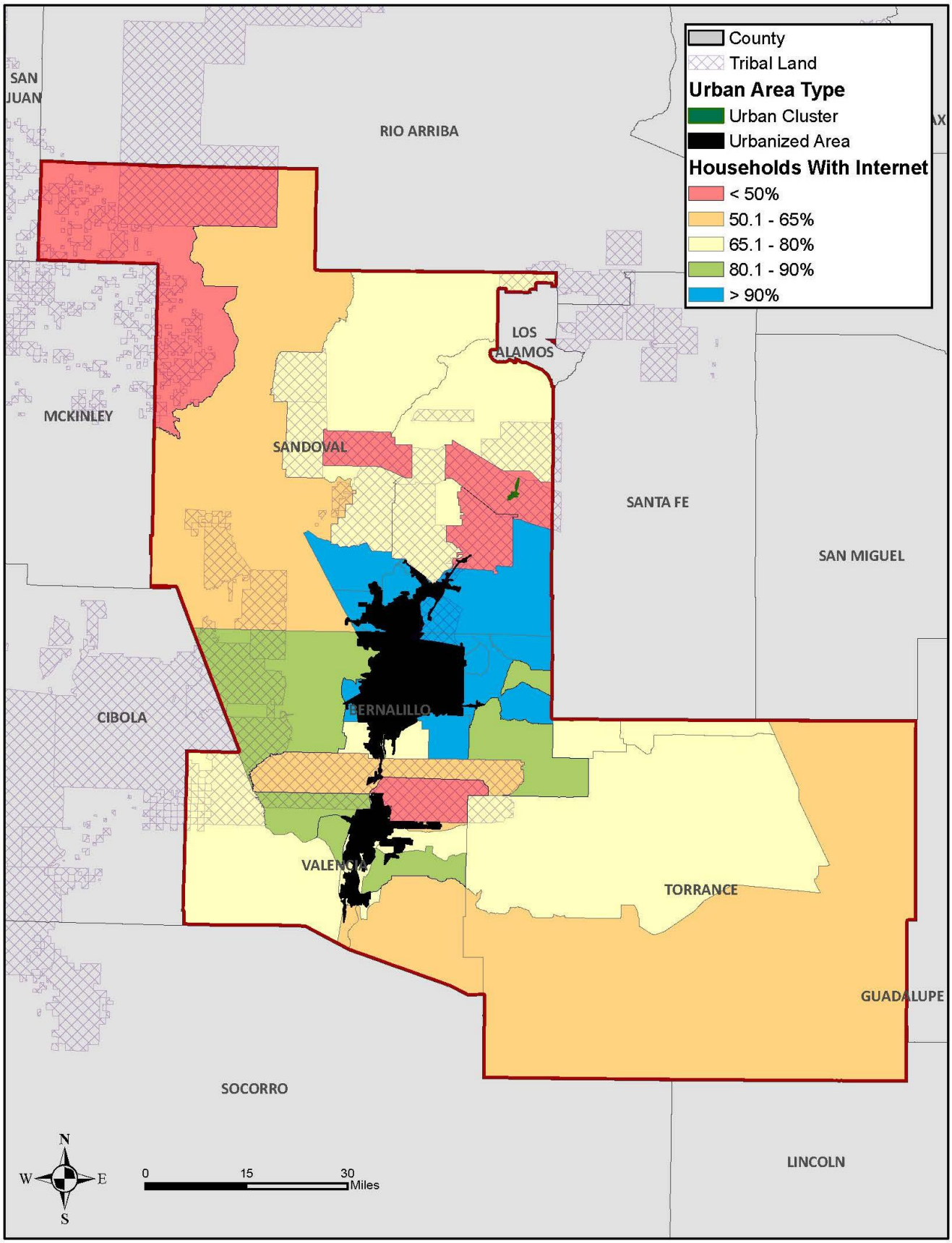


Figure 8: Internet Access in the Northwest New Mexico COG

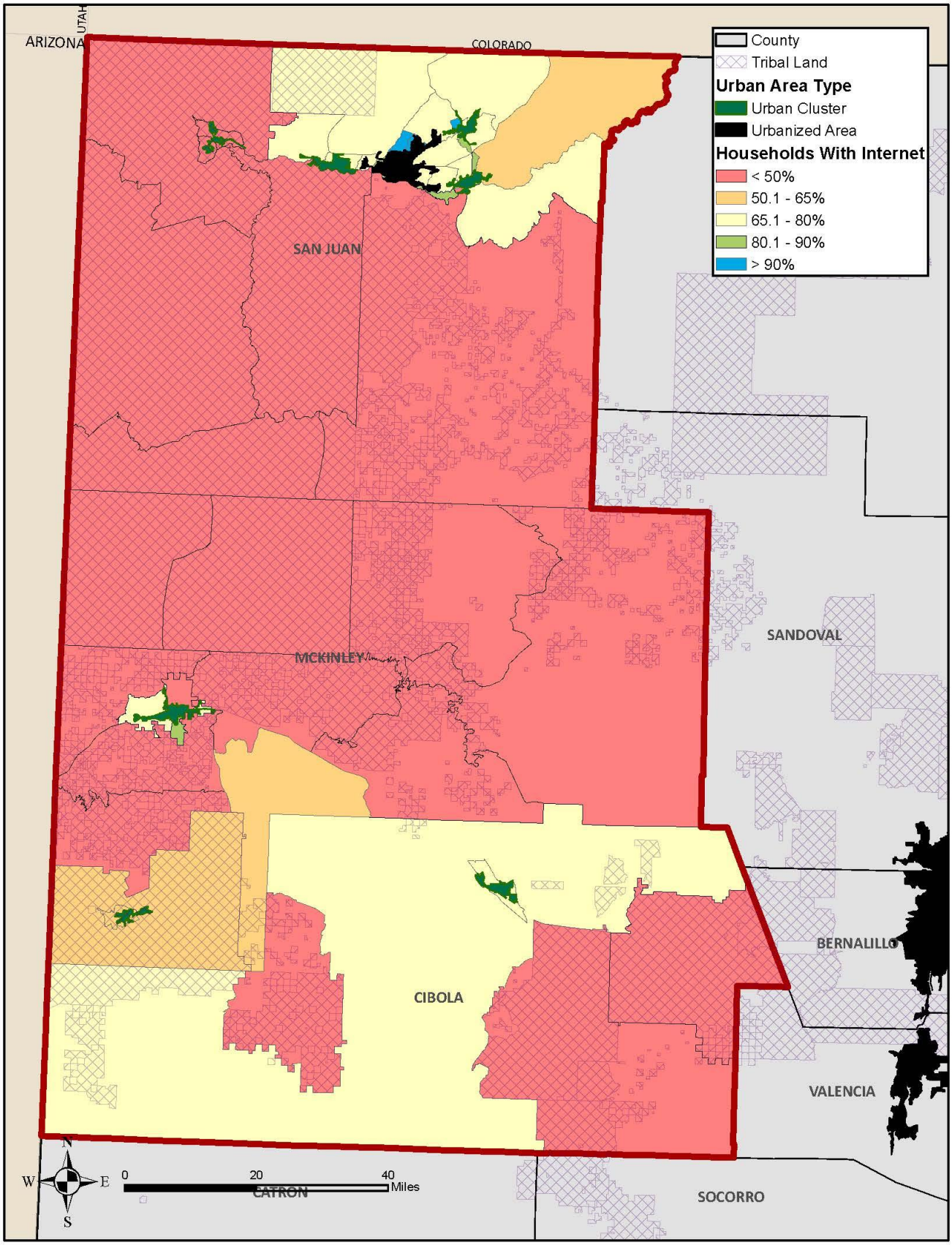


Figure 9: Internet Access in the North Central New Mexico EDD

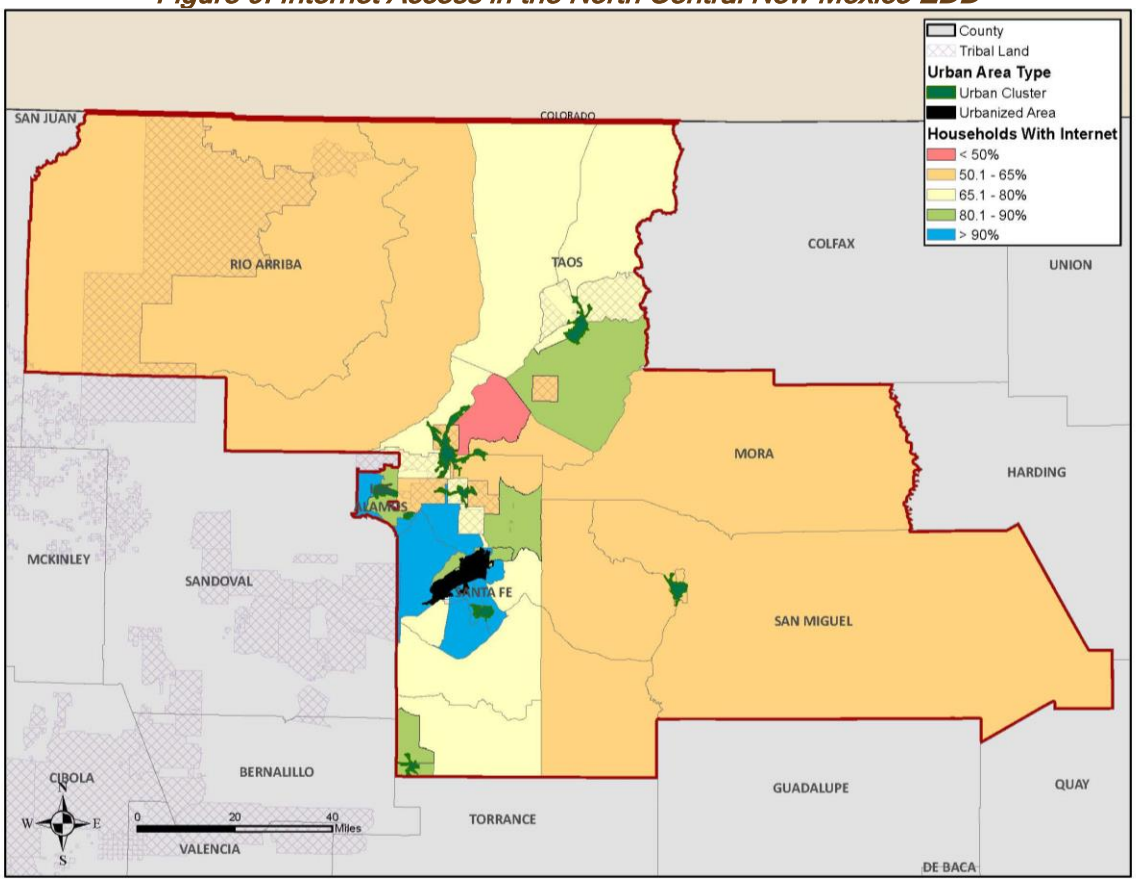


Figure 10: Internet Access in the Southeastern New Mexico EDD

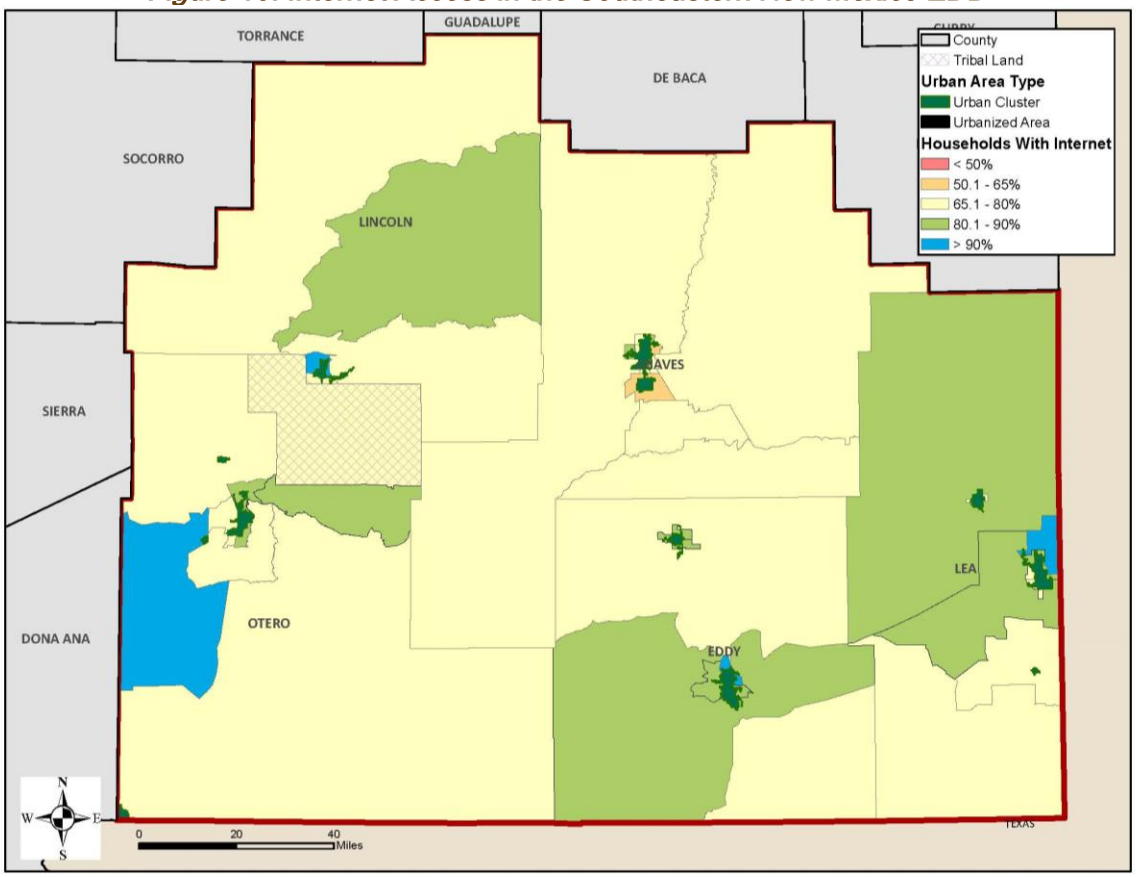


Figure 11: Internet Access in the South Central COG

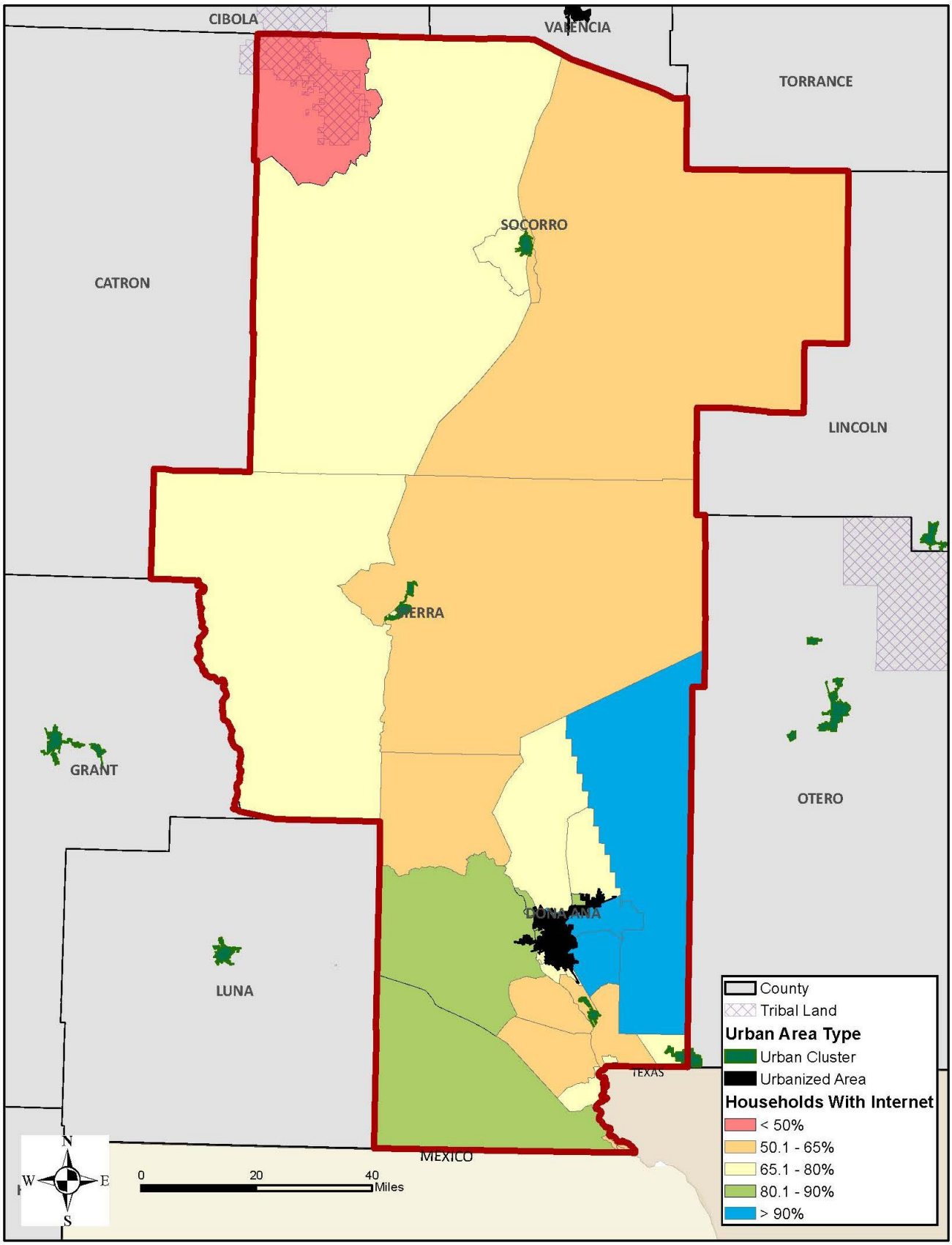
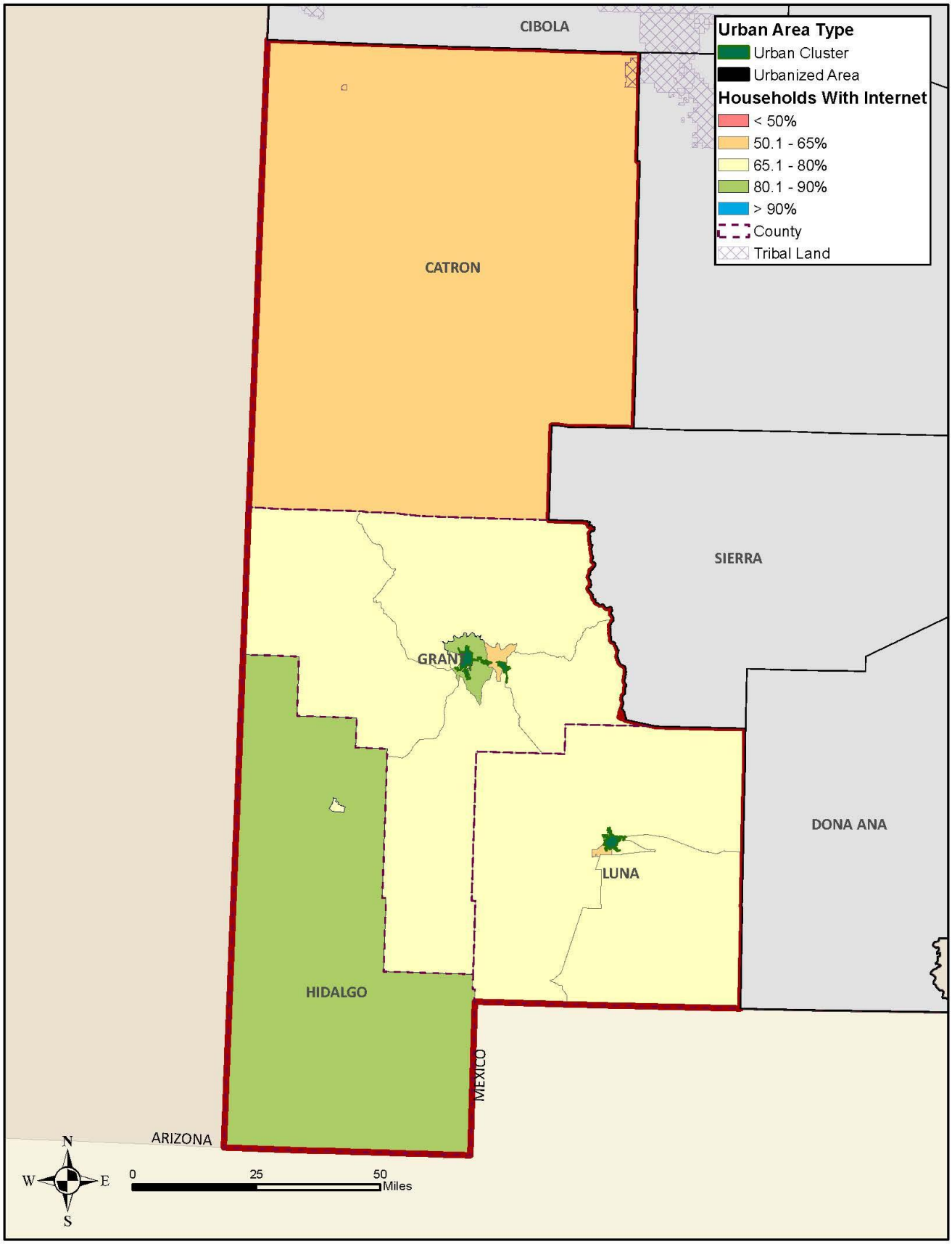


Figure 12: Internet Access in the Southwest New Mexico COG



POLICIES AND BEST PRACTICES

In New Mexico, most broadband services are provided by private, for-profit companies. For many years, regulation and involvement of the State of New Mexico in broadband was under the purview of the Public Regulation Commission (PRC), with seven other agencies tasked with addressing and implementing portions of the broadband system–these have included the Department of Information Technology, the Public Regulation Commission, the Department of Transportation, and the Public School Facilities Authority. However, recent legislation allows the State to centralize oversight, planning, and administration. In alignment with New Mexico's 2020 Broadband Strategic Plan (see text box below for high-level recommendations), the New Mexico Legislature created the Office of Broadband Access and Expansion in 2021, which is administratively attached to the Department of Information Technology. The office is intended to coordinate broadband activities throughout the state, engage in strategic planning, and maintain broadband coverage maps and data.

The New Mexico Legislature also recently enacted the Connect New Mexico Act to establish the Connect New Mexico Council. The Council is directed to develop a digital equity plan and administer a competitive grant program. Eligible awardees include local governments, state agencies, public educational institutions, tribal governments, and certain private entities working in a public partnership. The bill does not contain an appropriation for the grant program. The New Mexico Department of Transportation (NMDOT) plays a role in regulating broadband. The NMDOT issues permits for utility installation, including fiber optic cables and other infrastructure in state-owned highway rights-of-way.

Recommendations from the State's Broadband Strategic Plan (2020)

The State of New Mexico's Broadband Strategic Plan includes nine recommendations for meeting broadband infrastructure needs in New Mexico, which are summarized below.

1. *Establish and fund a grant program to expand rural broadband and leverage federal funds.*
2. *Prioritize fiber-based rural broadband solutions.*
3. *Prioritize fiber and wireless networks over legacy copper networks.*
4. *Include broadband in COVID-19 recovery planning.*
5. *Provide local technical assistance to companies and communities for broadband planning.*
6. *Prepare to leverage existing and future broadband funding.*
7. *Support local anchor institutions like libraries and schools to plan collaboratively and aggregate demand.*
8. *Elevate and fund the state's broadband office.*
9. *Develop a digital equity plan to complement the state's broadband strategic plan.*

National Best Practices

Across the nation there are clear examples of how New Mexico can better address broadband needs. State leaders can prioritize smart broadband investments by targeting funding toward practices known to promote longevity, impact, and long-term returns. This includes redirecting funding away from copper cable infrastructure and toward fiber network construction to increase bandwidth capacity for sustained future growth. By prioritizing fiber, New Mexico can build a long-lasting foundation of reliable broadband infrastructure. See the Appendix for a summary of state broadband providers and the primary technology type currently used.

National best practices highlight three key features to expanding broadband access, as follows:

1. **Centralize broadband coordination through a broadband office**. The state is already acting on this with the creation of the Office of Broadband Access and Expansion.
2. **Support local communities through planning and technical assistance**. Many rural New Mexican communities do not have the necessary expertise, staff, or financial resources to conduct broadband planning, much less to apply for competitive funding. The state, working through its centralized broadband office, can help by engaging in strategic and technical planning. For example, Georgia has a Broadband Ready Community Program, which helps communities interested in pursuing broadband access assemble their planning and data prerequisites. When they receive the designation, communities know they are ready to pursue funding. Further, the program helps the State get a better sense of broadband needs at the local and regional level.
3. **Provide subsidies to internet service providers or local governments through competitive grants**. Such grants can help to offset the costs to companies of expanding internet service. Key components of grant programs include evaluation criteria, clear accountability measures for recipients, and an emphasis on high-speed technology, such as fiber optic networks.

Other effective strategies include:

- **"Dig once" legislation**, which requires state transportation departments to alert internet service providers of planned roadwork so that providers can lay fiber optic cables in ground already opened for roadwork. New Mexico has a dig once policy on the books.
- Require grant recipients to build **infrastructure that is scalable at speeds of 100 Mbps**. This is consistent with federal requirements and will allow communities access to the broadest range of funding.
- Formalize procedures to encourage adoption through **digital literacy and inclusion programs** in communities with low broadband adoption rates. This can be done via partnerships between the state's Broadband Office and anchor institutions like schools and libraries—these entities function as both digital hot spots and provide materials on accessing and affording internet.
- Think of **broadband as a public utility**. Ammon, Idaho is an example.[13] A decade ago, the community began work to build a municipal fiber network using an open access model where the city operates the infrastructure and multiple providers offer services. The model considers broadband an essential public utility, with the goal not to make the most money, but to provide affordable and quality internet service. Households in Ammon voluntarily opt in to sharing the cost of infrastructure upgrades through the creation of local improvement districts; they repay the cost the cost in full, or over 20 years via a low-rate municipal bond (average less than $17 per month). An additional utility fee of $16.50 per month pays for operations.

[13] "What is the Ammon Model?," Broadband Communities, May/June, 2018. https://www.bbcmag.com/community-broadband/what-is-the-ammon-model.

Emerging Broadband Technology

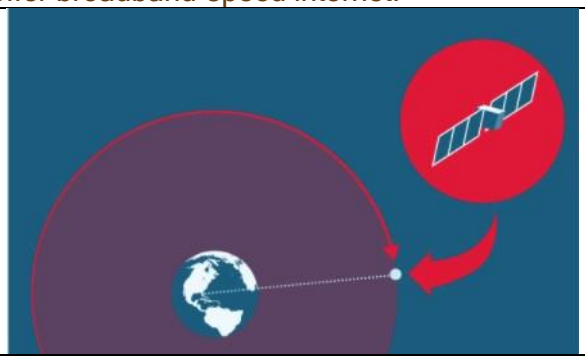
As New Mexico plots its internet future, it need not rely on existing fixed wire and wireless technologies alone. Recent engineering and technical innovations show some promise and may become part of the solution for New Mexico's rural communities as technologies and costs become more feasible and accessible. As with all emerging technologies, the State should be considerate of the risk and costs involved in pursuing any novel broadband solutions. What follows is a brief overview of emerging technologies that show early promise and are being piloted in New Mexico or are otherwise under consideration.

Low Earth Orbit Satellite Internet

Perhaps the emerging internet technology receiving the most attention currently is low-earth orbit satellite internet, in large part because of the piloting of SpaceX's Starlink. Traditional satellite internet technology, which is typically used in rural areas where no other options are available, relies on satellites in geostationary orbit (GEO). However, the long distances between the end user and satellite causes latency (a delay between when an action is taken and when the action is shown). Latency reduces the usability of GEO-provided satellite internet, particularly in our current environment where high speed and low latency are needed to conduct coursework or meetings online. Further, GEO satellite internet is generally an expensive option.

To solve the latency issue, low-earth orbit (LEO) satellites are positioned much closer to the earth's surface and a large constellation of satellites provide the coverage. Figure 13 illustrates how these satellites differ when launched. A 2020 McKinsey report concluded that several market factors and technical achievements make the potential of widespread LEO broadband more feasible than ever before.[14] Significant reductions in orbital rocket costs and satellite technology have been key to market entry. Several major companies are seeking to provide broadband using LEO satellites, including: SpaceX Starlink (Tesla), Project Kuiper (Amazon), Viasat, and Telesat. Continued technical innovations, and lower costs, can be expected as companies compete for greater market share.

Figure 13: Geostationary Orbit Versus Low-Earth Orbit Satellites

Traditional **GEO satellites** orbit far above the earth, have higher latency, and do not reliably offer broadband-speed internet.	**LEO satellites** have a large constellation of satellites that provide coverage.
	

[14]"Large LEO satellite constellations: Will it be different this time?" McKinsey & Company, 2020, https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/large-leo-satellite-constellations-will-it-be-different-this-time.

Currently, upfront costs for consumers are high for LEO internet. Customers must buy hardware ranging from $400 to $500 and pay a monthly broadband subscription. Nevertheless, these costs are lower than traditional satellite internet plans and have the potential to decrease over time. LEO internet technology is not without controversy. Starlink satellites alone are already responsible for over 50% of near-collisions of low-earth spacecraft; a proportion that is projected to rise to 90% when satellites are fully deployed.[15] Currently, Starlink has launched about 1,700 satellites, but the company expects to launch up to 42,000. The sheer number of satellites form multiple competing companies not only increases the chance of collisions with other objects in low earth orbit, but will also obstruct views of the sky and could impede the ability of astronomers and others to do necessary observations.

In a pilot of LEO internet in rural schools in North Carolina, speed and latency tests were conducted to monitor the efficacy. Downstream speed ranges were between 50 to 150 Mbps with the highest reported download speed at 272 Mbps. Upstream speeds ranged between 15 and 40 Mbps, and latency matched or beat speeds experienced with cellular LTE.

Microwave and Millimeter Wave Technology

For medium-density rural communities, microwave and millimeter wave technologies hold promise for delivering reliably high internet speeds. Microwave technology uses radio signals to beam a high-speed connection via a microwave radio link from a transmitter (which uses the high-speed fiber connection available via the middle mile network). The radio transmits the internet access through the air via an encrypted signal, which is then decrypted into a usable format at the end user. This solution is generally able to send with a 30-mile radius of the transmitter. Not all microwave signals require line-of-sight transmission, meaning that physical obstacles may not impede transmission. An example of non-line-of-sight microwave transmission is White Space Internet, which utilizes the low unused portions of the radio spectrum to transmit internet up to 10 miles. The major downside of white space radio waves is that they use a portion of the spectrum commonly allocated to television. Nevertheless Microsoft, Carlson Wireless Technologies, and others are utilizing White Space Internet globally and in parts of the United States.

Millimeter wave technology has been in development for decades, promising speeds up to 1 gigabit without cables or wires. However, the transmission distance is much lower than with microwave technology. Further, transmission can be negatively impacted by rain and humidity. Another complication is that millimeter waves are transmitted by line of sight, meaning that physical objects like buildings and trees will degrade the connection. Nevertheless, millimeter wave technology could be a solution to serve a small to medium-sized community under certain circumstances, using a single access point without having to run wires to every individual home. Starry Internet is one of the better-known companies to utilize millimeter wave technology in its internet service; the company only serves six cities currently but aims to build a nationwide network.

Both microwave and millimeter wave technologies are last mile solutions, and therefore would depend on the state developing a robust and widespread middle mile network. Nevertheless, these approaches have the advantage of not requiring any cables, ducts, or phone lines at the end user, reducing last mile infrastructure costs.

[15] Tereza Pultorova, “SpaceX Starlink satellites responsible for over half of close encounters in orbit, scientist says,” Space, August 18, 2021, https://www.space.com/spacex-starlink-satellite-collision-alerts-on-the-rise.

Optical Wireless

Optipulse is a New Mexico-grown company, scheduled to launch soon, which claims that its product will transmit data up to 100 times faster than 5G. Using laser technology, optical pulse internet works like other wireless internet options, using a transmitter on a tower and receivers. The estimated range is 1-10 kilometers. This technology is in the early stages, but has some high-profile partners. Within New Mexico, Central New Mexico Community College, the City of Albuquerque, Los Alamos National Laboratories, Plateau Communications, Sacred Wind Communications, and Sandia National Laboratories are supporters. National partners include Dell, NACA, Microsoft and the U.S. Army.

Stratosphere Communications

An approach to non-terrestrial broadband provision is to embed a wireless communication layer in the Earth's stratosphere, a region above the Earth's surface that sits above clouds but that remains within the atmosphere.

Also called high-altitude platform stations (HAPS), this technology uses floating dirigibles to beam internet to communities. End-users send data to the stratospheric communications platform. That data is then relayed to an internet backhaul connection, back to the communications platform, and lastly down to the end-user. This is a last mile solution.

In 2020, the New Mexico Economic Development Department pledged up to $5 million in Local Economic Development Act funding to the New Mexico-based Sceye Incorporated to pilot this approach. In October 2021, Sceye performed a test flight and demonstrated that its on-board satellites can connect to devices on the ground. Other companies have met with less success. In early 2021, another HAPS company, Loon LLC, shut down operations. An Alphabet subsidiary, Loon's chairman cited issues reaching commercial viability and other risks as key factors driving the decision.

CASE STUDIES: BROADBAND

- ***The Ammon Model (Idaho)***, *https://www.bbcmag.com/community-broadband/what-is-the-ammon-model*.
- ***The Arizona Corporation Commission***, *https://www.azcc.gov/utilities*.
- ***California Infrastructure Plan (2021)***, *https://www.ebudget.ca.gov/2021-Infrastructure-Plan.pdf*.
- ***Colorado Concern, Together We Build Report (2020)***, *https://coloradoconcern.com/hot-topics/together-we-build/*.
- ***Colorado Department of Local Affairs, Rural Economic Development Initiative,*** *https://cdola.colorado.gov/funding-programs/rural-economic-development-initiative*.
- ***Georgia Broadband Program****: https://broadband.georgia.gov/*.
- ***Georgia, Broadband Ready Community program:*** *https://broadband.georgia.gov/broadband-community-application-information*.
- ***Kentucky, Better Kentucky Plan,*** *https://governor.ky.gov/priorities/better-kentucky-plan*.
- ***Nevada State Infrastructure Bank,*** *https://apnews.com/article/nv-state-wire-nevada-government-and-politics-business-2866c243e739463205534f7d89c45512*.

See the appendices for more details on these and other plans.

COSTS TO CLOSE GAPS

This section outlines the estimated cost to expand broadband access to all New Mexicans. These estimates, which align with and are adapted from the New Mexico Broadband Strategic Plan (2020), reflect the cost for internet providers to expand their service to residential and commercial premises in the state. Cost estimates were generated with a fiber-focused infrastructure buildout, with wireless recommended in areas where fiber is not viable. According to the most recent estimates, about 44% of the residential and commercial locations without broadband have population densities that can support fiber networks. The cost to bring fiber-based high-speed internet infrastructure to the remaining unconnected areas of the state is currently high, making fiber investments infeasible. In these areas, non-fiber solutions are recommended by the state's Broadband Strategic Plan. These include technology currently on the market, such as fixed wireless, and a range of emerging technologies.

As the highest level, based on engineering estimates contained in the Broadband Strategic Plan, the **cost to provide high-speed wireline and wireless service to all New Mexicans is between $2 and $5 billion**. However, all cost estimates are subject to change as emerging technologies become more commercially viable. The section that follows first describes the optimal infrastructure type for each county under a statewide hybrid approach. Second, it provides total estimated cost for each county and region.

Recommended Broadband Infrastructure Strategies

New Mexico communities have a diverse set of conditions and needs that complicate broadband infrastructure strategies, including large distances, geographical barriers, and small population sizes. Fiber-to-the-home is currently the most reliable broadband infrastructure available. Fiber has technical superiority to other forms of broadband, but large up-front capital costs make it infeasible in some areas, particularly without heavy public sector subsidies to offset the costs both to the utility provider and consumers. For example, the average estimated cost to build fiber-to-the-home in San Juan County is four times the cost per location for the same infrastructure in Socorro County.[16]

Given the state's diverse topography and large land area, a hybrid broadband infrastructure strategy is likely the most feasible and efficient approach. A focus on deployment of proven technologies first is recommended, with gradual incorporation of emerging approaches as they increase in reliability and decrease in price. Rural communities with higher population densities are candidates for fiber solutions. Lower-density communities are better served by fixed wireless. The hardest-to-connect communities may be best served in the future by emerging technology not yet widely available in the market. Each county listed below contains a mix of viable solution types for their communities. The optimal and recommended county-by-county strategy, based on 2020 New Mexico Broadband Strategic Plan's recommended strategies, is outlined in Table 1.

[16] Calculation made using cost per premise estimates by county.

Table 1: Recommended Strategies by County, New Mexico Broadband Strategic Plan

County	Wireless & Emerging	Fiber and Wireless Mix	Fiber	County	Wireless & Emerging	Fiber and Wireless Mix	Fiber
Bernalillo		●		McKinley			●
Catron	●			Mora	●		
Chaves			●	Otero	●		
Cibola		●		Quay		●	
Colfax	●			Rio Arriba			●
Curry			●	Roosevelt	●		
De Baca	●			Sandoval	●		
Dona Ana		●		San Juan	●		
Eddy		●		San Miguel	●		
Grant			●	Santa Fe		●	
Guadalupe	●			Sierra		●	
Harding	●			Socorro			●
Hidalgo			●	Taos	●		
Lea	●			Torrance	●		
Lincoln		●		Union	●		
Los Alamos	●			Valencia	●		
Luna			●				

Cost Analysis

As with most state-level initiatives, there is uncertainty when estimating the costs of building widespread broadband infrastructure. Project costs are highly context dependent, varying with different levels of population density, terrain, and topography. This section builds on estimates compiled from the New Mexico Broadband Strategic Plan to describe infrastructure costs across the state, including at the county level and for some large-scale rural projects. These estimates were determined to be the best available because they consider New Mexico communities' unique geographic, demographics, and the unit price of infrastructure components. The costs below for fiber and non-fiber broadband may be added together to generate overall broadband infrastructure cost estimates.

Fiber Infrastructure

The total estimated cost to build the state's fiber network to cost-feasible areas is between $350 and $800 million, which equates to approximately $3,600 and $8,600 per location (meaning household, business, school, etc.). The cost of fiber is a function of many variables, including the entity that is building the infrastructure. Costs may be significantly lower for an incumbent internet provider expanding from its existing network region than for a new provider building the same infrastructure.

Table 2 offers an analysis of the infrastructure cost scenario, with a best-case low-cost estimate and a worst-case high-cost estimate. These provide a cost estimate range that leaders can use to plan for anticipated broadband costs. Table 2 also includes a "blended" or average price model, which assumes that both incumbent and new providers are building out infrastructure. In general, these build-out scenarios should be considered minimum cost estimates, particularly at the time of this study in 2021 where materials and labor are more expensive than historical averages. Further, new approaches to broadband delivery, such as publicly- or community-owned networks, may be more

expensive. Most of the costs below would likely be paid by private internet service providers though a combination of state and federal funding, which lessens the cost burden on communities and telecommunications companies.

Counties with no estimated costs do not generally have populations dense enough to support cost-effective fiber networks given current feasible spending constraints. In these counties, fixed wireless and emerging technologies are most suitable to meet immediate needs. Fixed wireless costs are described in the following section.

Table 2: Fiber Broadband Cost Analysis by County – Multiple Infrastructure Build-out Scenarios

County	Low Cost Incumbent Build out	Blended Cost Mixed Build-out	High Cost New Build-out
Bernalillo	$22,300,000	$37,600,000	$52,800,000
Catron	-	-	-
Chaves	$10,600,000	$21,600,000	$26,300,000
Cibola	$12,700,000	$24,100,000	$29,000,000
Colfax	-	-	-
Curry	$6,200,000	$12,600,000	$15,300,000
De Baca	-	-	-
Doña Ana	$23,000,000	$45,500,000	$55,100,000
Eddy	$16,300,000	$33,100,000	$40,300,000
Grant	$30,700,000	$34,200,000	$35,700,000
Guadalupe	-	-	-
Harding	-	-	-
Hidalgo	$4,200,000	$8,300,000	$10,100,000
Lea	-	-	-
Lincoln	$6,300,000	$12,700,000	$15,400,000
Los Alamos	-	-	-
Luna	$34,000,000	$69,000,000	$83,900,000
McKinley	$32,700,000	$65,100,000	$78,900,000
Mora	-	-	-
Otero	$5,500,000	$11,100,000	$13,500,000
Quay	$4,300,000	$8,800,000	$10,700,000
Rio Arriba	$35,600,000	$70,200,000	$85,000,000
Roosevelt	-	-	-
Sandoval	$5,400,000	$10,800,000	$13,200,000
San Juan	$18,400,000	$37,400,000	$45,600,000
San Miguel	$5,300,000	$10,400,000	$12,600,000
Santa Fe	$33,400,000	$65,400,000	$79,100,000
Sierra	$5,300,000	$10,700,000	$12,900,000
Socorro	$21,300,000	$42,200,000	$51,100,000
Taos	-	-	-
Torrance	$14,900,000	$30,000,000	$36,600,000
Union	-	-	-
Valencia	$4,100,000	$6,900,000	$8,100,000
Total	**$352,500,000**	**$581,900,000**	**$811,200,000**

The need for internet connectivity does not stop at the county line. In fact, projects may be strengthened through communities working together and thinking more regionally. As such, state and local leaders should be prepared to collaborate across jurisdictions and administrative boundaries. The state's COG districts provide a logical structure for this collaborative work. Doing so ensures New Mexicans are connected and that New Mexico's applicants are more competitive for national broadband funding applications. An added benefit of using these regional quasi-governmental entities in planning broadband expansion is they are typically eligible and well-suited to apply for competitive federal funding. Table 3 summarizes estimated fiber broadband costs within COG districts.

Table 3: Fiber Broadband Cost Analysis by Council of Government or Economic Development District – Multiple Infrastructure Build-out Scenarios

Council of Government or Economic Development District	Low Cost Incumbent Build-out	Blended Cost Mixed Build-out	High Cost New Build-out
Northwest New Mexico COG	$63,800,000	$108,600,000	$153,400,000
North Central New Mexico EDD	$74,300,000	$125,500,000	$176,700,000
Mid-Region COG	$46,600,000	$78,700,000	$110,700,000
Eastern Plains COG	$10,600,000	$18,300,000	$25,900,000
Southwest NM COG	$69,000,000	$99,300,000	$129,700,000
Southeast NM EDD	$38,700,000	$67,100,000	$95,500,000
South Central COG	$49,600,000	$84,400,000	$119,200,000
Total	**$352,600,000**	**$581,900,000**	**$811,200,000**

Non-Fiber Broadband Solutions

Given current technology constraints, fiber broadband remains the preferred, most reliable, and most sustainable form of broadband infrastructure. However, high up front capital costs make it infeasible for regions with low population density or otherwise challenging geography. In these areas, the State must look to non-fiber broadband solutions. This said, some non-fiber broadband technologies are currently riskier forms of state investments because their reliability and cost-effectiveness are less proven, and they may have lower up-front costs and higher long-term costs. Technical capabilities are rapidly changing, demanding types of investment and maintenance not typically associated with fiber networks. Additionally, the viability of newer technologies has not been widely proven and usage tends not to be widespread. Other aspects of service, such as customer support, may be difficult for small and growing businesses.

Given these considerations, state's new Office of Broadband Access and Inclusion should establish metrics for performance and customer support for all networks, including fiber and non-fiber technologies. State partners should demonstrate an ability and willingness to support the customers in their proposed service area.

Fixed Wireless: Fixed wireless is currently the most common and market-proven non-fiber broadband solution. Recent technological improvements have made broadband-speed internet more available from fixed wireless networks than ever. In low-density rural areas with few homes and businesses, fixed wireless is often more desirable because fiber options are not cost effective or there are too many physical impediments to running the cables.

Fixed wireless broadband is provided from access point antennas on towers or rooftop. Customers may have an antenna directly on the home or business, or on a mast near the premises. Fixed

wireless uses a variety of spectra.[17] Most fixed wireless networks require the use of antenna, both at the end-user's location and at the base station. The base station is connected directly to the internet, usually through a fiber backhaul connection to increase customer speeds. The customer and base station antenna usually must have a line of sight between them, allowing signals to travel unobstructed by mountains, buildings, and even dense vegetation. Figure 14 shows a typical configuration for a fixed wireless system. Many of the most promising emerging technologies utilize a fixed wireless approach. However, in some parts of New Mexico, topography makes fixed wireless a difficult broadband solution because of physical obstacles.

Figure 14: Example of Fixed Wireless Network from the 2020 NM Broadband Strategic Plan

Because there is less physical infrastructure, upfront capital costs are lower for fixed wireless projects. Most of the capital costs for a wireless network are captured in electronics and software, with much less construction needed to build fiber. Fixed wireless can also serve more customers per infrastructure component, with all homes and businesses in a region potentially served by a single transmission source. However, there may be more equipment maintenance costs over time, and internet speeds are generally less reliable.

There are many factors that determine wireless network costs, including equipment, tower leasing, and backhaul connections from the base station antenna to the internet. Costs are closely related to the number of customers that can be served, making bulk estimates difficult. Nevertheless, the 2020 New Mexico Broadband Strategic Plan analyzed the existing infrastructure to estimate the extent and costs of expanding wireless broadband unconnected locations. The assessment considers two cost scenarios based on the wireless take rate. "Take rate" is the percentage of potential customers in provider's service who subscribe to receive the service. The take rate is important because costs increase along with the number of subscribers, meaning higher take rates have higher project costs. Table 4 and Table 5 summarize two take rate scenarios and the associated costs by county and COG district for fixed wireless systems. Note that, given the uncertainty of cost factors, these estimates should be considered for high-level cost modeling and planning purposes only.

[17] When discussing broadband, spectrum is an allocated band of radio frequency that can be used to transmit signals.

Table 4: Fixed Wireless Cost Analysis by County, Two Customer Take Rate Scenarios

County	Low Estimate (35% Customer Take Rate)	High Estimate (60% Customer Take Rate)
Bernalillo	$6,300,000	$7,600,000
Catron	$7,500,000	$8,900,000
Chaves	$800,000	$1,000,000
Cibola	$7,200,000	$8,600,000
Colfax	$8,500,000	$10,200,000
Curry	$500,000	$600,000
De Baca	$600,000	$700,000
Doña Ana	$11,300,000	$13,500,000
Eddy	$2,200,000	$2,600,000
Grant	$2,500,000	$3,000,000
Guadalupe	$900,000	$1,100,000
Harding	$300,000	$300,000
Hidalgo	$1,700,000	$2,000,000
Lea	$2,900,000	$3,500,000
Lincoln	$2,500,000	$3,000,000
Los Alamos	$500,000	$700,000
Luna	$2,700,000	$3,200,000
McKinley	$6,300,000	$7,500,000
Mora	$1,000,000	$1,200,000
Otero	$4,300,000	$5,200,000
Quay	$800,000	$900,000
Rio Arriba	$3,900,000	$4,700,000
Roosevelt	$1,100,000	$1,300,000
Sandoval	$12,700,000	$15,200,000
San Juan	$14,000,000	$16,700,000
San Miguel	$16,100,000	$19,300,000
Santa Fe	$16,200,000	$19,300,000
Sierra	$4,200,000	$5,000,000
Socorro	$4,000,000	$4,800,000
Taos	$700,000	$900,000
Torrance	$2,600,000	$3,100,000
Union	$1,400,000	$1,600,000
Valencia	$6,000,000	$7,200,000
Total	**$154,200,000**	**$184,400,000**

As with fiber internet projects, fixed wireless deployment should not be limited to just county-level projects. In fact, because of the relatively limited physical infrastructure needed for fixed wireless, regional projects can easily transcend community or county boundaries with the appropriate coordination. Regional planning and cooperation can make investments more cost-effective and funding applications more successful. As with the fiber internet analysis, costs are outlined in Table 5 at the regional planning level using the COG districts as the regional division.

Table 5: Fixed Wireless Cost Analysis by Council of Government or Economic Development District – Two Customer Take Rate Scenarios

Council of Government or Economic Development District	Low Cost (35% Customer Take Rate)	High Estimate (60% Customer Take Rate)
Northwest NM COG	$27,500,000	$32,900,000
North Central NM EDD	$47,100,000	$56,300,000
Mid-Region COG	$27,600,000	$33,000,000
Eastern Plains COG	$5,500,000	$6,600,000
Southwest NM COG	$14,300,000	$17,100,000
Southeast NM EDD	$12,800,000	$15,200,000
South Central COG	$19,600,000	$23,400,000
Total	**$154,000,000**	**$184,000,000**

Emerging technologies were outlined in the previous section. At this point, the viability, reliability, and cost–both to the utility and the consumer– are uncertain for these options. The Office of Broadband Access and Inclusion should monitor these technologies, in coordination with communities and telecommunication companies, as they are tested and use is expanded to determine if and when any are suitable for wider dissemination in hard-to-connect areas.

The Role of New Mexico Legislature in Meeting Broadband Need

Across the U.S., state and local governments utilize two overarching strategies to extend broadband service. First, states can provide funding to subsidize an internet service provider's (ISP) cost of building broadband infrastructure. This is typically accomplished through a state-operated program offering grants to private internet providers. Second, states can finance or support publicly-owned and operated broadband infrastructure. These types of projects are usually operated by municipalities or other public bodies.

Grant Programs

The most common solution is to directly subsidize and support private ISPs as they build out broadband infrastructure. This type of funding is usually handled through competitive grant programs, where private entities compete for state money.

Unfortunately, this type of program is infeasible in New Mexico because of the anti-donation provision in the New Mexico Constitution. Section 14 of Article IX of the New Mexico Constitution prohibits the State or local governments to provide direct or indirect donations or aid to any person or organization. There are at least two ways to accommodate this restriction.

First, the State can work with broadband providers to compete for federally-administered grants. Strategies along this line are outlined in depth in later sections. In general, the State can help private grant seeking activities by advancing broadband availability mapping or creating and funding a state broadband office to act as a clearing house for broadband operations. Activities aligned with these priorities are underway at the New Mexico Department of Information and Technology.

Second, the State can directly apply and compete for federal broadband grant funding. Federal money is more likely to be allowed to be allocated by the State to private enterprises building broadband infrastructure. In general, federal money requires state match funding, which can be coordinated within the confines of the anti-donation provision through state ownership and leasing.

CONNECTMAINE GRANT PROGRAM HAS MAJOR IMPACT ON RURAL BROADBAND

In 2006, the State of Maine created the ConnectMaine Authority to stimulate investment in broadband infrastructure in unserved communities. From 2007 to 2020, the Authority awarded over 150 grants totaling over $13 million. This has generated an additional $12 million in private and local investment. Collectively, the program has helped bring broadband to more than 40,000 households across Maine. Communities that apply for grants must work with telecommunications providers established in Maine to be eligible. Minimum broadband speeds are an established criterion of project eligibility.

Community-Owned Infrastructure

The second broadband tool available to the State is community-owned infrastructure. Under this strategy, municipalities and other public bodies build broadband infrastructure and operate as a service provider. This approach is currently used by hundreds of municipalities across the country.

Community broadband networks come in many forms. Local governments or public utilities may construct and manage broadband networks on their own or partner with the private sector. Some communities have used existing or newly-formed cooperatives to provide broadband as a utility.

COMMUNITY NETWORKS IN WESTERN COLORADO – RIO BLANCO COUNTY

In 2014, after a successful referendum on the favorability of municipal networks, the Rio Blanco County built a fiber-to-the-home network serving the towns of Meeker (pop. 2,400) and Rangley (pop. 2,300). The county owns and operates the network, which consists of both wireless and fiber optic technology. County officials partnered with local internet service providers to serve as the first point-of-contact for residents. Total project costs were about $13 million and were covered by grants from the state, anchor institutions, and the county.

In New Mexico, some of the most successful examples of community-owned broadband have been found in Tribal communities. The Pueblo of Jemez, for instance, deployed a fiber and wireless network to connect households. Total project costs were around $5 million. In 2017, the Middle Rio Grande Pueblo Tribal Consortium began construction to build a fiber-optic network that would connect libraries and schools. The total cost to build the 60-mile network was $4.2 million. Federal funding under the E-Rate program subsidized $3.9 million of total costs. After the network was constructed, broadband speeds increased and costs decreased.[18] [19]

By design, community-owned broadband networks absorb the risk involved in any investment. Fiber-to-the-home investments often take years to reach profitability, both for public and private networks. The decision to pursue community-owned infrastructure should be made by the community and entities responsible for implementation. Therefore, the community, as primary stakeholders, would need to accept the potential risks involved and to understand the long-term, economy-wide benefits of reliable, fast broadband.

[18] "How to Leverage E-Rate to Bring Broadband to Your Community," presentation to the National Tribal Broadband Summit, September 23-24, 2019, https://www.doi.gov/sites/doi.gov/files/uploads/21.-how-to-leverage-e-rate-to-bring-broadband-to-your-community.pdf.

[19] May Ortega, "Four pueblos team up to bring broadband to more residents," Albuquerque Business First, December 18, 2017, https://www.bizjournals.com/albuquerque/news/2017/12/18/four-pueblos-team-up-to-bring-broadband-to-more.html.

ELECTRICAL COVERAGE IN NEW MEXICO

BACKGROUND

The state of New Mexico, like the nation as a whole, is at the beginning of a momentous shift in how electricity is generated, stored, and distributed. This comes as state and national priorities move away from traditional energy sources like oil and gas toward greener energy sources such as solar, wind, and geothermal. These changes will require a dramatic reimagining of the energy grid, away from the traditional power plant design that has held sway for over 60 years, toward a more decentralized system that consists of numerous renewable energy installations connected together via new transmission and distribution lines and backed up using batteries. A decentralized system consisting of connected smaller grids using smart grid technology has promise of increasing resiliency and reducing the spread of power outages, but it will also require much coordination and technological integration to ensure reliability.

Generally speaking, the electricity supply chain involves three basic stages: generation, transmission, and distribution. In New Mexico, coal and natural gas continue to make up the majority of in-state electricity generation. However, proportions are declining in favor of renewables, which comprised 27% of the state's net electricity generation in 2020, up from only 6% in 2011. This shift has in part been occurring because of market forces – renewables are getting cheaper – and in part due to legislation. In 2019, the State set an ambitious renewable energy target by enacting the Energy Transition Act (ETA). The act requires investor-owned utilities to have 50% of electricity retail sales from renewable resources by 2030, 80% by 2040, and 100% by 2045.

Transmission lines move electricity from the generation site to electrical substations, which then distribute power to homes and business. They extend over long distances from remote generation areas to areas with homes and businesses. Most of New Mexico's transmission lines were built in the 1960s and 1970s, meaning they are aging and represent a significant hurdle to diversifying the state's electricity generation portfolio. For example, the state's wind-rich regions on the Eastern Plains have limited transmission infrastructure, making it difficult to transmit energy from where it is generated to the households that need it.

Distribution is the final step in the supply chain. This phase involves carrying power from the transmission system directly to customers by lowering the voltage level with the use of transformers. In urban areas transformers are built underground, whereas in rural areas transformers are more often mounted on utility poles.

Electrical utilities in the west operate within the context of the Western Transmission Grid (WECC: Western Electricity Coordinating Council) and Central Transmission Gid (Southwest Power Pool: SPP). New Mexico is divided between these two zones, meaning the state's power lines are part of a multi-state network comprising 1.6 million square miles. This arrangement supports economies of scale in an area with vast distances and remotely located communities. As New Mexico moves toward heavier use of renewables, it has been rethinking the ideal location of power lines. As this chapter will show, renewable energy potential is distributed around the state and typically not in the same places as traditional power stations. To make the improvements needed to reach underserved communities, while also upgrading infrastructure to better harness renewables, the New Mexico Renewable Energy

Transmission Authority (RETA) estimates that 900-to-1,300 miles of high voltage transmission lines are needed, along with battery storage, and new wind, solar, and other installations encompassing a wide swath of New Mexico.[20] These efforts will help to make the state more resilient, create thousands of jobs, and help New Mexico to move away from fossil fuels.

Regulatory authority over the electricity system, including generation, transmission, and distribution systems, is shared between states and the federal government. These bodies also regulate the local distribution and retail sales of electricity within a state. The federal government, through the Federal Energy Regulatory Commission (FERC), regulates wholesale electricity sales and interstate transmission of electricity. In New Mexico, the PRC regulates electric utilities. All utilities in the state are required to provide adequate and reliable electricity service to customers at fair prices.

PROFILE OF NEED

Unlike with the other infrastructure areas explored in this report, electrical data are not collected and disseminated publicly in a way that makes it possible to gain a detailed picture of the location of households that are underserved. Neither the U.S. Census nor the state's PRC, which oversees electrical utilities, publish detailed data on the types of premises served by electrical utilities or the location to the census tract level. Project partner, UNM's Bureau of Business and Economic Research (BBER), sought to supplement the data that are published with direct calls to the various electrical utilities, but the data remain incomplete. As such, we were able to piece together a general understanding of needs and locations of service, but it was not possible to produce detailed maps of the locations of high need across the state.

What BBER was able to glean is that New Mexico **has a gap between the total number of electricity customers and housing units of about 4.57%, or 42,834 households**. According to the U.S. Energy Information Administration (US EIA), New Mexico has the second-highest proportion of housing units without an electricity subscription in the Mountain West. Only Arizona has a higher proportion of unelectrified households. See Table 6, below, for a comparison with other Western states.

Table 6: Share of Housing Units by State without an Electricity Subscription[21]

State	Electricity Customers (Housing Units)	Total Housing Units	Share of Housing Units without Electricity Subscription
New Mexico	895,086	937,920	4.57%
Arizona	2,853,183	3,003,286	5.00%
Oklahoma	1,777,156	1,731,632	0%
Colorado	2,370,164	2,386,475	0.68%
Wyoming	274,881	276,846	0.71%
Montana	516,054	510,180	0%
Utah	1,116,145	1,087,112	0%
Idaho	763,841	723,594	0%
Nevada	1,204,996	1,250,893	3.67%

[20] "New Mexico Renewable Energy Transmission and Storage Study," New Mexico Renewable Energy Transmission Authority, 2020, https://nmreta.com/nm-reta-transmission-study/.
[21] U.S. Energy Information Administration, Form 861 and 2019 five-year ACS estimates.

To help gain a better understanding of the electrification situation in New Mexico, we recommend that the PRC be mandated to collect and publish data on the types of connections served by electricity (e.g., home, apartment, business, farm equipment, or pump jack), as well as the census tract in which connections are located.[22]

New Mexico's electric utilities provision is divided between rural electric cooperatives, public utilities, and large multi-state utilities companies. To provide context on the electrical providers currently serving New Mexico, Table 7 lists providers, organized by type, primary counties served, number of residential customers (BBER's best estimation), and average price for electricity.

Table 7: Electrical Utilities in New Mexico[23]

Rural Electric Cooperatives			
Name	**Counties Served**	**# Residential Customers**	**Average Price (cents/kWh)**
Central New Mexico Electrical Cooperative	Torrance, Bernalillo, Chaves, Guadalupe, Lincoln, De Baca, Sandoval, San Miguel, Socorro, Valencia, Santa Fe	16,194	17.43
Central Valley Electric Cooperative, Inc.	Eddy, Chaves, parts of Lea and Otero	5,768	8.06
Columbus Electric Cooperative	Grant, Hidalgo, Luna	3,542	16.38
Continental Divide Electric Cooperative	Bernalillo, Cibola, McKinley, Sandoval, Valencia	21,057	14.33
Duncan Valley Electric Cooperative	Grant, Hidalgo	244	13.28
Farmers' Electric Cooperative, Inc.	Curry, De Baca, Guadalupe, Harding, Quay, Roosevelt, San Miguel	9,934	11.20
Jemez Mountains Electric Cooperative, Inc.	Rio Arriba, Santa Fe, Sandoval, McKinley, San Juan	25,509	13.74
Kit Carson Electric Cooperative	Taos, Colfax, Rio Arriba	24,654	18.55
Lea County Electric	Chaves, Eddy, Lea	7,128	8.81
Mora-San Miguel Electric Cooperative	Guadalupe, Mora, San Miguel, Santa Fe	10,822	17.21
Navopache Electric Cooperative	Catron	1,354	13.16
Northern Río Arriba Electric	Rio Arriba	2,586	18.16

[22] This data could be supplemented by data on homes served by natural gas or propane, as households that rely on expensive propane tanks would be strong contenders for conversion to 100% electrical as the State continues its grid modernization.

[23] Data compiled by BBER and from the Energy Information Administration 2019 Utility Bundled Retail Sales-Residential, https://www.eia.gov/electricity/sales_revenue_price/.

Otero County Electric Cooperative, Inc.	Otero	15,946	18.44
Rio Grande Electric Cooperative	Eddy, Otero	242	15.81
Roosevelt County Electric Cooperative, Inc.	Roosevelt, Chaves, Curry, De Baca	3,795	9.54
Sierra Electric Cooperative, Inc.	Catron, Luna, Socorro, Sierra	3,601	19.30
Socorro Electric Cooperative, Inc.	Catron, Cibola, Sierra, Socorro, Valencia	10,238	15.65
Southwestern Electric Co-op	Union	1,440	24.77
Springer Electric Cooperative, Inc.	Colfax, Harding, Mora, San Miguel, Union	2,449	17.57
Public Utilities Companies			
Name	**Counties Served**	**# Residential Customers**	**Average Price (cents/kWh)**
City of Aztec	San Juan	2,655	13.27
City of Farmington	San Juan	34,986	11.14
City of Gallup	McKinley	8,484	12.26
City of Truth or Consequences	Sierra	3,421	14.47
Los Alamos County Utilities	Los Alamos	7,807	13.16
Navajo Tribal Utility Authority	McKinley, San Juan	9,614	13.12
Raton Public Service Co.	Colfax	3,721	15.57
Town of Springer	Colfax	607	18.48
Investor-Owned Electric Utility Companies			
Name	**Counties Served**	**# Residential Customers**	**Website**
El Paso Electric Company	Doña Ana, Otero	88,405	10.47
Public Service Company of New Mexico (PNM)	Bernalillo, Grant, Hidalgo, Luna, Otero, Sandoval, San Miguel, Santa Fe, Union, Valencia	471,935	13.26
Southwestern Public Service Company (SPS; Xcel Energy)	Chavez, Curry, Eddy, Lea, Roosevelt	96,964	9.65

The three investor-owned electric utilities (El Paso Electric [EPE], Public Service Company of New Mexico [PNM], and Southwestern Public Service Company [SPS]) serve approximately 70% of New Mexicans. Each of the three have been granted the ability to generate, transmit, and distribute electricity in specific geographic areas of the state. For example, PNM serves regions highlighted in orange in Figure 15, EPE serves a portion of south-central New Mexico as shown in Figure 16, and Figure 17 shows the SPS service area in south-east New Mexico.

Figure 15: PNM Service Areas[24]

Figure 16: El Paso Electric Service Area[25]

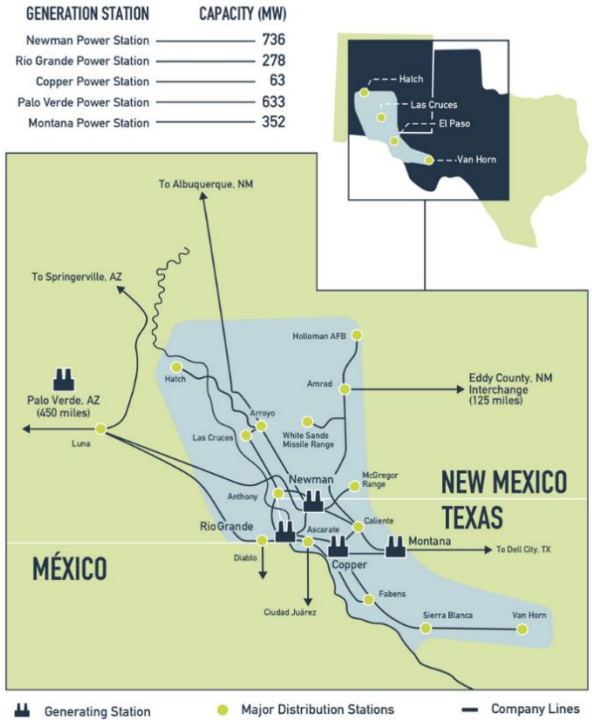
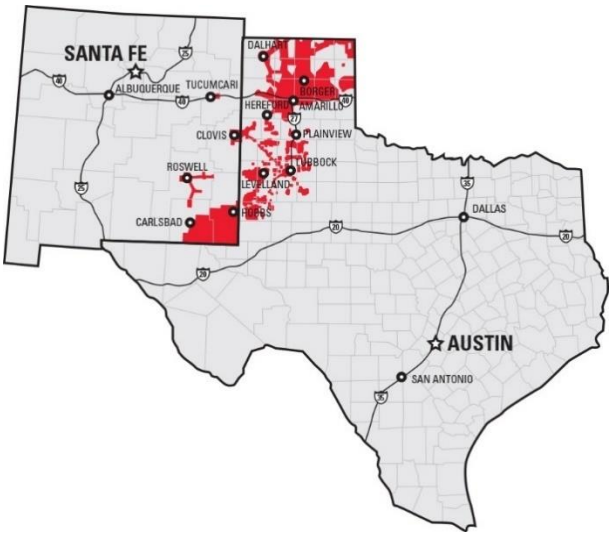


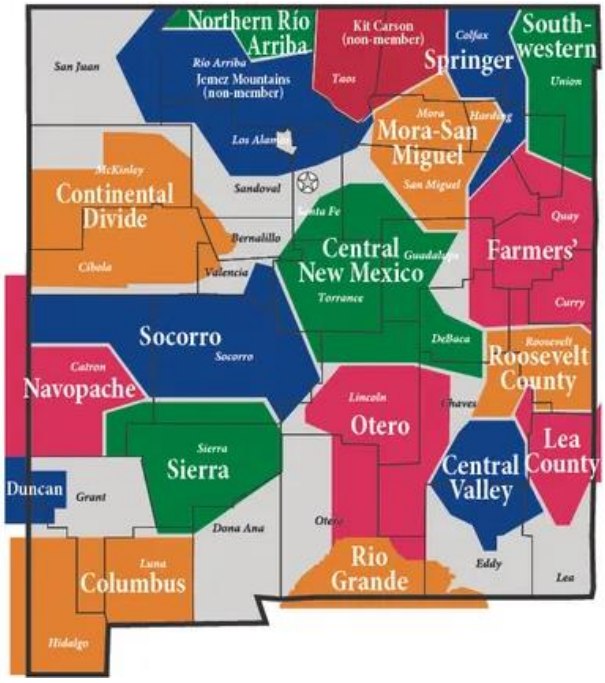
Figure 17: Southwestern Public Service Company Service Area[26]



These large utilities companies, however, concentrate activity in cities and urban areas. Rural communities are generally served by rural electric distribution cooperatives. **About 20% of all New Mexico residents are served by the state's rural cooperatives**, each of which is not-for-profit and is owned by the customers. Fourteen of the rural electrical cooperatives belong to the New Mexico Rural Electric Cooperative Association, which represents cooperative member interests. The two non-members are also the state's largest rural cooperatives–Kit Carson and Jemez Mountains Electric Coops. The PRC regulates rural cooperatives, but they are not subject to the same level of review as investor-owned utilities. Figure 18 shows the geographic service areas of cooperative electricity providers in the state.

[24] Map source: PNM, https://www.pnm.com/about-pnm.
[25] Map source: EPE, http://epelectric.com.winvps2.stantonstreethosting.com/about-el-paso-electric/service-area.
[26] Map source: SPS, https://sec.report/Document/0000092521-20-000003/.

Figure 18: Members of the Rural Electric Cooperative Association and Service Areas[27]

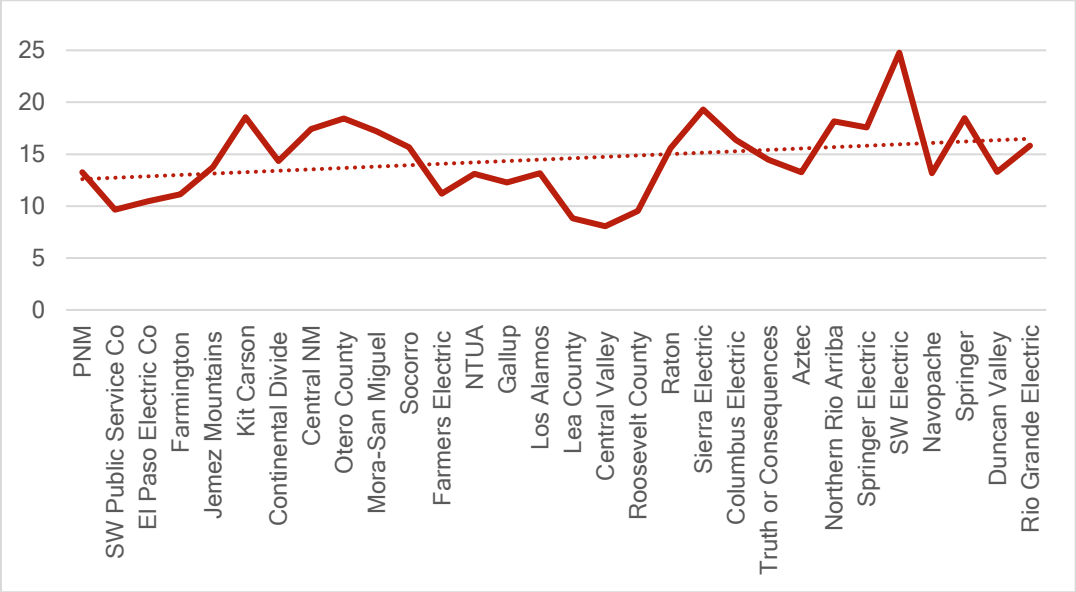


While detailed information by county or census tract is not available, it is safe to assume that the areas of highest need around the state coincide roughly with the areas that struggle the most with internet connectivity, for similar reasons. The cost considerations for traditional electrical service are similar for running fiber for broadband– vast distances, physical impediments from mountains and forests, and small customer sizes in remote communities, farms, and ranches. However, similar to broadband, there are emerging technologies and approaches that seek to rethink the electricity sector, make it greener, with more resilient grids, and make it more affordable for both utilities providers and customers. Some of these approaches will be explored in the following section.

The average cost of electricity in the west, per the U.S. Energy Information Administration, was 12.5 cents/kWh in September 2021. Figure 19 shows the cost of electricity in New Mexico organized by utility size, with largest utilities on the left and smallest on the right. While the largest utilities are slightly more likely to have lower rates, prices range widely and there is not an especially strong relationship between utility size and electricity price. Factors that are likely to affect the cost are topography, mix of power sources (coal, gas, solar, wind), and the geographic size of the service area. As is clear from this chart, electricity costs for New Mexicans can range well above or slightly below the national average. Per the Energy Information Administration, the lowest-cost electricity in the state is 8.06 cents/kWh and the highest is 24.77 cents/kWh. Using the national average home energy consumption of 893 kWh of electricity per month, the cost gap between the most expensive and lowest cost utility amounts to a billing difference $149.22 per month.[28]

[27] Map source: New Mexico Rural Electric Cooperative Association, https://www.nmelectric.coop/coops.
[28] "Frequently Asked Questions," U.S. Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php.

Figure 19: Price of Electricity (cents/kWh), by Utility Size Smallest to Largest

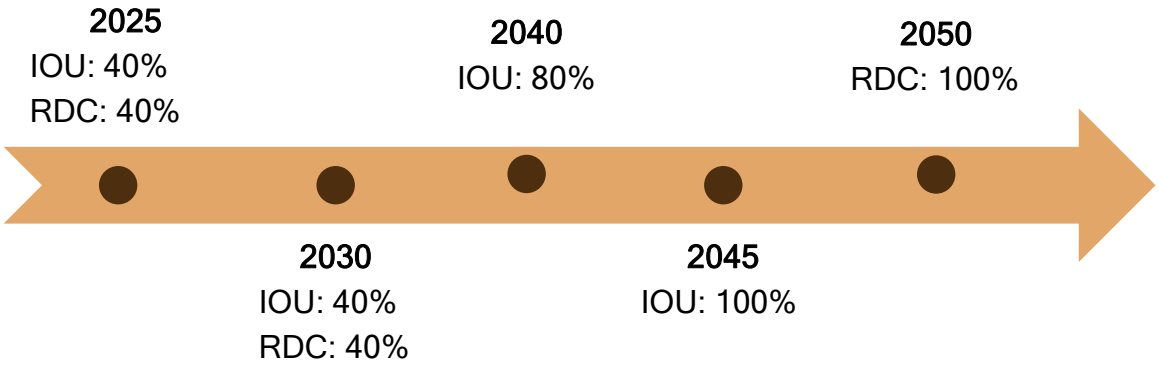


Modernizing New Mexico's Electric Infrastructure

There are two high-level priorities relating to electric infrastructure in New Mexico. First, there is a need for additional infrastructure to meet renewable energy goals. This requires changes to the statewide generation and transmission mix. Second, communities need additional infrastructure to meet their individual contexts, from basic electrification to advanced energy resilience.

Rural electric cooperatives have, by law, until 2050 to meet the 100% renewable energy requirement mandated in the State's 2019 Energy Transition Act. Figure 20 shows the renewable energy timeline per the Energy Transition Act. To ensure they are on track, utilities are required to submit an annual procurement plan detailing how they plan to meet benchmarks for the coming year. These targets create statewide economic opportunities. However, they require upgrades to the electric grid and investment in transmission infrastructure on a large scale to modernize systems to be more resilient, responsive, and interactive. These planning practices also help utilities and public officials to better manage the electric grid.

Figure 20: Energy Transition Act Renewable Energy Milestones



IOU: Investor-Owned Utility; RDC: Rural Distribution Cooperative

In recognition of the updates that need to be made, in 2020, Governor Lujan Grisham signed into law House Bill 233, Energy Grid Modernization Roadmap, which directed Energy, Minerals, and Natural Resources Department (EMNRD) to develop a grid modernization roadmap, established a grant fund, and allows utilities to submit applications for investments in eligible grid modernization projects. The Act tasked the department with finding policies to promote renewable energy, increase energy storage capacity, improve demand-side management and energy efficiency, increase distribution and transmission system resilience, and study the effect of microgrids on the system. This grid modernization planning is underway, with the Roadmap for Electric Grid Modernization in New Mexico forthcoming. This document will draw on the expertise of over 40 electricity sector representatives, national lab scientists, academics, renewable energy experts, and environmental and consumer advocates with expertise in grid technologies, electricity business models and finance, and energy policy.

Other strategies to meet state renewable energy targets involve expanding the state's transmission line infrastructure. New Mexico is unusually blessed with renewable energy potential, particularly in wind and solar. As such, the state is already ahead of much of the nation in terms of having the raw ingredients needed to transition away from oil and gas power. However, expansion of use of renewables is limited by aging transmission lines. If upgraded, a 2020 study by NM RETA found **transmission infrastructure could be increased from 2,500 megawatts (MW) of renewable capacity to 11,500 MW by 2030**.[29] The 11,500 MW would satisfy New Mexico's clean energy goals and even position the state as a clean energy exporter to markets in Arizona, California, and Texas. In addition, the private investment in development, construction, and operation of new renewables and transmission is predicted to **create 3,700 construction and development jobs through 2032 and up to 800 permanent jobs**. Some utilities are ahead of targets. Kit Carson Electric Cooperative, for instance, is on track to meet 100% of daytime peak energy requirements with solar by 2022.[30]

Solar Energy

New Mexico is top three in the nation for solar energy potential, as illustrated in Figure 21, which shows the amount of solar energy that shines across the nation. The strongest irradiance is in the southwestern corner of New Mexico, but the abundance of land availability and overall high solar strength across the state mean that solar development potential is high in nearly any portion of the state.

[29] "New Mexico Renewable Energy Transmission and Storage Study," New Mexico Renewable Energy Transmission Authority, 2020, https://nmreta.com/nm-reta-transmission-study/.
[30] Media Kit, Kit Carson Electric Cooperative, 2019, https://kitcarson.com/wp-content/uploads/2019/11/2019-KCEC-Media-Kit-November.pdf.

Figure 21: Nationwide Solar Irradiance, National Renewable Energy Laboratory[31]

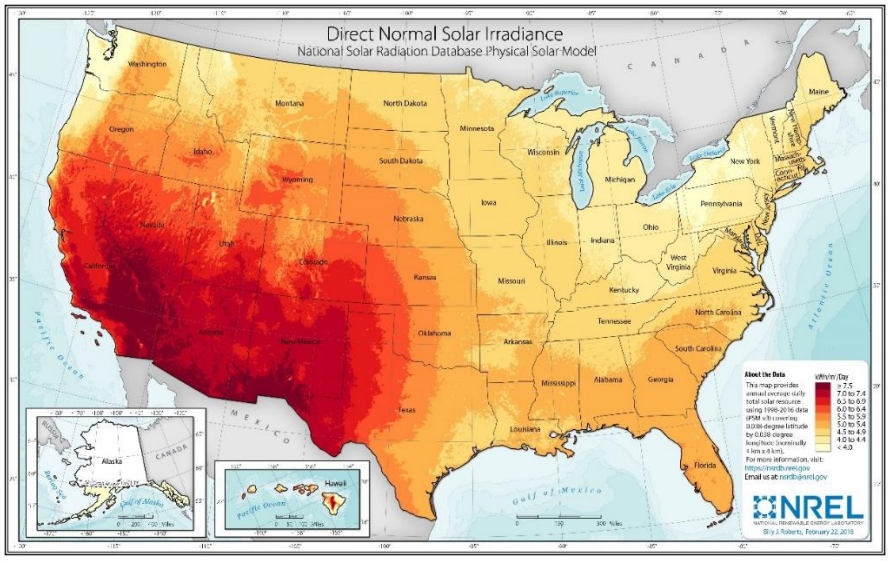


Table 8 breaks down New Mexico's solar capacity potential by county, organized from greatest to least. The assessment was made as part of the 2020 NM RETA Renewable Energy Transmission and Storage Study. The table also summarizes the share of the solar potential that is on private or state lands, as opposed to federal or tribal lands—an important consideration for determining the location of solar projects, as different land owners will involve different considerations.

Table 8: Solar Energy Potential by County

County	Total Potential Solar (MW-DC)	Solar Share on Private or State Lands
Chaves	493,733	80%
McKinley	458,673	29%
Catron	457,267	58%
Sandoval	447,156	10%
Socorro	433,420	66%
Union	406,948	97%
Lea	397,693	95%
San Juan	375,051	96%
Torrance	373,723	96%
Guadalupe	346,781	98%
Cibola	330,133	52%
Quay	330,125	100%
Lincoln	329,401	78%
Luna	302,255	72%
Eddy	292,008	60%
De Baca	279,350	97%
Hidalgo	254,410	70%
Grant	246,366	80%
Colfax	243,592	99%
Harding	231,779	95%

[31] Map Source: National Renewable Energy Laboratory, 2018, https://www.nrel.gov/gis/assets/images/solar-annual-ghi-2018-usa-scale-01.jpg.

San Miguel	223,588	30%
Sierra	209,859	63%
Rio Arriba	205,146	41%
Doña Ana	164,975	48%
Mora	146,571	100%
Roosevelt	131,258	100%
Santa Fe	128,209	87%
Otero	124,480	73%
Valencia	121,139	77%
Curry	96,786	100%
Bernalillo	89,872	59%
Taos	87,951	71%
Los Alamos	1,677	18%
Total	**8,761,374**	**73%**

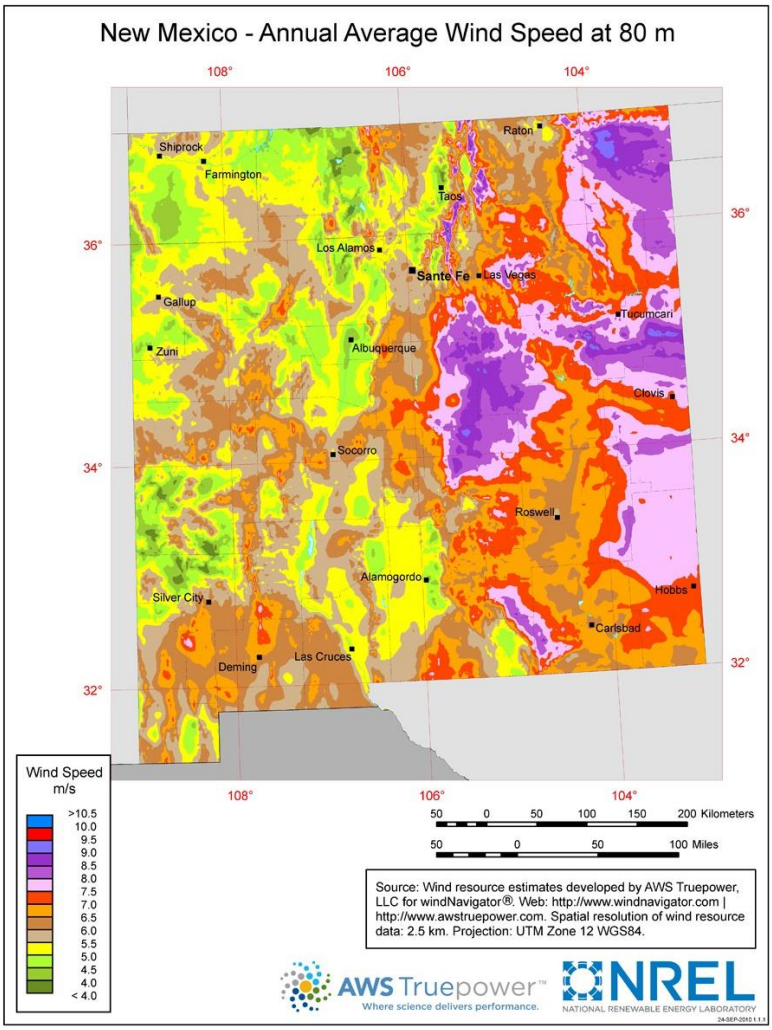
Across the state, large solar projects are underway. For instance, the Jicarilla Apache Nation is working with PNM on an innovative public-private partnership to launch a mutually-beneficial 400-acre solar farm. It will bring clean energy jobs to the Jicarilla Apache Nation, while helping the city of Albuquerque move toward its goal of 100% renewable energy for municipal operations by 2030. The 50 MW project is expected to generate sufficient power for 16,000 homes. Made possible by the 2012 Helping Expedite and Advance Responsible Tribal Home Ownership (HEARTH) Act, which reduces regulatory hurdles for energy development on tribal land, it is only the third solar project on tribal lands in the nation. However, this project could be a model for increasing use of renewables while creating quality jobs for tribes.

Wind Energy

New Mexico also has high wind energy potential. While not as generalized statewide as solar energy, the Eastern Plains are a strong candidate for future wind projects, with high average wind speeds and a large number of windy days. Figure 22 visualizes New Mexico's wind potential. A study by the National Renewable Energy Laboratory (NREL) found that **New Mexico has the 10th highest potential wind capacity in the nation**, with the potential to install up to 492,083 MW of wind power capacity, which would generate 1,644,970 GWh annually.[32]

[32] "Estimates of Windy Land Area and Wind Energy Potential by State for Areas >= 30% Capacity Factor at 80m" (XLS). National Renewable Energy Laboratory, 2010.

Figure 22: New Mexico Wind Potential, NREL[33]



The New Mexico Energy, Minerals, and Natural Resources Department reports that New Mexico's current wind energy capacity is 4,428 MW (online and under construction), less than 10% of the state's total wind energy potential. Capacity is growing rapidly, and wind installations not only increase electricity generation, but their benefits extend to job creation and a new revenue source for landowners via property leases. Sagamore Wind Farm, the second-largest wind farm in the state at 522MW, came online in Roosevelt County in December 2020. It is estimated to create enough energy for 194,000 homes. The project generated 500 construction jobs, will employ 25 permanent workers, and will generate about $234 million in local economic benefits over its 25-year life.[34] These revenues include $44 million in gross receipt taxes, $89 million in lease payments to landowners where the wind farm is located, and $101 million in property taxes. Another project, the Western Spirit Wind project, is the largest wind installation to-date in New Mexico at 1,050 MW total power generation across four sites in Guadalupe, Lincoln and Torrance Counties. The farms are connected by a 155-mile-long transmission line. Operated by international renewable energy company Pattern and sold to PNM for $285 million, it came online in December 2021. This project is significant in that it represents

[33] Map Source: National Renewable Energy Laboratory, 2010, https://openei.org/wiki/File:NREL-nm-80m.pdf.
[34] Kevin Robinson-Avila, "Xcel Energy completes construction of 522 MW Sagamore wind farm in New Mexico," Albuquerque Journal, December 17, 2020, https://ieefa.org/xcel-energy-completes-construction-of-522mw-sagamore-wind-farm-in-new-mexico/.

construction of New Mexico's first major renewable energy transmission line. It created 1,000 construction jobs and promises 100 full-time permanent positions. It is projected to generate $3 million per year in property tax revenues, lease revenues for 50 landowners, and $16 million over the life of the project to the State Land Office. Dependent on the construction of additional transmission lines, Pattern has plans to invest up to $6 billion in another 3,000 MW of wind farms in New Mexico.

Table 9 summarizes the maximum wind energy capacity in New Mexico by county. As in Table 8, the proportion of private and state land is also indicated. Most of the wind potential is clustered in the central region of the state: Union, Guadalupe, Lincoln, and Quay counties. However, most of the counties in the Eastern Plains have reasonably high potential. In fact, New Mexico has the potential to produce so much wind power that it could be a net exporter of wind energy to neighboring states.

Table 9: Wind Energy Potential by County

County	Total Potential Wind (MW)	Wind Share on Private or State Lands
Union	20,772	97%
Guadalupe	19,713	97%
Lincoln	19,186	77%
Quay	16,659	100%
Lea	13,104	100%
Torrance	11,989	97%
San Miguel	8,635	94%
De Baca	6,759	97%
Chaves	6,324	75%
Roosevelt	5,754	100%
Harding	5,396	95%
Eddy	4,851	38%
Curry	3,840	100%
Santa Fe	2,051	100%
Colfax	1,599	99%
Otero	1,388	18%
Cibola	1,208	30%
Socorro	675	43%
McKinley	541	78%
Sierra	360	88%
Mora	321	95%
Grant	297	84%
Luna	263	49%
Rio Arriba	258	16%
Hidalgo	253	60%
Sandoval	229	50%
San Juan	121	0%
Valencia	102	49%
Dona Ana	86	21%
Bernalillo	44	100%
Taos	43	12%
Catron	24	11%
Los Alamos	-	100%
Total	**152,842**	**90%**

Other Renewable Energy Potential

New Mexico's has two other sources of renewable electrical energy that are currently underutilized relative to potential, geothermal and biomass, which have the benefit of being able to be carried out on a small scale, potentially to serve small and disconnected communities. **New Mexico has the sixth-greatest geothermal potential of any state**. Recognizing that, New Mexico passed the Geothermal Resources Development Act in 2016, which transferred oversight of geothermal energy resource development to the Energy, Minerals, and Natural Resources Department's Energy Conservation and Management Division, away from the Oil Conservation Division. This shift in oversight has resulted in some changes in policy that should smooth the way for additional geothermal projects. Currently, the state only has one, a 15 MW industrial-scale geothermal power plant, compared to 28 plants in Nevada and 51 in California. Geothermal has direct use heating applications, as well as being a source of electrical power. Nearly all areas of New Mexico have some geothermal potential. Nationally, the total number of geothermal plants and capacity has been trending down for the past decade or so, but with many states setting ambitious renewable energy targets, geothermal energy is getting another look. As New Mexico seeks to modernize its grid and move to low-emissions renewable energy, geothermal may be worthy of reconsideration.

Biomass involves using a wide range of organic matter for power generation—anything from burning wood, to sewage, to agricultural waste. It only contributes minor amounts to New Mexico's electricity generation. **The state recently extended a tax credit for agricultural biomass**, which points to opportunities for communities to create small-scale energy generation from their local farm waste or other effluent.[35] A primary opportunity for biomass is as a supplemental energy source during off-peak times for other renewable options like wind and solar. The by-product from wood biomass is called biochar, which has a beneficial use to enrich farm soil.[36]

POLICIES AND BEST PRACTICES

Much of the state's electricity is provided via private companies, meaning the State of New Mexico has not asserted direct decision-making power over how most systems operate or where they operate. Further, these companies are profit motivated and the cost to extend services to rural households often does not outweigh the benefit from a profit-oriented perspective. However, the State can create incentives for utility companies to serve new areas. It can also experiment with new methods of power generation, transmission, and distribution to bring electricity to rural and remote communities. What follows are short descriptions and examples of models that communities nationwide are employing to build resiliency and cost efficiency into electrical systems, while better serving rural and remote homes.

Community Electrification and Resilience

Current estimates indicate 4.57% of households in New Mexico do not have an electricity subscription. Without detailed data, it is impossible to pinpoint where these homes are located. However, it is safe to assume that a large proportion of these homes are in rural or remote communities. In some

[35] Erin Voegel, "New Mexico governor signs bill to extend biomass tax credit," Biomass Magazine, March 5, 2020, http://biomassmagazine.com/articles/16859/new-mexico-governor-signs-bill-to-extend-biomass-tax-credit
[36] "North Eastern and North Central New Mexico Wood Biomass Electric Generating and Biochar Production Facility Feasibility Assessment and Business Model," Adelante Consulting prepared for New Mexico Energy Minerals and Natural Resources Department, 2018, https://www.adelanteconsulting.com/documents/2019/04/emnrd-report.pdf.

communities, the costs may be too high to get the needed infrastructure to an end-user. In others, residents may not be able to afford the high cost of a subscription.

Traditional electrification strategies, involving long transmission lines from generating facilities, are costly to serve rural communities. Electricity distribution generally benefits from economies of scale. If a provider can serve many households in a region, the cost to build that infrastructure is lower per household. In some rural areas, scale is not possible and small communities either go unserved or endure expensive bills. Even in communities that do have electricity, rough terrain and a lack of redundancy can lead to frequent and lengthy outages, which pose a risk for residents and businesses. The costs are increased and risk is exacerbated using traditional, fossil fuel-reliant methods because generation is centrally located, generally serving many homes across a large geographic area. Around the nation, alternatives to traditional methods are becoming ever more viable. Some places are discovering that the way that electricity has traditionally been generated and delivered is less efficient than smaller, decentralized models. In general, these new methods seek to increase electricity accessibility, reliability, and affordability.

THE IMPORTANCE OF A RESILIENT ELECTRIC GRID IN NEW MEXICO

Recent natural disasters across the nation have raised important questions about the resilience of our nation's electrical grid. Grid resilience is defined as the grid's ability to withstand and reduce the impact of disruptive events. Increased grid resilience is integral as New Mexico transitions its electric infrastructure. There are multiple risks, including natural disasters and fuel shortages, which can cause widespread power outages that may threaten New Mexico's economy and resident's safety. Low-income groups are especially vulnerable, as they may have access to fewer resources that minimize the impact of outages.

A major risk for New Mexico is extreme weather due, in part, to a changing climate. In February 2021, extreme cold weather across the U.S. caused record winter demand for electricity and left about 4.5 million customers in Texas and over 375,000 customers in Louisiana and Oklahoma without power. As wildfires worsen in California, major utilities in that state subject millions of customers to rolling blackouts to reduce the risk of fire on windy and dry days. Climate change is expected to affect every aspect of the electricity grid, with no state spared. More frequent droughts may pose a threat to regional hydroelectricity sources, while more wildfires may damage transmission lines.

Distributed Energy Resources

Distributed energy resources (DER) produce and supply electricity on a small scale spread out over a wide area. DER can be connected to a lower-voltage distribution grids, or directly to residences and businesses. With DER, power is generated right where it is needed. The most common example is solar panels on a private residence, which may connect to a larger power system or may be off-grid. As New Mexico transitions to renewable energy generation, DER will be an important component of a resilient grid. Some utility customers, like renters, may not have access to the economic and environmental benefits of an installation on their home, however.

One of the ways the New Mexico Legislature has sought to help encourage DER is the Community Solar Act in 2021, which allows subscribers to operate community solar projects. The Community Solar Act has potential to allow many more people to have the benefit of solar without an installation on their home, and may help utilities, including rural cooperatives, move closer to renewable energy targets.[37] The pilot goes into effect in April 2022 and will test when this kind of project will allow customers to opportunity to access the benefits of distributed energy investments through larger, community-based projects.[38] However, the legislation requires that solar installations be grid-tied, meaning it is not yet the solution for rural and remote areas that are not serviced by an electrical utility.

There remains a lot of room to increase DER usage and capacity. For instance, in 2020, distributed solar generation made up 18% of all solar electricity generated in the state and 4% of all renewable energy. NREL estimates that 50% of residential and commercial rooftops in the United States are suitable for solar photovoltaic installations, meaning that this resource is underutilized relative to potential.[39]

In general, DERs show strong potential of helping New Mexico meet energy demands and to tap into the state's renewable energy potential from wind, geothermal, and solar. According to the Alliance for Rural Electrification, mini-grid and stand-alone systems powered by renewable energy, including solar, are becoming more financially competitive and may soon be a financially viable solution to electrifying rural and remote communities or household clusters.[40]

[37] SB 84-- Community Solar Act, 2021, https://www.nmlegis.gov/Legislation/Legislation?chamber=S&legType=B&legNo=84&year=21.
[38] Community solar is becoming a more popular model; 39 states have some sort of community solar legislation.
[39] "Community Solar," National Renewable Energy Laboratory, December 2020, https://www.nrel.gov/state-local-tribal/community-solar.html.
[40] Alliance for Rural Electrification, https://www.ruralelec.org/grid-electricity-systems.

MICROGRIDS: AN ESSENTIAL, LONG-TERM RESOURCE FOR ALASKAN COMMUNITIES

Alaska, perhaps more than any state, must get creative with utility provision because the state lacks an extensive road system able to traverse its difficult landscape and geographic dispersion. Alaska has over 200 remote microgrids. Since the 1960s, electricity in these communities has largely relied on diesel generators. Recent innovations and investment in renewable energy generation has resulted in a dramatic increase in Alaska's renewably powered microgrids, including electrical systems, wind-hybrid systems, geothermal, and solar energy systems. Early investment in microgrids has spurred several innovations which now position Alaska as a global leader in the technology. This is a benefit to the state economy as global demand grows for microgrid technology.

In Kotzebue, for example, a rural Alaskan city with a population of about 3,200, price shocks in fossil fuels motivated the community to consider other energy systems. After investigating options, the city turned to a renewable-supported microgrid to meet their energy needs. Because of its geography near the coast, the city has high-class wind energy resources. Community leaders built 19 wind turbines that produce 2,965 kW of electricity. The city displaced 90,000 gallons of diesel and now saves about $900,000 in annual energy expenditures after the microgrid investment.

Microgrids

A microgrid is defined by the Department of Energy as a group of interconnected electrical loads and distributed energy resources, all of which has a central controllable entity. One of the key features of microgrids is that they can connect and disconnect from the grid. This makes microgrids feasible both for communities needing to electrify for the first time and those needing to increase resilience. In general, microgrids do not include backup generators and other power systems unable to operate in conjunction with the grid. However, these may be useful resiliency infrastructure for some communities.[41]

Because of their adaptability and ability to tie into any kind of energy generation source, microgrids can be deployed in many different regions and many different end-users. For example, a microgrid may support existing grid infrastructure at a commercial or industrial site or on a campus. For New Mexicans, community or remote microgrids are applicable for broad electrification and resiliency. Across the United States, community or remote microgrids have an average generation capacity between 1 MW and 10 MW. In New Mexico, 1 MW of generation can support an estimated 200 to 300

[41] "DOE Microgrid Workshop Report (Technical Report)," U.S. Department of Energy, 2011, https://energy.gov/sites/prod/files/Microgrid%20Workshop%20Report%20August%202011.pdf.

homes.[42] The average cost of a community-sized microgrid is approximately $2.1 million per MW of generation capacity.[43]

In a bid to build a climate-change-proof electrical system, Green Mountain Power in Vermont is working to overhaul its electrical utility system through use of microgrids.[44] It is moving away from large generator plants and transmission lines to a system of microgrids, tied together like networks of utility-connected devices and drawing on battery storage to smooth energy spikes and troughs. The benefit of connecting a series of microgrids is that local communities can maintain their own power supply even if there is a disruption somewhere else in the system from a winter storm or other event. Further, homes throughout the network are installed with batteries, which bank power and from which the utility may draw during peak demand times to reduce the need for additional power.

Emerging Technologies in Electrical Generation

As the State and the nation look to reduce carbon output in electricity generation, New Mexico is involved in a number of cutting-edge projects. These resources and infrastructure will help New Mexico to be well-positioned for Infrastructure Bill funding for cutting-edge technologies and may, as technology is improved upon and expanded, help to serve remote areas of the state that are difficult to reach with traditional electrical power infrastructure.

The Carbon Free Power Project

Los Alamos County is exploring small nuclear as a means of meeting its renewable energy goals, which include being carbon neutral by 2040. The current iteration of the plan is a subscription of 1.8 MW of power from a 462 MW nuclear electric generation facility to be constructed at Idaho National Laboratory and utilize small modular reactor technology developed by NuScale Power.[45]

Smart Grid/ New Energy and Industrial Technology Development Organization (NEDO) Project

From 2009-2015, Japan's NEDO, the State of New Mexico, and Los Alamos National Lab partnered on a project to demonstrate the use of renewable energy on a microgrid to meet residential community's needs. A 1 MW solar array served 1,600 residential homes. While the pilot has ended, the utility-scale solar array is still in service, operated by the Los Alamos Department of Public Utilities.

[42] The exact number of homes that can be powered per MW of renewable energy is dependent on many factors, including the renewable type, renewable generation efficiency, the average energy used per home, and the scale of the generation (i.e., utility-scale or site-scale). This analysis uses methodology from the Solar Energy Industries Association.
[43] This estimate was generated by the National Renewable Energy Laboratory after a 2018 survey of 80 microgrid projects across the United States. Authors note a wide range of microgrid design variability that may influence the ultimate cost per MW of generation capacity.
[44] Alejandro de la Garza, "This Vermont Utility Is Revolutionizing Its Power Grid to Fight Climate Change. Will the Rest of the Country Follow Suit?" Time Magazine, July 26, 2021, https://time.com/6082973/vermont-electric-grid/.
[45] Across the nuclear power sector, innovations are promising higher safety and less waste, including more efficient reactors and safer fuels.

New Mexico SMART Grid Center

The State of New Mexico is part of an Established Program to Stimulate Competitive Research (EPSCoR) initiative to research and create workforce training programs for next-generation power production and delivery. Current work is to develop research capacity and education programs to support a modern electric grid built on the principles of distribution feeder microgrids (DFMs).

National Solar Thermal Test Facility

While the state does not have any solar thermal electric power plants, Sandia National Laboratories in Albuquerque is home to the National Solar Thermal Testing Facility, which is funded by the Department of Energy and provides data and evidence for the design, construction, and operation of solar thermal power plants, which concentrate the sun's energy to generate power.

CASE STUDIES: ELECTRICAL

- ***The Arizona Corporation Commission,*** *https://www.azcc.gov/utilities*.
- ***Colorado Concern, Together We Build Report (2020),*** *https://coloradoconcern.com/hot-topics/together-we-build/*.
- ***Colorado Department of Local Affairs, Rural Economic Development Initiative,*** *https://cdola.colorado.gov/funding-programs/rural-economic-development-initiative*.
- ***Nevada State Infrastructure Bank,*** *https://apnews.com/article/nv-state-wire-nevada-government-and-politics-business-2866c243e739463205534f7d89c45512*.

See the appendices for more details on these and other plans.

COSTS TO CLOSE GAPS

Given the lack of precise data on where homes remain unelectrified, it is impossible to put forth a high-level cost or detailed cost estimates with the same level of detail as in the Broadband or Water sections of this report. Decisions such as running power lines from the existing grid, establishing new micro-grid systems to serve remote areas, or developing off-grid renewable energy systems all have widely varying costs and considerations that are dependent on community size and location. Further, the majority of electrical system decisions fall outside the realm of state and local governments, as they are carried out by private firms and cooperatives.

While the State may have limited control over how electrical utilities design projects, it does have the power to demand that utilities report better, more granular, data publicly. This is a critical first step in understanding how to coordinate resources to serve rural homes that are not electrified. Now is the time to take this step, as New Mexico is committed to its push to mandate use of renewables, which is requiring a rethinking of the grid and electrical transmission. Taking into account underserved areas as the State develops its plan to upgrade the entire electrical system supports system-level efficiencies, rather than approaching electrical solutions on a community-level, ad hoc basis.

System Upgrades

Even in areas already served by electricity, upgrades to the grid are generally long overdue, with much of the state's infrastructure decades many old and ill-matched to the electricity sources of the future, which in New Mexico principally include solar, wind, geothermal. As electric utilities continue to move toward meeting state renewable energy goals, system-wide upgrades will be needed. These will include systems that can better handle the variable energy of renewable sources, industrial battery storage, home-based battery storage, new transmission lines, and linkages to DER systems such as community solar installations. All of this activity coincides with a movement away from oil and gas and toward greater electrification of many items, including vehicles. New Mexico must anticipate this shift in the sources of energy and ensure that the electrical grids of the future are able to take surges in electrical generation (from renewable energy) and in use (from charging electric vehicles, heating, and cooling).

Transmission Line Expansion

Currently, New Mexico has two interconnected electrical transmission systems: one spans the north and much of the western part of the state; the other powers the southeast. The systems transmission backbone consists of several lines that run from the Four Corners area into the state's central load center around Albuquerque and Santa Fe. This legacy system was designed to be heavily reliant on coal- and natural gas-fired power plants. Renewable electricity generation requires a differently-configured transmission network because the state's natural energy resources are not located near legacy power plants.

A primary concern when seeking to reach un-electrified homes, and upgrading the state's grid to make it more resilient and to accommodate new energy sources, is the cost of new transmission lines. Generally speaking, **the cost of running new transmission lines is $1 million to $3 million per mile**. This cost range encompasses the following factors: 1) Land and right-of-way; 2) Poles, structures, and foundations; 3) Technical components like conductors and shield wire; and 4) Technical services and overhead (e.g., project management, engineering, and administrative costs). It is because of these high costs that electric utilities often struggle to justify running new lines to rural and remote

communities. Costs can vary widely for a variety of reasons, including scope and scale of project, terrain and land ownership, and whether the lines will run overhead or be buried. Cost break downs are shown in Table 10.

Table 10: Electrical Project Components and Cost

Component	Cost Range
Poles, structures, and foundations	$850,000 - $1,500,000 per mile
Additional technical components	$50,000 per mile
Overhead and financing	10% - 15% of total project costs[46]

Estimating land costs in New Mexico is particularly challenging because of the state's mix of private, state, Tribal, and federally-owned land. Transmission lines typically run along highway rights of way in most states, which simplifies permitting and construction. But in New Mexico, given the relatively low number of roads and vast distances, transmission lines may need to cut across land. Land costs are excluded from the table above and are the most variable component of project cost estimates. This cost category includes acquisition and permitting costs, which are usually around $20,000 per acre, but can vary widely depending the type of land being acquired and how much the owner seeks to sell or lease for. Generally speaking, farm, pasture, or otherwise rural land can cost from $15,000 to $20,000 per acre, while land with residential or commercial development can cost $20,000 to $25,000 per acre—these estimates include acquisition and regulatory and permitting costs. A project may need to cross all of these types of land, complicating the process of securing rights-of-way and drawing out the timeline to project completion. Because of these factors, acquisition and permitting costs in New Mexico are higher than in many parts of the United States.

To help understand in more detail the types of cost considerations that go into an energy transmission system, international energy firm, MISO Energy, puts out an annual cost estimation guidebook. Below, Tables 11-20, represent listed costs from MISO Energy's sample budgets. These are published to help clients understand the items and amounts required for various components of an electrical utility transmission system. While MISO does not serve New Mexico, it does work in a number of states across the United States and these cost estimates represent averages. There are additional costs to consider, for instance, MISO Energy recommends adding an additional cost of $6,897 per acre for traversing mountainous terrain.

Note that many of the terms used in electrical utilities are highly technical and may not be familiar to someone outside of the industry. Further, these tables are by no means a comprehensive list of items that may be required, depending on the type and scope of the electrical transmission project. Nevertheless, the tables below should convey the levels and variety of costs involved, and the complexity of these systems. In terms of actual project planning and budgeting, the vast majority of people in New Mexico are served by private utilities and cooperatives that handle these decisions—electric utility projects are rarely the responsibility of the State.

[46] Given recent inflationary pressures, a 30% contingency on project costs in the short term is recommended.

Table 11: A/C Transmission - Steel Pole - Single Circuit[47][48]

Tangent structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	7,000	7,900	8,400	9,300	11,100	22,300	35,100
Foundation size (Cu. Yd)	5.5	6.0	8.0	9.0	13.0	21.0	41.0
Material	$16,072	$18,138	$19,286	$21,353	$25,486	$51,201	$80,590
Installation	$24,108	$27,208	$28,930	$32,029	$38,228	$76,801	$120,577
Hardware	$4,232	$4,937	$5,291	$5,996	$7,053	$9,437	$10,332
Foundation	$7,572	$8,259	$11,013	$12,389	$17,895	$28,908	$56,440
Running angle structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	11,600	13,000	13,900	15,300	18,300	37,900	59,700
Foundation size (Cu. Yd)	9.0	10.5	13.0	14.0	19.5	30.0	54.5
Material	$26,634	$29,848	$31,914	$35,129	$42,017	$87,018	$137,071
Installation	$39,950	$44,772	$47,872	$52,693	$63,025	$130,528	$205,607
Hardware	$4,232	$4,937	$5,291	$5,996	$7,053	$9,437	$10,332
Foundation	$12,389	$14,455	$17,895	$19,272	$26,844	$41,297	$75,024
Non-angled dead-end structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	14,000	15,800	16,800	18,600	22,200	42,400	66,700
Foundation size (Cu. Yd)	11.0	12.0	15.0	16.5	22.5	33.5	60.0
Material	$32,144	$36,277	$38,573	$42,706	$50,971	$97,350	$153,143
Installation	$48,216	$54,415	$57,859	$64,058	$76,457	$146,026	$229,715
Hardware	$8,345	$9,735	$11,821	$11,821	$13,908	$33,920	$53,358
Foundation	$15,142	$16,519	$22,714	$22,714	$30,973	$46,116	$82,595
Angled dead end structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	20,400	23,000	24,500	27,100	32,400	48,100	80,700
Foundation size (Cu. Yd)	15.0	16.5	20.0	21.5	29.0	41.5	72.0
Material	$46,838	$52,808	$56,252	$62,222	$74,390	$110,438	$185,287
Installation	$70,258	$79,212	$84,378	$93,332	$111,586	$165,656	$277,931
Hardware	$8,345	$9,735	$10,431	$11,821	$13,908	$33,920	$53,358
Foundation	$20,649	$22,714	$27,532	$29,597	$39,921	$57,128	$99,113

[47] All tables adapted from "Transmission Cost Estimation Guide," MISO Energy, April 27, 2021, https://cdn.misoenergy.org/Transmission%20Cost%20Estimation%20Guide%20for%20MTEP21337433.pdf.
[48] Tangent structures are the towers that hold up the lines along the route; angle structures are used when lines need to change direction; dead end structures are where transmission lines end.

Table 12: A/C Transmission - Steel Pole - Double Circuit

Tangent structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	11,300	12,700	13,500	14,900	18,600	36,000	50,300
Foundation size (Cu. Yd)	8.0	10.0	14.5	17.5	23.0	46.5	78.5
Material	$25,945	$29,159	$30,996	$34,210	$42,706	$82,656	$115,489
Installation	$38,917	$43,739	$46,494	$51,316	$64,058	$123,984	$173,233
Hardware	$8,239	$9,612	$10,298	$11,672	$13,732	$18,478	$20,244
Foundation	$11,013	$13,766	$19,961	$24,091	$31,661	$64,011	$108,062
Running angle structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	15,000	16,800	17,900	19,700	24,600	47,700	70,400
Foundation size (Cu. Yd)	13.0	15.5	21.5	25.5	32.5	61.0	99.0
Material	$34,440	$38,573	$41,098	$45,231	$56,482	$109,519	$161,638
Installation	$51,660	$57,859	$61,648	$67,847	$84,722	$164,279	$242,458
Hardware	$8,239	$9,612	$10,298	$11,672	$13,732	$18,478	$20,244
Foundation	$17,895	$21,337	$29,597	$35,103	$44,739	$83,971	$136,281
Non-angled dead-end structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	16,700	18,700	19,900	22,000	27,400	54,000	75,500
Foundation size (Cu. Yd)	15.5	18.5	25.0	29.5	37.0	68.5	109.0
Material	$38,343	$42,935	$45,690	$50,512	$62,910	$123,984	$173,348
Installation	$57,515	$64,403	$68,536	$75,768	$94,366	$185,976	$260,022
Hardware	$16,457	$19,201	$20,573	$23,316	$27,430	$67,466	$106,330
Foundation	$21,337	$25,467	$34,414	$40,609	$50,933	$94,296	$150,047
Angled dead end structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Steel weight (lbs.)	26,000	29,200	31,100	34,300	42,800	84,600	118,200
Foundation size (Cu. Yd)	20.0	24.0	32.0	37.0	46.0	81.5	127.0
Material	$59,696	$67,043	$71,406	$78,753	$98,269	$194,242	$271,387
Installation	$89,544	$100,565	$107,108	$118,129	$147,403	$291,362	$407,081
Hardware	$16,457	$19,201	$20,573	$23,316	$27,430	$67,466	$106,330
Foundation	$27,532	$33,038	$44,050	$50,933	$63,322	$112,191	$174,825

Table 13: A/C Transmission - Wood Pole - Single Circuit

Tangent structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Material	$4,518	$8,457	$8,563	$11,399	$12,345	N/A	N/A
Installation	$12,608	$13,133	$14,709	$21,013	$31,519	N/A	N/A
Hardware	$4,413	$4,991	$5,463	$6,041	$7,880	N/A	N/A
Running angle structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Material	$7,932	$14,814	$14,971	$19,962	$21,591	N/A	N/A
Installation	$22,063	$23,009	$25,741	$36,772	$55,158	N/A	N/A
Hardware	$7,722	$8,721	$9,561	$10,559	$13,816	N/A	N/A
Angled dead end structure							
Voltage class	69kV line	115kV line	138kV line	161kV line	230kV line	345kV line	500kV line
Material	$9,035	$16,968	$17,126	$22,799	$24,690	N/A	N/A
Installation	$25,215	$26,266	$29,418	$42,025	$63,038	N/A	N/A
Hardware	$8,825	$9,981	$10,927	$12,083	$15,759	N/A	N/A

Table 14: HVDC Transmission - Steel Pole - Single Circuit

Tangent structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	14,773	19,943	21,938	26,325
Foundation size (Cu. Yd)	17.0	23.0	26.0	31.0
Material	$33,990	$45,886	$50,475	$60,570
Installation	$50,986	$68,830	$75,713	$90,856
Hardware	$4,587	$5,843	$6,355	$6,663
Foundation	$23,448	$31,655	$35,268	$42,322
Running angle structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	25,126	33,920	37,313	44,775
Foundation size (Cu. Yd)	23.0	31.0	34.0	41.0
Material	$57,812	$78,047	$85,851	$103,022
Installation	$86,718	$117,069	$128,777	$154,532
Hardware	$5,734	$7,303	$7,944	$8,328
Foundation	$31,570	$42,618	$46,880	$56,257
Non-angled dead-end structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	28,072	37,898	41,688	50,025
Foundation size (Cu. Yd)	25.0	34.0	38.0	45.0
Material	$64,590	$87,198	$95,917	$115,101
Installation	$96,886	$130,796	$143,876	$172,651
Hardware	$9,046	$21,909	$23,831	$24,984
Foundation	$34,756	$46,920	$51,612	$61,935

Angled dead end structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	33,965	45,852	50,438	60,525
Foundation size (Cu. Yd)	30.0	41.0	45.0	54.0
Material	$78,148	$105,500	$116,051	$139,260
Installation	$117,222	$158,250	$174,075	$208,890
Hardware	$9,046	$21,909	$23,831	$24,984
Foundation	$41,706	$56,304	$61,935	$74,322

Table 15: HVDC Transmission – Steel Tower – Single Circuit

Tangent structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	10,227	15,341	16,875	20,250
Foundation size (Cu. Yd)	13.0	19.0	21.0	25.0
Material	$19,556	$29,333	$32,267	$38,720
Installation	$29,333	$44,001	$48,401	$58,082
Hardware	$4,587	$5,843	$6,355	$6,663
Foundation	$17,465	$26,197	$28,817	$34,580
Running angle structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	16,751	22,614	24,875	29,850
Foundation size (Cu. Yd)	31.0	41.0	45.0	54.0
Material	$32,030	$43,241	$47,564	$57,077
Installation	$48,045	$64,861	$71,346	$85,616
Hardware	$5,734	$7,303	$7,944	$8,328
Foundation	$41,996	$56,695	$62,364	$74,837
Non-angled dead-end structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	19,318	26,080	28,688	34,425
Foundation size (Cu. Yd)	40.0	55.0	60.0	72.0
Material	$36,969	$49,867	$54,855	$65,826
Installation	$55,480	$74,801	$82,282	$98,738
Hardware	$9,046	$21,909	$23,831	$24,984
Foundation	$55,609	$75,072	$82,579	$99,095
Angled dead end structure				
Voltage class	± 250kV line	± 400kV line	± 500kV line	± 600kV line
Steel weight (lbs.)	25,000	33,750	37,125	44,550
Foundation size (Cu. Yd)	74.0	100.0	110.0	132.0
Material	$47,804	$64,535	$70,988	$85,186
Installation	$71,705	$96,802	$106,482	$127,779
Hardware	$9,046	$21,909	$23,831	$24,984
Foundation	$101,950	$137,632	$151,396	$181,674

Table 16: Conductor Costs (<1000 kcmil)

Conductor	Material cost per 1000 feet		Installation cost per 1000 feet	Accessories cost per 1000 feet
	ACSR	ACSS		
266.8 thousand circular mils (kcmil) "Waxwing"	$566	$552	$770	$245
266.8 kcmil "Partridge"	$683	$706	$954	$245
336.4 kcmil "Merlin"	$604	$673	$875	$245
336.4 kcmil "Linnet"	$696	$806	$1,028	$245
336.4 kcmil "Oriole"	$868	$894	$1,210	$245
397.5 kcmil "Chickadee"	$745	$784	$1,050	$245
397.5 kcmil "Ibis"	$895	$955	$1,269	$245
397.5 kcmil "Lark"	$884	$1,060	$1,329	$245
477 kcmil "Pelican"	$873	$960	$1,257	$245
477 kcmil "Flicker"	$838	$1,004	$1,261	$245
477 kcmil "Hawk"	$1,043	$1,115	$1,481	$245
477 kcmil "Hen"	$1,162	$1,192	$1,617	$245
556.5 kcmil "Osprey"	$1,049	$1,060	$1,449	$245
556.5 kcmil "Parakeet"	$1,230	$1,225	$1,689	$245
556.5 kcmil "Dove"	$1,163	$1,281	$1,676	$245
636 kcmil "Kingbird"	$1,013	$1,192	$1,509	$245
636 kcmil "Rook"	$1,148	$1,379	$1,729	$245
636 kcmil "Grosbeak"	$1,315	$1,435	$1,887	$245
666.6 kcmil "Flamingo"	$1,356	$1,590	$1,994	$245
795 kcmil "Coot"	$1,343	$1,490	$1,942	$245
795 kcmil "Tern"	$1,269	$1,512	$1,903	$245
795 kcmil "Cuckoo"	$1,413	$1,700	$2,129	$245
795 kcmil "Condor"	$1,468	$1,700	$2,169	$245
795 kcmil "Drake"	$1,590	$1,599	$2,192	$245
900 kcmil "Canary"	$1,800	$1,755	$2,445	$245
954 kcmil "Rail"	$1,677	$1,706	$2,325	$245
954 kcmil "Cardinal"	$1,836	$1,892	$2,561	$245

Table 17: Optical Ground Wire and Shield wire Costs

Wire	Material cost per 1000 feet	Installation cost per 1000 feet
Shield wire (insulated cable conductor)	$551	$828
Optical ground wire	$2,495	$3,742

Table 18: Circuit Breaker Unit Costs

Voltage class	69kV	115kV	138kV	161kV	230kV	345kV	500kV
Foundation size (Cu. Yd)	3.6	4.5	5.3	6.7	8.0	8.8	19.8
Material cost	$42,025	$52,531	$55,158	$57,784	$99,809	$330,422	$434,959
Installation cost	$7,880	$8,405	$8,931	$9,456	$10,506	$15,759	$21,013
Jumpers, conduit, wiring, grounding	$8,405	$9,456	$10,506	$12,608	$15,759	$21,013	$26,266
Foundation cost	$4,956	$6,195	$7,296	$9,223	$11,013	$12,113	$27,256

Table 19: Voltage Transformer (set of 3) Unit Costs

Voltage class	69kV	115kV	138kV	161kV	230kV	345kV	500kV
Foundation size (Cu. Yd)	1.8	2.3	2.7	3.4	4.0	8.0	12.1
Steel stand weight (pounds)	1250	1350	1425	1500	1750	2000	2500
Material cost	$21,013	$23,640	$26,266	$28,893	$36,772	$44,126	$84,050
Installation cost	$2,101	$2,364	$2,627	$2,889	$3,152	$4,203	$5,253
Jumpers, conduit, wiring, grounding	$6,304	$7,092	$7,880	$9,456	$11,819	$15,759	$19,696
Steel stand material cost	$2,870	$3,100	$3,272	$3,444	$4,018	$4,592	$5,740
Steel stand installation cost	$3,301	$3,565	$3,763	$3,961	$4,621	$5,281	$6,601
Foundation cost	$2,477	$3,166	$3,717	$4,680	$5,506	$11,013	$16,656

Table 20: Grid Supporting Devices Unit Costs

Voltage class	69kV	115kV	138kV	161kV	230kV	345kV	500kV
Reactor ($/mega volt amps, reactive [MVAr])	$14,262	$14,262,	$14,262	$14,262	$14,262	$14,262	$14,262
Capacitor bank ($/MVAr)	$10,506	$10,506	$10,506	$10,506	$10,506	$10,506	$10,506
Static VAr Compensator ($/MVAr)	$101,043	$101,043	$101,043	$101,043	$101,043	$101,043	$101,043
STATCOM ($/MVAr)	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Synchronous condenser($/MVAr)	$150,000/MVAr + $150/kw (step-up to 69kV)						
Energy storage (lithium ion)	Battery system: $300/kwh + Inverter: $80/kw + $150/kw (step-up to 69kV)						

Generation: Microgrids and Smart Grids

With renewable energy requiring a far less centralized design than traditional energy generation, microgrids are perceived by some as the electrical system design of the future. They can be more flexible to local needs, reduce the distance of transmission lines, and allows for more regional autonomy—rather than relying on energy generated hundreds of miles away. This design has the potential to reduce the size and severity of power outages, preventing major disruptions to work and life in the event of extreme weather.

Upgrading to new technologies is not low-cost, however. **The average cost of a community-scale microgrid is $2.1 million per MW of generation capacity**, with costs typically ranging from $1.4 million to $3.3 million depending on the design and type.[49] For utility-scale microgrids, the cost is a little higher at $2.5 million. The breakdown of costs for microgrid systems depend on the type of system being developed and its intended use. For instance, a utility-scale project is more likely to build on existing infrastructure and to be employed as a means of incorporate renewable energy into the grid. A community-scale system may have to develop more energy generation infrastructure, particularly if it is remotely located. For all systems, energy storage is a significant cost category to ensure steady electric availability throughout the day—as utility scale batteries improve, this cost should decrease.

For context, in New Mexico a 1 MW electrical system produces enough power an average of 200-300 homes per year; an estimate that ranges by community depending on the amount of electricity used by individual homes.[50] **An NREL report on the costs of microgrid systems found some economies of scale and cost savings on systems between 3 MW and 10 MW in size, which would serve 750 to 2,500 households on average.**[51]

Another consideration is that the cost to build and run a microgrid system varies widely depending on the type of fuel used. For instance, Alaska is a leader in microgrid technology—developed out of necessity due to the remoteness of many communities, but has some of the nation's highest energy costs because many systems still use diesel fuel, which must be transported vast distances. As communities incorporate renewable energy in the mix, operation and maintenance costs tend to go down and sustainability goes up. Further, a popular method in microgrids is to use a method call combined heat and power (CHP). Per the EPA, CHP captures the heat discharged from energy creation to generate thermal heating, often through hot water or steam. Two-thirds of heat energy created in conventional electricity generation is typically lost; this approach can increase the efficiency of systems from 50% to more than 80%, creating cost savings and a secondary benefit of heating for nearby facilities.

A related technology, which is integral to the functioning of microgrids and is coming into wider use is smart grids. Many New Mexicans already have smart meters for water, gas, or electric. Using two-way communication between the utility and the consumer throughout the system, smart grids take this idea to the next level. A smarter electrical grid promises more efficient electricity transmission, shortened duration of power disturbances, reduced operations costs from less need for human monitoring, and even lower rates to consumers. A barrier to the wide implementation of smart grid technology in New

[49]"Phase I Microgrid Cost Study," National Renewable Energy Laboratory, 2018, https://www.nrel.gov/docs/fy19osti/67821.pdf.
[50] "What's in a Megawatt?" Solar Energy Industries Association, https://www.seia.org/initiatives/whats-megawatt.
[51] Phase I Microgrid Cost Study," National Renewable Energy Laboratory, 2018, https://www.nrel.gov/docs/fy19osti/67821.pdf.

Mexico is the limited availability of broadband-speed internet in many locations. Because smart grids require presence of internet capabilities, it is impossible to estimate the cost of upgrading New Mexico's grid. However, a study by the Electric Power Research Institute (EPRI) conducted a decade ago found that **the national cost of upgrading to a smart grid would be $338 million to $476 million, but that it would result in benefits worth $1.3 trillion to $2 trillion**.[52] No follow-on study of current costs and benefits has been conducted since, but the Department of Energy believes that smart grids would save fuel, increase system efficiency, and lower customer bills, resulting in hundreds of thousands of dollars in annual benefits.[53]

Generation: Renewable Energy

While the state has mandated a move to renewable energy generation, transmission is the major hurdle. The state's Renewable Energy Transmission Authority (RETA) estimates that between **$9 to $11 billion in total private investment is needed for renewable energy infrastructure upgrades.**[54] A key issue that is driving up costs is where the renewable energy is located. Much of the renewable energy generation capacity is in the eastern portion of the state, where there is little existing transmission infrastructure. However, these investments, which would allow New Mexico to come closer to harnessing its full renewable energy potential, currently estimated at 11,500 MW, would position the state to be a renewable energy exporter. This means upgrades could result in substantial revenue generation potential once the infrastructure is operational. Further, the work is projected to create 3,700 construction jobs and 600-800 permanent positions.

One of the benefits of electricity from a system that draws on renewable energy is that generation and transmission can occur on a more local scale, which has potential to benefit small and remote communities. As the quality of batteries goes up, and their price comes down, renewables become an even more viable option for serving rural communities. **A 5 kW solar panel system designed for single residential use, for example, is on average $15,000.**[55] The average payoff rate for a home solar system nationwide is eight years, meaning after that point electricity will be virtually free for the homeowner, aside from routine maintenance costs.[56]

As with traditional electricity generation, renewable energy benefits from scale. A 1 MW solar farm averages $1-$1.36 million. This is, on average 50% cheaper, than home solar systems when measured as a cost per unit of energy output. The break-even point for utility-scale and solar systems is similar to home systems—averaging 8.1 to 8.2 years nationally.[57] Once installed, solar farm maintenance only needs to be performed 2-3 times per year, meaning ongoing maintenance costs tend to be low. Average return on investment for a solar system is 13.91%.

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[52] "Guidebook for Cost/Benefit Analysis of Smart Grid Demonstration Projects," EPRI, 2021, https://www.epri.com/research/products/000000000001025734.
[53] "Smart Grid System Report" (report to Congress), Department of Energy, 2018, https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf.
[54] "Transmission and Storage Study," New Mexico Renewable Energy Transmission Authority, 2020, https://nmreta.com/nm-reta-transmission-study/.
[55] "Solar panel cost in New Mexico," Energy Sage, 2021, https://www.energysage.com/local-data/solar-panel-cost/nm/.
[56] "Understanding solar panel financial benefits," Energy Sage, https://news.energysage.com/understanding-your-solar-panel-payback-period.
[57] Sara Gambone, "Payback and ROI of Solar Energy for Farms & Businesses" Paradise Solar Energy, https://www.paradisesolarenergy.com/blog/payback-and-roi-of-solar-energy-for-farms-businesses.

Utility-scale wind costs an average of $1.3 million to $2.2 million per MW of installed capacity.[58] Most commercial-scale turbines are 2 MW in size and cost around $3-$4 million installed. However, as with any electrical project, costs can vary tremendously based on individual factors. Beyond the turbines themselves, cost considerations for wind projects include wind resource assessment and site analysis expenses; construction expenses; permitting and interconnection studies; utility system upgrades, transformers, protection and metering equipment; insurance; operations, warranty, maintenance, and repair; legal and consultation fees.

Improvements in utility-scale batteries are helping to make these large utility-scale renewable energy projects feasible. Costs, lifespan, and capacity can vary a great deal depending on factors like weather (how hot or cold the climate is) and usage. A 2021 NREL study states that the average battery storage cost for a four-hour lithium-ion battery is $345/kWh.[59] However, the study projects that battery costs will come down significantly in the upcoming decades, with an average cost reduction of 42% by 2030 and 57% by 2050. With these ongoing improvements in performance and costs of batteries, it will be increasingly possible for homes or small communities to have reliable electricity from a small system, without even needing to be tied into the larger grid, a hopeful consideration for those in remote communities.

[58] "How much do wind turbines cost?" Wind Industry, https://www.windustry.org/how_much_do_wind_turbines_cost.
[59] Wesley Cole, et al, "Cost Projections for Utility-Scale Battery Storage: 2021 Update," NREL, https://www.nrel.gov/docs/fy21osti/79236.pdf.

WATER/ WASTEWATER IN NEW MEXICO

BACKGROUND

The New Mexico Environment Department oversees approximately 1,090 public water systems (PWS) in the state. These public water systems provide drinking water to 2 million people, or approximately 99% of the state's population. The PWS are divided by population served as follows:

- Large Community Water System Population greater than 10,000
- Medium Community Water System Population between 3,301 and 10,000
- Small Community Water System Population between 501 and 3,300
- Very Small Community Water System Population less than or equal to 500

PWS systems are categorized into Community, Non-Transient Non-Community, and Transient Non-Community. Most residents are served by community water systems. According to the New Mexico Environment Department Drinking Water Bureau, nearly 96% of residents, or 1,982,521 people as of June 2021, are on one of 576 community water systems. Non-Transient Non-Community and Transient Non-Community water systems represent the other 3-4% of systems; they include schools or state parks, which provide access to water but may not be utilized daily.

New Mexico's network of water utilities is dominated by small systems. In fact, New Mexico's water utilities are so small that 67% of the state's community water systems serve under 500 people, an additional 20.8% serve under 3,300 individuals, and only 5.5% serve more than 10,000 people.[60] Only two of the state's community water systems serve over 100,000 people. There are 250 rural communities in New Mexico dependent on a single source of water. The forms that community water systems in New Mexico can take are diverse (see text box below), further complicating initiatives to close gaps, connect systems, and finance infrastructure.

This decentralized system of small drinking and wastewater systems emerged in part due to New Mexico's large distances, varied topography, and widely dispersed population centers. However, New Mexico is not alone in struggling to manage a large number of small drinking water and wastewater systems. Nationally, water and wastewater systems are by far the most fragmented of utilities. In the United States, it is estimated that there are 1,079 telephone companies, 2,552 natural gas utilities, 3,300+ electric utilities, 53,000+ public water supplies, and 17,000+ wastewater districts.[61]

Isolated drinking and wastewater systems create challenges when it comes to maintenance, funding, oversight, and ensuring long-term sustainability. With few subscribers, many systems will never be able to set rates at a point where they are both affordable and allow the system revenues for operation and maintenance, much less to conduct sustainability planning and upgrades. Larger systems have the benefit of scale, with sufficient customers to allow a balance of affordability, quality service, and appropriate planning. Larger systems are also easier to monitor to ensure quality and reliability for consumers. Nevertheless, in some parts of the state, physical consolidation may not be possible. Additionally, many small systems operators and boards worry about the loss of control and autonomy

[60] New Mexico Environment Department, Drinking Water Bureau.
[61] "Water Regionalization Pros and Cons," 2018, https://www.epa.gov/sites/default/files/2018-02/documents/funding_the_future-history.pdf.

that consolidation might bring—concerns that may be allayed by speaking to systems where regionalization worked, and from having a strong voice in decision making of how a regionalized/consolidated system could look.

Just because most New Mexicans have access to water does not mean the state does not have serious water infrastructure issues. In fact, water and wastewater represent some of the state's most urgent priorities due to how critical they are to public health. Lack of safe water is a public health crisis—one that threatens even communities that do currently have drinking water and wastewater systems.

WATER UTILITIES ORGANIZATIONAL TYPES

Mutual Domestic Water Consumer Associations (MDWCA): An organizational structure that is common in New Mexico, but not as popular elsewhere. The New Mexico Sanitary Projects Act in 1947 authorized the creation of MDWCAs. This act was created out of recognition that unsanitary surface water and shallow wells were contributing to high infant mortality rates and excess deaths in the state. MDWCAs tend to be very small and run by an individual or small group. As a local government entity, MDWCAs are eligible for public funding.

Water Cooperatives: Water Cooperatives are consumer-owned and board-governed utilities formed to provide safe, reliable and sustainable water service at a reasonable cost. Water Cooperatives are considered nonprofit corporations and are granted Federal tax-exempt status under IRC section 501(c)(12), which requires that they operate on a nonprofit basis and meet the 85% income from members rule. Water cooperatives are most often found in suburban and rural areas that are located too far from municipal water companies to receive service.

Municipal and County Utilities: Public water supply system or water supply network including water treatment facilities, water storage facilities (reservoirs, water tanks and water towers) and a pipe network for distributing the treated water to customers including residential, industrial, commercial or institutional establishments.

Private utilities: While water is frequently thought of as a public utility, private water companies serve an estimated 73 million people nationally. Private water companies have existed for hundreds of years, but have grown more popular as governments seek to downsize budgets and services. While this type of organization is not without its criticisms, private water utilities have widespread support from the Conference of Mayors Urban Water Council, the National League of Cities, the Brookings Institution, and the White House. They can provide proven options for municipalities facing urgent water infrastructure and operational needs.

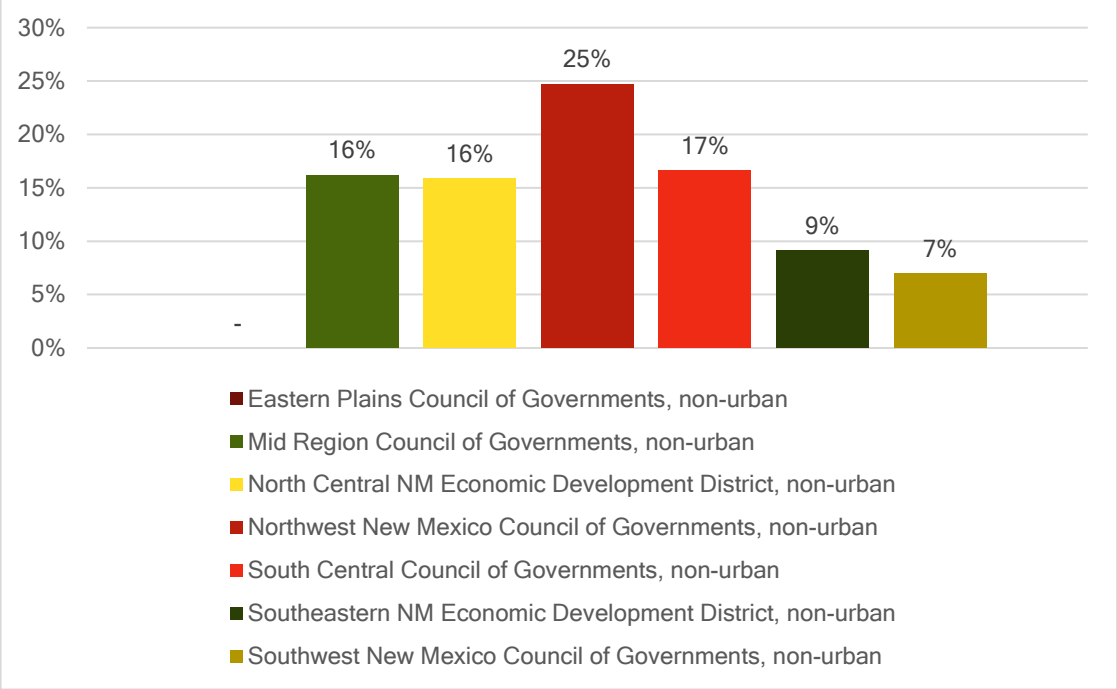
Sources: *Water & Waste Digest, University of Wisconsin Center for Cooperatives, Utton Transboundary Resource Center, National Association of Water Companies.*

PROFILE OF NEED

The American Society of Civil Engineers estimates that the drinking water needs gap, both in terms of access and necessary repairs and upgrades, in New Mexico is at least $1.4 billion.[62] Broadening the lens to include all water, stormwater, and wastewater projects, the 2018 State Water Plan estimates that the short-term need may be $4 billion.[63]

Further, the U.S. Census data show pockets of extreme need that are masked by the overall high access rate, with the greatest concentration in the northwest region of the state, centered on the Navajo Nation. Below, Figure 23 shows the proportion of the population in each COG district that lives in a census tract with low access to water.[64] This is not the proportion of people without water, but rather the relative volume of people in each COG district who live in areas where water and wastewater infrastructure is poor.

Figure 23: Share of Non-Urban Households That are in Census Tracts with Limited Water Infrastructure, by COG District[65]



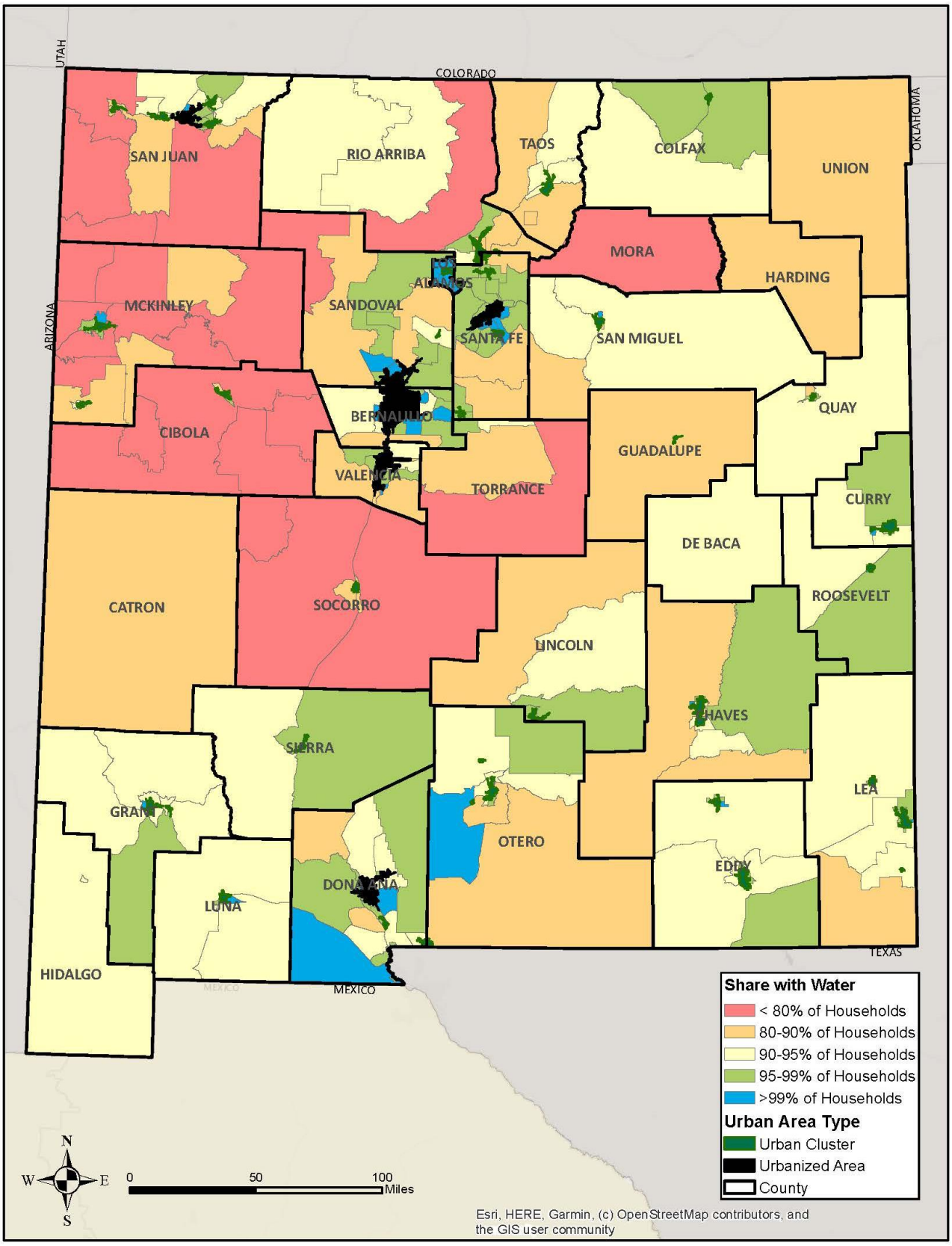
Below, Figure 24 shows state-level water access, where one can see clear dividing lines in access by census tract. Looking at the COG district maps represented in Figures 25-31, the picture is even clearer where the low-access areas are across the state. As with the internet access maps in the Broadband section, one can again see a relationship between water availability and proximity to a city

[62] "New Mexico Infrastructure Report Card," Report Card for America's Infrastructure, https://infrastructurereportcard.org/state-item/new-mexico/.
[63] "New Mexico State Water Plan," New Mexico Office of the State Engineer, 2018 https://www.ose.state.nm.us/Planning/swp.php.
[64] Note that the only households represented in the figures in this chapter are those counted by the Census. In communities like the Colonias on the state's southern border or in frontier communities, there is a risk of undercounting, and therefore a risk of underrepresenting the problem that water access represents.
[65] Note that the Eastern Plains COG data are not missing from this table; data show that 0% of residents live in a low-access census tract.

or urban area. One also sees a relationship between low water access and tribal lands, particularly the Navajo Nation. The area with the most widespread need is across Cibola, McKinley, and San Juan Counties. The need for sanitation and clean water in 2020 showed how high the stakes of water can be, when rural households on the Navajo Nation and elsewhere struggled to abide by hygiene recommendations during the height of the COVID-19 pandemic because of a lack of running water. Other areas of high concern are in the frontier communities in north-central New Mexico, and in Socorro and Torrance counties.

Some notes for readers on the water maps– given that far more households have water than broadband, the thresholds for what constitutes high, medium, and low levels of access are set differently for water. This was done in order to highlight the areas of greatest need on the map. These maps draw from U.S. Census data on presence of plumbing in the home, which indicates running water. Delving into the data, the overlap between drinking water and wastewater access at the household level was nearly total. As such, these maps are representative of the locations of highest need for both water and wastewater across the state.

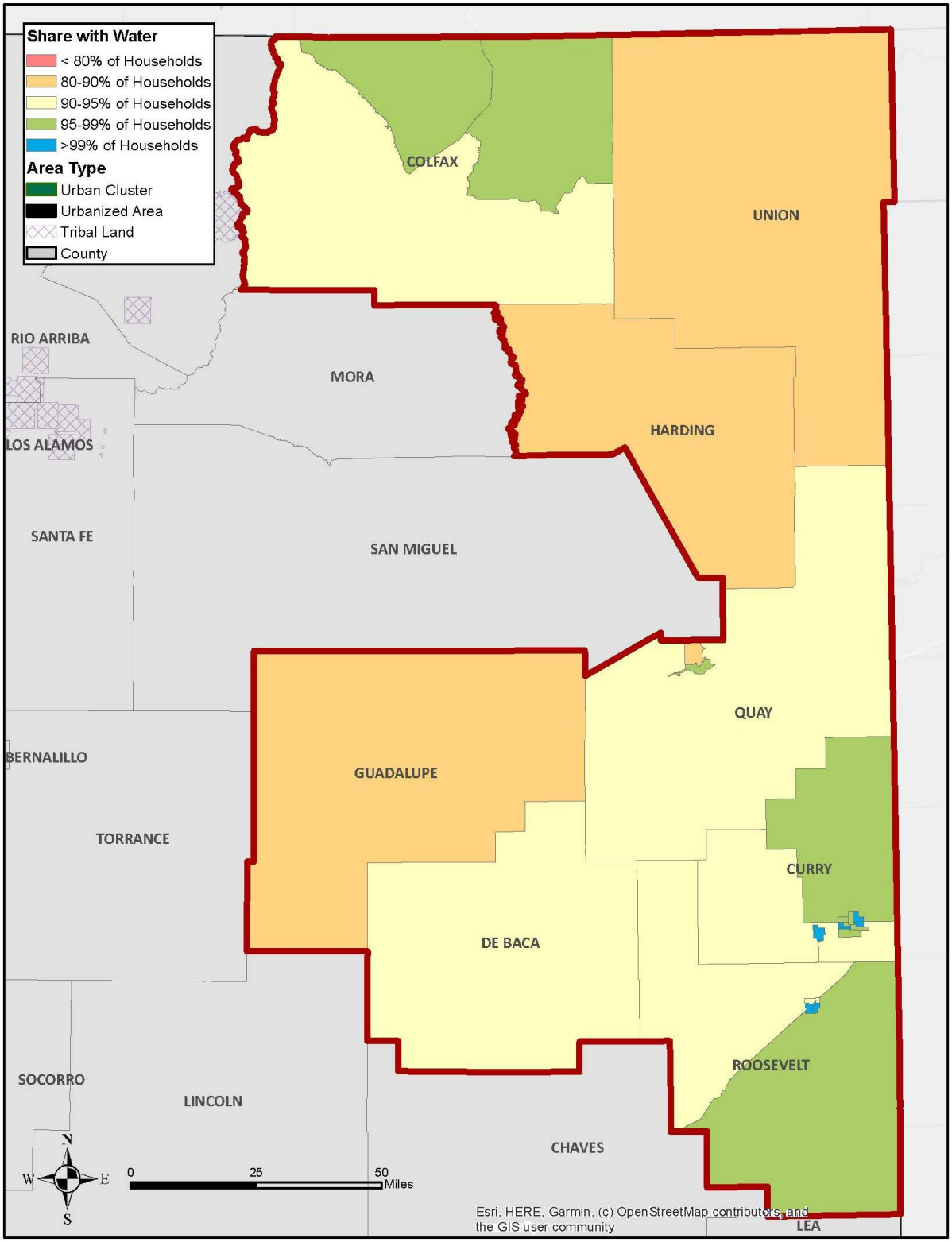
Figure 24: Water Access by Census Tract[66]



[66] Map source: U.S. Census, American Community Survey, 2019. Maps created by BHI using GIS.

Figures 25-31: Water Access by COG Area, with Tribal Areas Shown[67]

Figure 25: Water Access in the Eastern Plains COG



[67] Map source: U.S. Census, American Community Survey, 2019.

Figure 26: Water Access in the Mid-Region COG

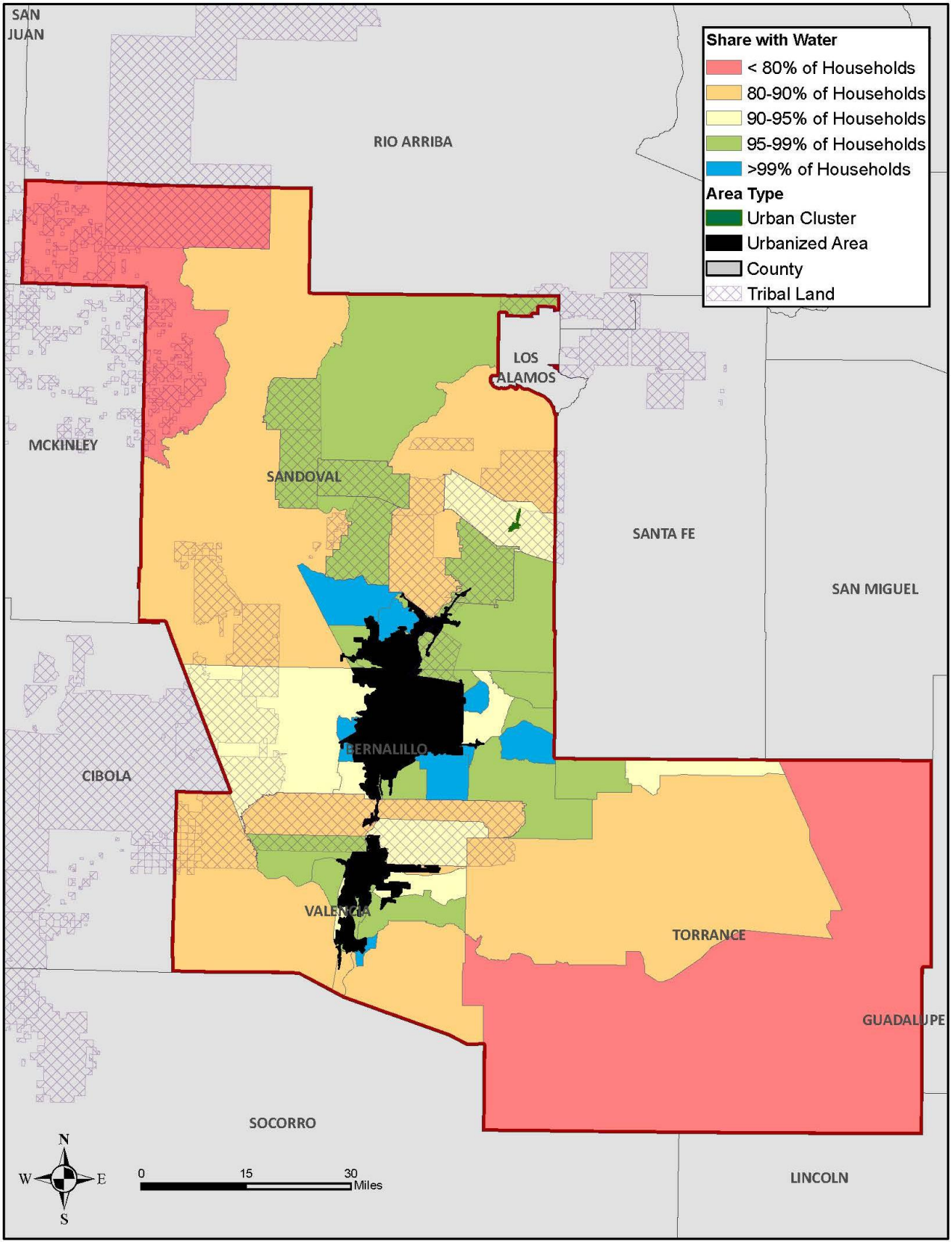


Figure 27: Water Access in the Northwest New Mexico COG

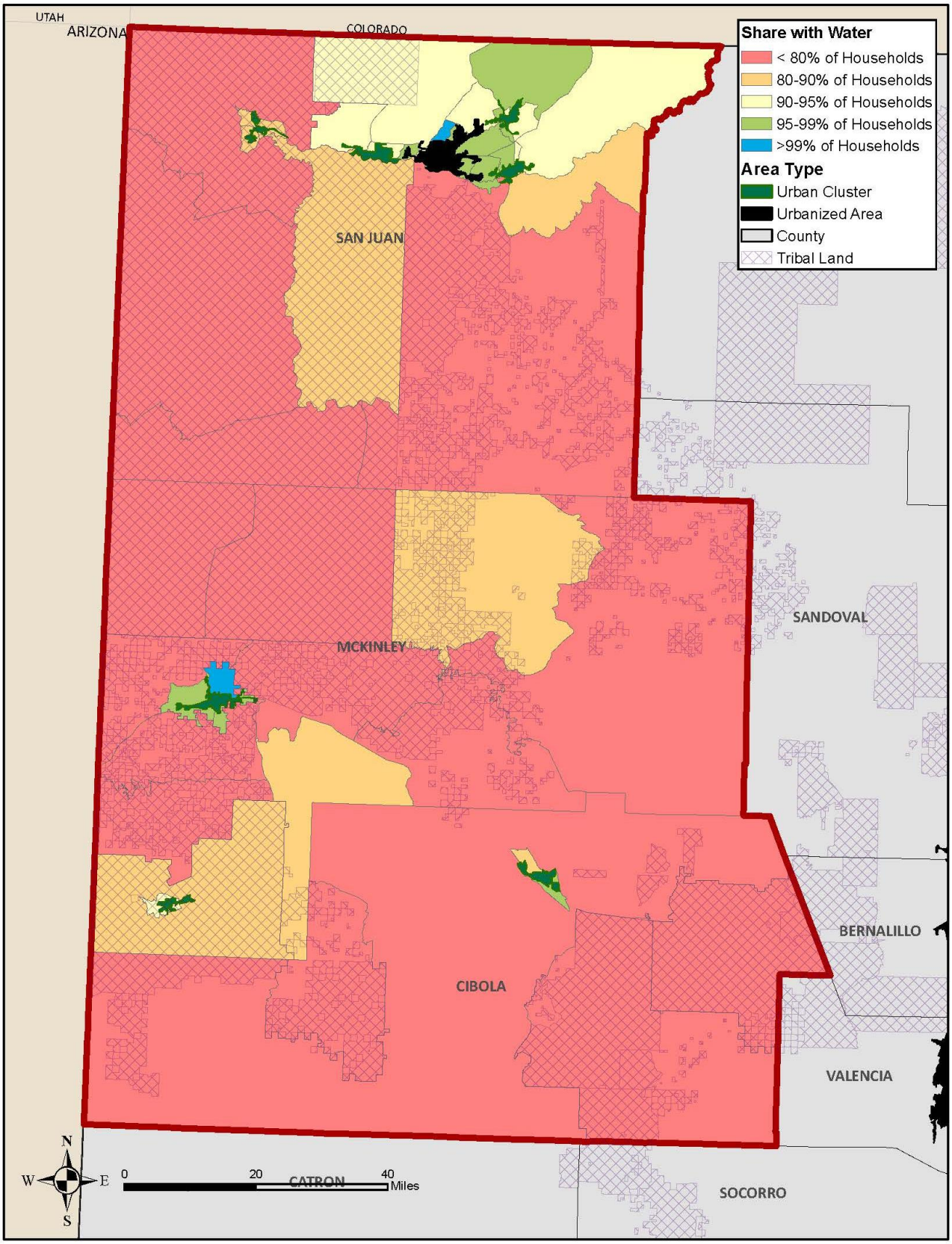


Figure 28: Water Access in the North Central New Mexico EDD

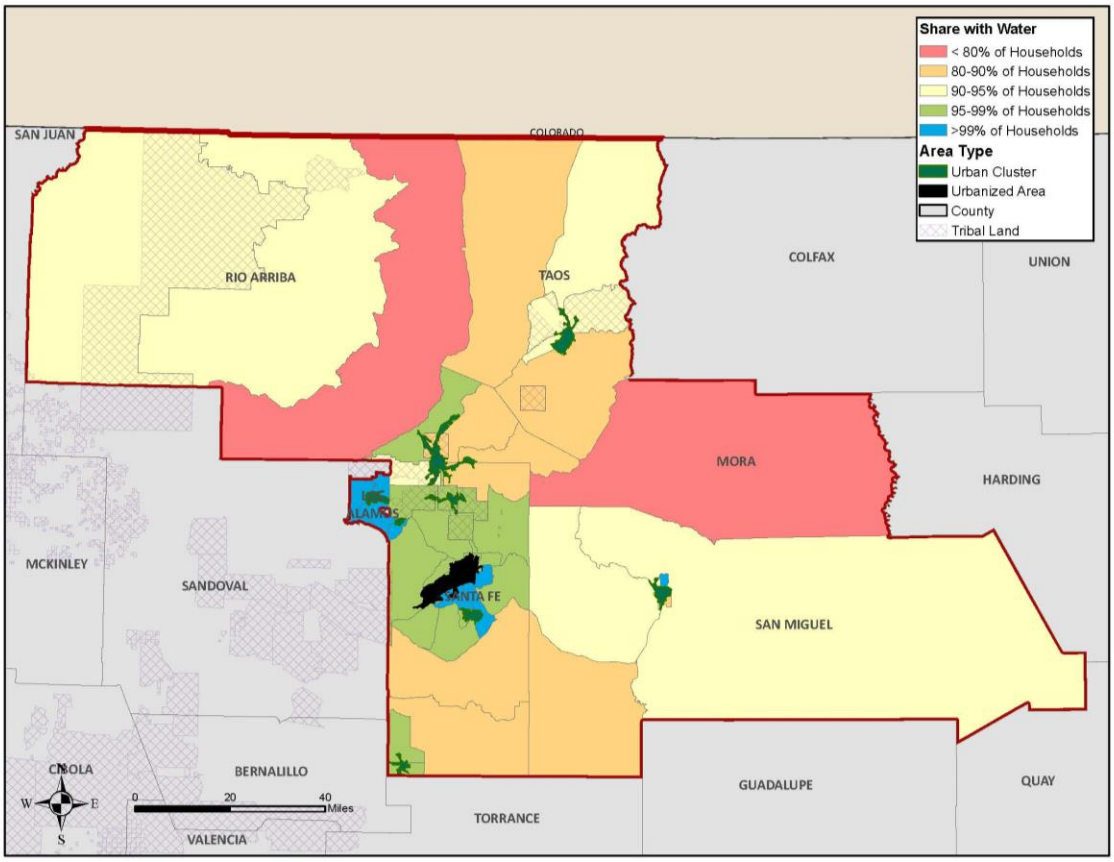


Figure 29: Water Access in the Southeastern New Mexico EDD

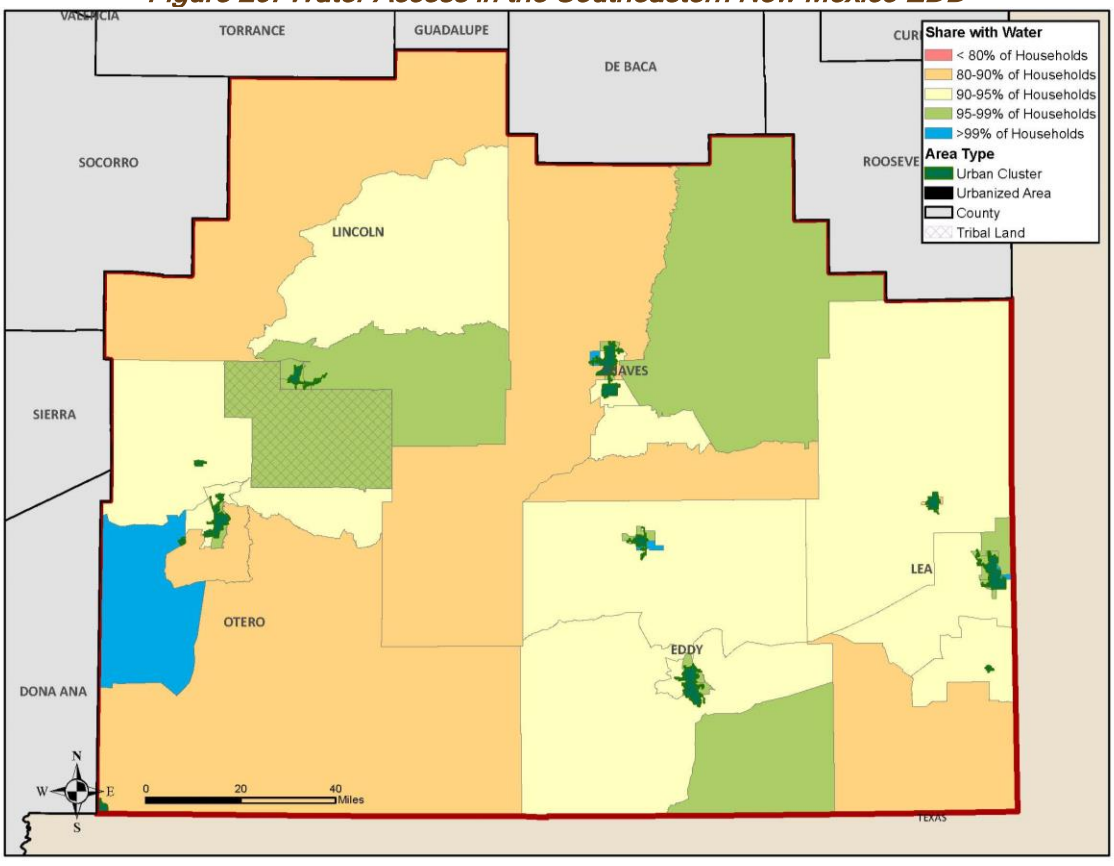


Figure 30: Water Access in the South Central COG

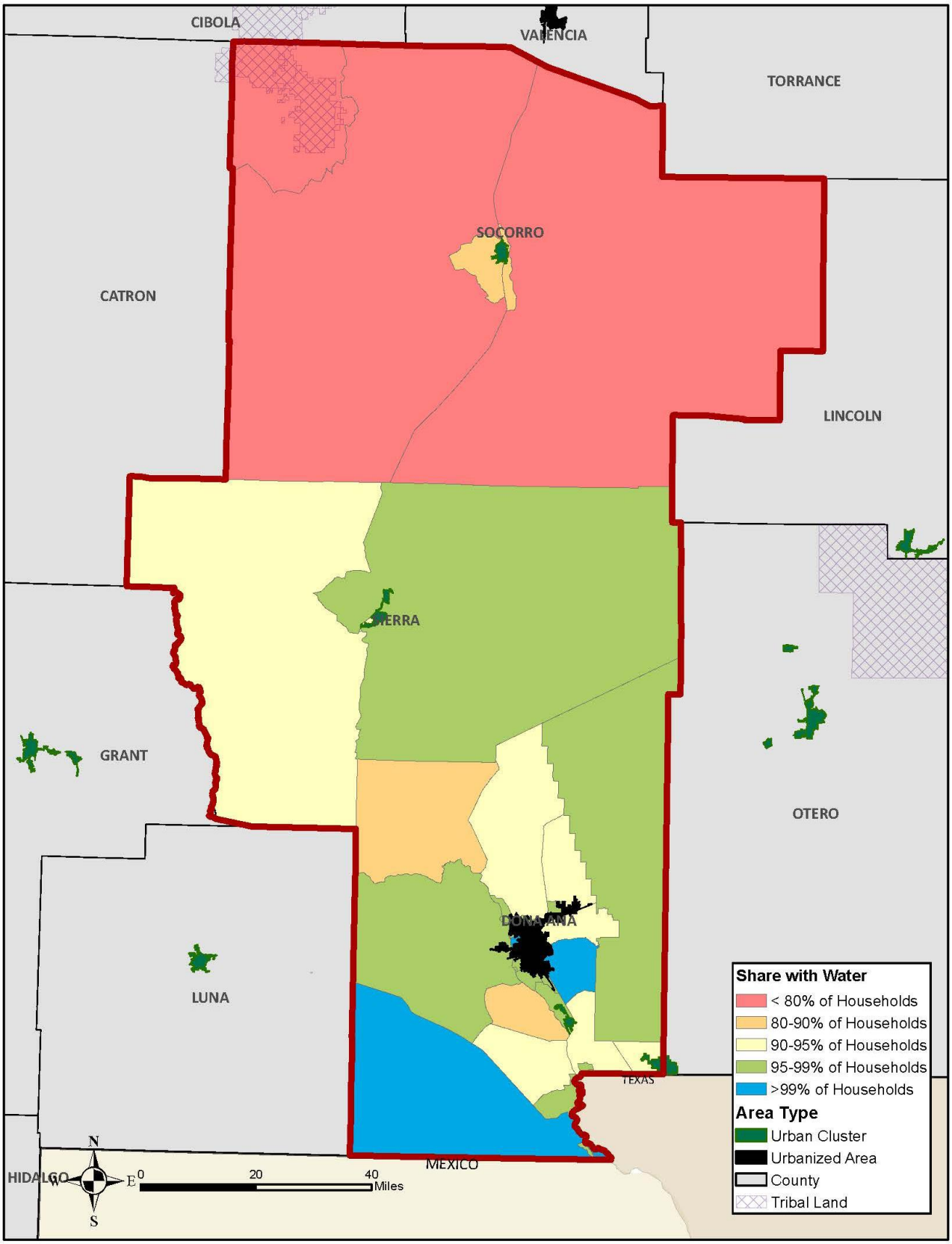
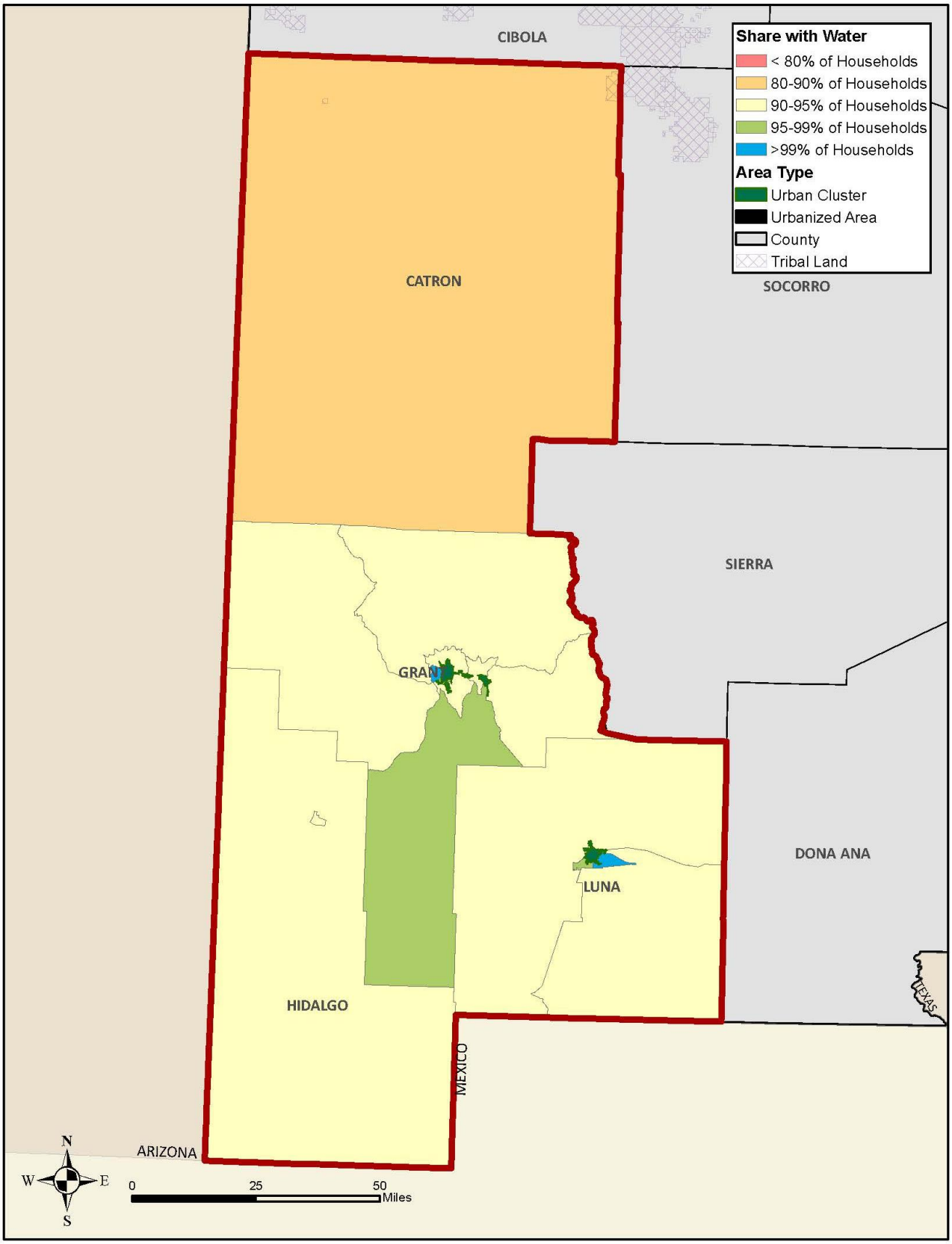


Figure 31: Water Access in the Southwest New Mexico COG



To look at the variation in need between urban and rural areas another way, Table 21 underscores the discrepancies on water access in rural areas by looking at the numbers of occupied households that lack access to water and contrasting the overall percentage of all county residents with those living in rural areas only. Data are highlighted where the percentage of people lacking access to water goes up by more than a percentage point when urban areas are excluded from the dataset. These gaps represent thousands of households without reliable access to water. Cibola, McKinley, and San Juan Counties alone report 3,052 households that do not have water.

Table 21: Water Access for Occupied Housing Units[68]

County	Total Occupied Housing Units	Occupied Housing Units (Rural)	% Lacking Complete Plumbing (All)	% Lacking Complete Plumbing (Rural)
Bernalillo	267,699	11,828	0.4%	1.7%
Catron	1,325	1,325	1.1%	1.1%
Chaves	23,284	5,778	0.9%	0.8%
Cibola	8,708	4,326	3.8%	5.7%
Colfax	5,853	2,374	0.0%	0.0%
Curry	18,548	3,804	0.3%	0.3%
De Baca	672	672	0.0%	0.0%
Doña Ana	77,842	2,333	0.9%	1.3%
Eddy	21,251	5,878	0.5%	1.0%
Grant	11,851	7,633	1.9%	2.7%
Guadalupe	1,384	513	1.7%	1.6%
Harding	211	211	0.0%	0.0%
Hidalgo	1,679	1,679	1.3%	1.3%
Lea	22,523	3,662	0.4%	0.2%
Lincoln	7,566	3,727	0.1%	0.1%
Los Alamos	7,931	126	0.0%	0.0%
Luna	8,904	3,572	0.2%	0.3%
McKinley	20,942	12,176	9.9%	19.3%
Mora	1,713	1,713	2.6%	2.7%
Otero	23,634	8,515	0.7%	1.1%
Quay	3,040	1,386	0.6%	0.0%
Rio Arriba	12,730	7,405	1.4%	2.1%
Roosevelt	6,814	2,699	0.2%	0.6%
Sandoval	51,001	10,421	1.1%	4.1%
San Juan	43,387	16,801	2.4%	5.3%
San Miguel	11,609	6,214	2.0%	3.1%
Santa Fe	61,921	19,028	0.4%	0.7%
Sierra	5,555	2,606	0.7%	0.6%
Socorro	4,520	2,008	1.4%	3.3%
Taos	12,103	9,410	1.1%	1.5%
Torrance	5,644	5,644	0.5%	0.5%
Union	1,395	447	0.1%	0.4%
Valencia	27,010	10,800	0.3%	0.3%

[68] American Community Survey, 2015 and 2019, U.S. Census.

However, simply looking at numbers of homes that are connected to water belies the complexity and pervasive nature of water needs in the state. Across New Mexico, the critical concern, even in communities with reliable water systems, is repairing aging systems and preparing for the future.

The state has a series of authorities to oversee and set goals for New Mexico's largely disconnected group of water systems. The New Mexico Office of the State Engineer's Interstate Stream Commission, has 16 water planning regions, which all perform planning and prepare their own reports that help to guide water management practices statewide. Additional water planning drought and data collection is carried out by the New Mexico Water Resources Research Institute. The Office of the Engineer also produces the State Water Plan (SWP) every two years, which sets overarching goals and priorities.[69] The state's Legislative Finance Committee also recently analyzed state water funding and provided recommendations on how to improve funding strategies, which largely align with the recommendations put forth in this report.[70] In the 2018 SWP, the New Mexico Office of the State Engineer (OSE) laid out ten overarching goals related to water infrastructure in the state (see the text box that follows).[71]

STATE WATER PLAN PRIORITIES (2018)

1. Maintain and operate properly functioning water systems.
2. Maintain and operate properly functioning wastewater systems.
3. Develop water and wastewater systems of sufficient capacity.
4. Replace use of potable water for non-potable use with alternative sources, such as treated effluent or desalination of brackish water, when possible and economically feasible.
5. Protect communities from floods.
6. Protect water quality.
7. Protect human health.
8. Reduce costs of infrastructure management.
9. Improve system efficiency, including reducing energy costs to pump water, or treat wastewater, or other actions which reduce costs and improve the delivery systems.
10. Promote equitable investment in water infrastructure.

[69] "New Mexico State Water Plan," New Mexico Office of the State Engineer, 2018 https://www.ose.state.nm.us/Planning/swp.php.
[70] "State-Funded Water Projects," New Mexico Legislative Finance Committee Program Evaluation Unit, June 23, 2021, https://www.nmlegis.gov/Entity/LFC/Documents/Program_Evaluation_Reports/State-Funded%20Water%20Projects.pdf.
[71] These 10 goals are not the only ones laid out by the OSE. The SWP also includes goals relating to data collection, accessibility, and monitoring, drought policy, watershed management, water supply and demand, water conservation, water quality, and water planning. These additional goals, specifically those around drought policy, watershed management, water supply and demand, and water conservation, emphasize the urgent need for New Mexico to address the set of challenges the state is facing with regard to its water infrastructure and supply.

Generally speaking, the goals contained within the SWP are concerned with expanding access to those not currently served by water infrastructure, strengthening existing water infrastructure, and preparing the state for long term water sustainability. The State is well aware of the need to invest in water infrastructure and regularly undergoes analysis into confronting issues. That said, New Mexico faces a number of challenges to ensuring the sustainability of drinking water access and infrastructure. Several of those, such as water rights disputes with other states, poor financial capacity and/or low managerial and technical capacity of systems, and limited federal funding represent ongoing tests to the integrity of New Mexican water systems. Others, however, such as projected population growth and an increasing gap between supply and demand for water, constitute a longer-term threat to the sustainability of New Mexican water systems.

Water Rights Disputes

As a landlocked state, New Mexico is surrounded by other states with claims to the same water sources. As a result, New Mexico is involved in eight interstate water compacts. Each of these compacts requires New Mexico to access only a predetermined amount of water from a given water basin. While egalitarian in theory, interstate compacts have proven detrimental to New Mexico's water supply. They limit the ability for New Mexico to use and store sufficient water to meet the demand of its population and can cause confusion when obligations change in response to water shortages in other states. Moreover, New Mexico has had ongoing disputes over water rights with other states even with these compacts in place. Texas is an especially notable challenge for New Mexico water supply. According to Texas state law, any municipality that owns access to even part of an aquifer is "entitled to use the aquifer to benefit its citizens without regard to the hydrological effects on anyone else." We can see the effects of this policy in a town like Jal, where the supply of drinking water has been seriously diminished due to the presence of a pipeline built by the nearby city of Midland, Texas draining the shared aquifer.

Financial Capacity

One of the most significant challenges to rural water systems in New Mexico is low levels of financial capacity. In short, rural water systems often do not generate sufficient revenues through their rate structures to adequately cover their costs, including staff, insurance, legal and financial services, certified operators, expansion, scheduled or emergency repairs, and technology upgrades. Insufficient financial capacity can also prevent water systems from accessing the credit that they need to expand, which is especially significant for areas of the state expected to grow in the coming decades.

Managerial and Technical Capacity

Related to inadequate financial resources, rural water systems throughout New Mexico often lack the trained and certified staff needed to ensure that operations are conducted professionally. Some, especially small utilities, even rely on volunteers to run and maintain the systems. Relying on staff without the proper training and certification puts the technical capacity and the long-term sustainability of rural water systems in jeopardy. This limited capacity extends to the ability to seek out and secure needed funds. A Southwest Environmental Finance Center survey conducted in spring 2021 found that 60% of respondents were only aware of a few of the funding resources available in the state and fully one-third of funding resources were not accessed by a single respondent. About two-thirds reported that seeking funding was difficult, and 51% reported that compiling required documentation is a significant challenge.

Limited Federal Funding

The sustainability of water systems in New Mexico is further threatened by the fact that federal funding for water infrastructure in New Mexico and nationally has been insufficient for proper maintenance. Further, many funding sources cannot be used for operations and maintenance at all—leaving systems without needed ongoing support. According to the United States Water Alliance, federal funding for water systems has "flatlined" since the 1980s, meaning the cost of water system expansion and maintenance falls to state governments and local systems. The Federal Infrastructure Bill, which recently passed, will substantially increase federal dollars to rural water infrastructure in the short term. However, without planning solutions to long-term operations and maintenance issues, these funds may mean only a temporary fix. The fact remains that rural water systems across New Mexico have long been in desperate need of funding and planning resources to help address long-term, systemic challenges relating to the distribution and structure of water and wastewater systems.

Supply and Demand Gap

As a result of the above challenges, New Mexico faces a supply and demand gap with regard to water systems, particularly those in rural areas. By 2030, the State Water Plan estimates that the high-water demand projection will be in excess of the average water supply. By 2050, even the low water demand projection will exceed the average water supply, and by no small margin. For example, the Legislative Finance Committee projects that existing water supplies in Eastern New Mexico may only meet 12% of demand by 2060. Already in 2010, the state's demand for water exceeded the water supply in drought times; a significant fact given that more than half of the state is currently experiencing extreme or exceptional drought conditions with little expectation of abatement.

The State Water Plan does, however, offer several important caveats regarding supply and demand that must be considered. The first is that supply and demand cannot be viewed as entirely independent of one another. Demand often depends on supply, particularly in terms of agricultural applications in rural communities. The second is that short-term variability in supply is addressed by legal and policy action, meaning that water supply projections will shift over time as the State passes new water conservation laws, as agriculture becomes more efficient, and as people change habits.

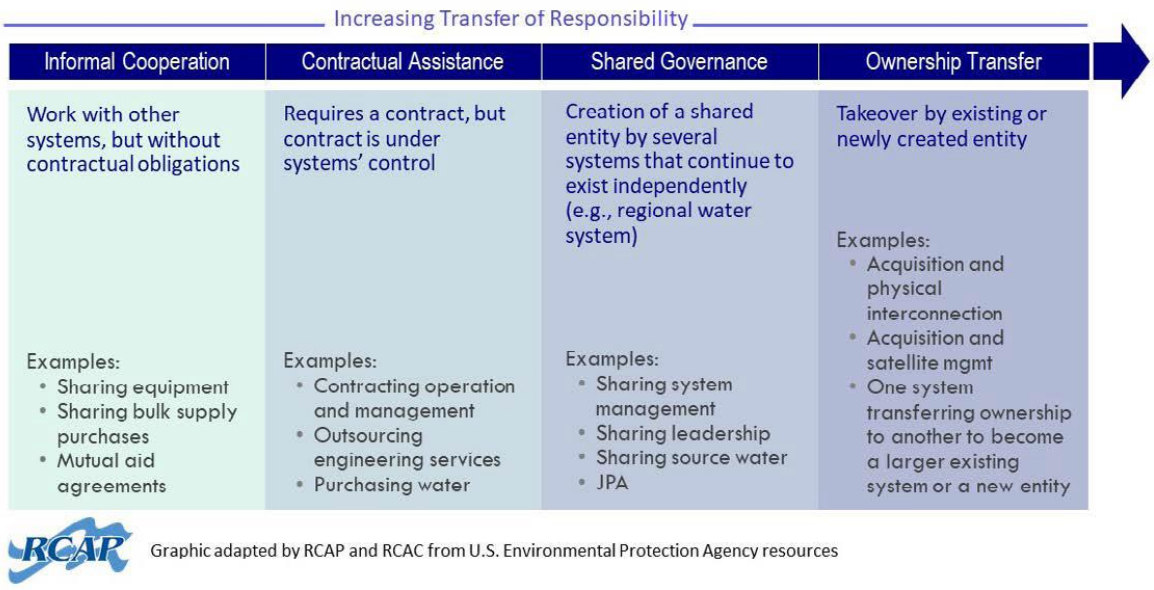
POLICIES AND BEST PRACTICES

Despite the challenges of New Mexico's water systems, there are several strategies available to strengthen these systems, which are based on current nationally-accepted best practices. These include the regionalization of water systems, efforts to bank water, and a concerted effort to address both the supply and demand of consumable water. Together, these efforts pertain to the core issue at hand–water access–because without a sustainable system, every resident's water supply may be in jeopardy.

Regionalization/ Consolidation

Regionalization refers to the process by which multiple water systems, generally in relative proximity, agree to some degree of cooperation.[72] Cooperative measures can range from sharing of equipment in emergencies to fully physically interconnecting infrastructure.[73] Figure 32 was developed by the Regional Community Assistance Partnership (RCAP) and it shows that the term "regionalization" encompasses a variety of different arrangements that do not always mean physically joining systems. Nationwide, regionalization has proven to be an effective strategy in improving the financial and technical capacity of water systems, supporting improved planning, maintenance, and administration.[74] Use of regionalization to de-fragment New Mexico's water systems would be a benefit in terms of oversight and safety.[75] Means of doing so include reducing the financial and regulatory hurdles that stand in the way of systems that wish to combine. Small systems may not understand the benefits of regionalization, but representatives from local regionalized systems to help communicate the benefits may be more effective than relying on third-parties or state staff.

Figure 32: Regionalization, Transfer of Responsibility Continuum



[72] Utton Center Transboundary Resources Center, "Community Water Systems," *Water Matters!*, The University of New Mexico, 2015, https://uttoncenter.unm.edu/resources/research-resources/water-matters-2015---full-pdf.pdf, 13-9.
[73] Ibid.
[74] Ibid.
[75] "Program Evaluation: State Funded Water Projects," New Mexico Legislative Finance Committee, 20.

Regionalized water systems help to ensure that funding for infrastructure is less piecemeal and that dollars can be efficiently and reliably put to use.[76] They also lessen the need for volunteer operators and allow for certified operators to support a larger number of people.[77] Customers of these water systems also tend to experience improved service due to the heightened financial, managerial, and technical capacities. Regional water systems are especially useful in addressing serious issues in small, rural water systems that prevent them from expanding to serve new residents such as run-down infrastructure, poor water source quality, and insufficient staffing or financial resources.[78] A number of states, including California, Kansas, Kentucky, and West Virginia have legislation on the books that mandates water regionalization in certain cases. Kentucky is a long-time leader on regionalization, passing laws 20 years ago that new systems must consider connection to exiting systems.[79] The Kentucky Public Service Commission is also empowered to order consolidation, rate changes, and other charges. Because of these policies, Kentucky has gone from 2,178 community water systems in 1974, to 394 systems—of which, 98 are large or very large and only 14 are very small. At the same time, the State has increased the reach of the water system to serve more people.

While still not widespread, regionalization has been a New Mexico state priority for more than a decade and there are several large-scale regional partnerships among water systems in the state. Table 22 lists 16 of the most significant and their locations in the state.

Table 22: Highlighted New Mexico Regional Water Systems[80]

Water System	County/Counties Served
Albuquerque-Bernalillo County Water Users Authority	Bernalillo
Eastern New Mexico Rural Water System	Curry, Quay, Roosevelt
El Rito Regional	Rio Arriba
El Valle Water Alliance	Sandoval
Greater Glorieta Community MDWCA	Santa Fe
Lower Des Montes MDWCA	Taos
Lower Rio Grande Public Water Works Auth.	Southern Doña Ana
Rio Embudo MDWCA	Rio Arriba
San Juan County Rural Water Association	San Juan
San Juan Water Commission	San Juan
Sangre De Cristo Regional	Guadalupe
Santa Cruz Region MDWCA	Rio Arriba
Santa Cruz River Valley Association	Rio Arriba
The Mariposa Alliance	McKinley[81]
Union De Llano MDWCA	Taos
Valdez MDWCA	Taos

[76] Ibid.
[77] "New Mexico State Water Plan Part II: Technical Report," New Mexico Office of the State Engineer, 2018, p. 47.
[78] Ibid.
[79] "Building the Capacity of Drinking Water Systems: Kentucky," EPA, https://www.epa.gov/dwcapacity/kentucky.
[80] Ibid.
[81] Daniel B. Stephens and Associates, Inc., "McKinley County Small Water Systems Regionalization Plan: Phase IIB Summary Report," July 26, 2010, http://www.nwnmcog.com/uploads/1/2/8/7/12873976/mckinley_phase_iib_7-26-2010.pdf.

Banking Water

Included in the State Water Plan is a set of recommendations from the Regional Water Planning Steering Committee around ways to fortify New Mexico's water systems. Increasing the flexibility of water banking is among these recommendations.[82] However, as of 2018, only three of New Mexico's 16 defined water regions had submitted plans for additional water banking measures. There is clearly ample room to develop additional water banking measures, and the State should encourage rural water systems to invest in banking water to improve long-term resiliency and ease variations in supply. A reason why these plans have not been created is the pervasive lack of planning capacity identified in interviews conducted as part of research for this report.

Address Supply and Demand Issues

While both of the above strategies represent important tools to make communities more water-secure, they cannot alone solve the water infrastructure crisis that the state currently faces. To maintain long-term stability among rural water systems, New Mexico will have to address both the supply and demand sides of the water equation. There is a serious need for projects that increase the drinking water supply in the state. These could include underground storage and recovery projects (USRs), desalination projects, drilling new wells, importing water from alternative groundwater basins or surface water supplies, treatment projects for effluent, and the transfer of water rights from agricultural sources to municipal sources.[83] The State Water Plan also references several draught mitigation strategies that would be increase the available supply of potable water.[84] Meanwhile, demand-side strategies could include infrastructure investments that allow water systems to use water more efficiently, reducing evaporative losses from surface water sources, and decreasing the use of potable water for nonessential purposes.[85] Water recycling and reuse technologies are also improving. This includes desalinization processes, which could reclaim water for drinking that was used in oil and gas and other water-intensive industries. Potable water reuse, which reclaims wastewater for drinking, can also be a solution for water systems in areas where groundwater and surface water supplies are diminishing.

Critical to making informed decisions relating to any of these strategies is the need for better data on the state's water systems. Each community should be actively monitoring its underground water supplies in wells and aquifers to understand more about water levels and recharge rates. Without having a complete picture of the state's water resources, both above and under the ground, it is impossible to make decisions about the urgency of measures such as regionalization or reducing water usage.

[82] "New Mexico State Water Plan Part II: Technical Report," New Mexico Office of the State Engineer. The full list of recommendations can be found in Appendix 2B.
[83] Ibid, 70.
[84] Ibid.
[85] Ibid.

CASE STUDIES: WATER

- ***California Human Right to Water Board,*** *https://www.waterboards.ca.gov/water_issues/programs/hr2w/.*
- ***California Infrastructure Plan (2021),*** *https://www.ebudget.ca.gov/2021-Infrastructure-Plan.pdf.*
- ***Colorado Concern, Together We Build Report (2020),*** *https://coloradoconcern.com/hot-topics/together-we-build/.*
- ***Colorado Department of Local Affairs, Rural Economic Development Initiative,*** *https://cdola.colorado.gov/funding-programs/rural-economic-development-initiative.*
- ***Kansas Public Water Supply,*** *https://www.kdheks.gov/pws/.*
- ***Kentucky, Better Kentucky Plan,*** *https://governor.ky.gov/priorities/better-kentucky-plan.*
- ***Kentucky Energy and Environment Department, Division of Water,*** *https://eec.ky.gov/Environmental-Protection/Water/Pages/default.aspx.*
- ***Montana Water, Wastewater and Solid Waste Action Coordinating Team (W2ASACT),*** *http://dnrc.mt.gov/divisions/cardd/wasact.*
- ***Nevada State Infrastructure Bank,*** *https://apnews.com/article/nv-state-wire-nevada-government-and-politics-business-2866c243e739463205534f7d89c45512.*
- ***West Virginia Public Service Commission,*** *http://www.psc.state.wv.us/.*

See the appendices for more details on these and other plans.

COSTS TO CLOSE GAPS

The American Society of Civil Engineer's annual Infrastructure Report card estimates that New Mexico's drinking water infrastructure needs are $1.4 billion over 20 years; wastewater needs over the same time period are $320 million.[86] These estimates mostly align with the current dollar amount of unfunded water projects in the Department of Finance and Administration's Infrastructure Capital Improvement Plan (ICIP) database for 2022-2026, the amount of requested water supply projects is $1,277,316,753, and it is $797,898,433 for wastewater.[87] The 2018 State Water Plan puts the all-in short-term cost for water projects at $4 billion.[88] As a means of understanding what these numbers mean on a community level, this section uses seven case studies to explore costs relating to water and wastewater system installation and expansion.

Drinking Water Systems Costs Introduction

Before going into additional details on New Mexico's system-level costs, first it is helpful to define the components of a water system. These include: 1) Supply, 2) Transmission and distribution lines, 3) Storage, 4) Booster stations, and 5) Hydraulic control valves. For existing systems, booster stations and hydraulic control valves are common features for asset upgrades, rehabilitation, or new facilities for system expansion. While the costs of materials and labor are subject to fluctuations, the numbers in this section should be useful in generating standard cost estimates for the installation of a new system or for improvements and upgrades to an existing system.

Supply refers to a community's ability to access water and may be provided via surface water or ground water.[89] To obtain water, a public water system needs to have sufficient water rights, which are granted by the Office of the State Engineer. In New Mexico, water rights are managed according to the seniority of the age of the water right and not proximity to a water source. Another consideration of surface water supply is presence of obligations under multi-state compacts in which rivers passing through New Mexico are required to convey water to adjacent states.

An estimated 87% of the state's public water supply comes from ground water. Ground water is located in aquifers below the surface and can be thousands of feet deep. Typically, ground water is shallower the closer it is to a river or stream. Depending on a hydrogeologic study, some aquifers may be classified as groundwater under the direct influence of surface water. Depending on the water quality, treatment may be required prior to use as drinking water. This can range from chlorination to arsenic treatment depending on the water chemistry. In the event that a new community system is created or an existing system is expanding, the proximity of the water supply to the community directly impacts the cost of the infrastructure to supply the citizens.

Transmission and distribution lines are the infrastructure which transfers and delivers supply to customers. These classifications of waterlines provide domestic service and possibly fire protection. The cost of transmission and distribution lines increase the greater the service area. Typically,

[86] "New Mexico Infrastructure Report Card," https://infrastructurereportcard.org/state-item/new-mexico/.
[87] Infrastructure Capital Improvement Plan dashboard, New Mexico Department of Finance and Administration, https://www.nmdfa.state.nm.us/dfa-dashboards/infrastructure-capital-improvement-plan-dashboard/.
[88] "New Mexico State Water Plan," New Mexico Office of the State Engineer, 2018 https://www.ose.state.nm.us/Planning/swp.php.
[89] Water systems typically require pumps to transfer the water to the customers.

isolation valves and fire hydrants are also components, which increase the level of service of a water system both for fire protection and on-going maintenance and operations.

Storage in water systems is typically provided with tanks. These tanks are ideally located at a higher elevation than the customers to provide water pressure. Elevated storage tanks also reduce power needs and wear and tear by minimizing pump cycling. This storage provides redundancy in the event of a power outage or other failure of a water source. If there is no suitable site with sufficient elevation difference, elevated tanks may be constructed. Elevated tanks require a higher upfront cost but may be cost-effective depending on the distance required to install transmission lines to a point at which there is sufficient change in ground elevation.

Booster stations are intermediate facilities to assist in transferring water from a source to the customers or within a public water system to manage pressure zones. Pressure zones are discreet areas of a system where the public water system manages the minimum and maximum customer pressures to provide reliable service and not damage other plumbing components. Typically, smaller communities have only a single pressure zone and do not require booster stations.

Hydraulic control valves are part of the water system to help manage customer water pressures and delineate pressure zone boundaries.

Water System Challenges

Common challenges faced by New Mexico's predominantly small systems all can add to costs. Many of these challenges compound or add urgency to the infrastructure needs across the state. Primary drinking water system challenges include the following:

- Aging infrastructure;
- Insufficient revenue generation from too few ratepayers or excessively low rates;
- Lack of capacity (non-certified operators, insufficient or nonexistent staff, lack of governance) in part due to insufficient revenues to pay for staff; and
- Lack of system redundancy.

All water systems, regardless of size, which request state funds are required to complete a preliminary engineering report and asset management plan. The fee for these documents is approximately $50,000 each for small communities– a cost that is incurred every five years. These documents are valuable in identifying system needs and dollars required to address existing and future system deficiencies. These documents may be grant-funded, as many small communities do not have the capital available to complete plans. Insufficient capital creates a cycle in which a community in need falls further behind because they do not meet the prerequisites for requesting financial assistance.

Aging Infrastructure

Aging infrastructure is a concern for all communities in New Mexico. Most communities only replace pipes and facilities as breaks or failures occur. The closer infrastructure gets to its design life, the more failures that are anticipated to occur. Typical design life for pipe lines can be upwards or 75 years depending on the pipe material. Storage tanks may have a 50-year design life, but require inspections every 1 to 3 years. Tanks also need to be taken offline every 25 years for repainting and coating. Wells require pumps, and pumps may need to be replaced every 5 to 10 years. The overall design life of wells is dependent on the water table draw down, which is in turn dependent on use and recharge rates. For example, Clovis is located on the edge of the Ogalala Aquifer, which extends into

Texas, Oklahoma, Kanas, Colorado, Nebraska, Wyoming, and South Dakota. Pumping in these other states leaves communities in eastern New Mexico with a depleting supply resource.

Replacing aging infrastructure is costly. The revenue required to save for these future needs, while also compensating operators and collecting data to submit for regulatory compliance, often exceeds the fees charged to customers for water. Consequently, communities must apply for grants or loans periodically to offset budget shortfalls. These requests are likely to be required more frequently if regular operations and maintenance are not performed.

Insufficient Revenue Generation

The rates charged to customers are often below levels needed to operate and improve water systems. This is a serious consideration, given that many residents of small towns in New Mexico are lower-income and may not be able to afford higher water rates. Without sufficient funds, systems may lack the ability to perform routine maintenance or meet compliance and oversight requirements. Insufficient revenue generation over time can create a backlog of repairs, and such shortcomings create a variety of potential public health risks.

Lack of System Redundancy

Small water systems still require redundancy to ensure water security for customers if there is an event that affects operations. For example, if a well goes down and it is the sole water supply for a community, it has two choices: haul in water or relocate. A desire for redundancy applies not only to water supply but also storage. As noted, tanks require assessments and at least once every 25 years will need to be repainted and recoated. This requires the tank to be taken offline for a couple months or more. If there is not a backup tank, a community may face similar obstacles to insufficient supply.

Drinking Water System Improvement Cases and Costs

To help illustrate the various considerations and costs associated with operating and expanding water systems, this section utilizes a case study from each of New Mexico's seven COG districts. These case studies take costs submitted to the State to quantify ICIP requests, which are then combined with industry knowledge to develop unit type costs that can be used for preliminary budgeting purposes. System components for each case study are taken from the Drinking Water Watch website from the New Mexico Environment Department.[90] Though system costs can be derived for the major components, the inventory does not include information about the lineal feet of distribution lines.

Though these examples are meant to be representative of the needs confronted by water systems across the State of New Mexico, the infrastructure needs of each individual system will vary. The seven communities selected as representative of the public water system for their region include:

1. Melrose (Eastern Plains)
2. Estancia (Mid Region)
3. Springer (North Central)
4. Milan (Northwest)
5. Magdalena (South Central)
6. Jal (Southeast)
7. Hurley (Southwest)

[90] "Drinking Water Watch," New Mexico Environment Department, November 2021, https://dww.water.net.env.nm.gov/NMDWW/.

Table 23 provides an overview of the projects to be reviewed in this report, including the total requested funds, number of connections, and connections per square mile as a measure of population density.

Table 23: Summary of Proposed Water System Improvements by Location

Location	Region	Popu-lation	Number of Connections	Area (Sq. Mi.)	Connec-tions per Sq. Mi.	Improvements	Requested Funds
Melrose	Eastern Plans	1,268	475	1.69	281	Construct/replace two wells; bulk water fill station	$500,000
Estancia	Mid-Region	1,795	646	6.22	104	Water distribution line replacement	$1,975,000
Springer	North Central	1,363	603	2.26	267	Water distribution line replacement	$1,265,000
Milan	Northwest	3,669	1,051	4.34	242	Water meter and valve replacements/ upgrades	$800,000
Magdalena	South Central	1,571	434	6.22	70	Storage tank; booster pump station; new water line	$1,482,955
Jal	Southeast	3,072	991	4.82	206	System replacement	$11,700,000
Hurley	Southwest	1,372	602	1.02	590	System replacement; booster pump and two storage tanks	$10,500,000

Melrose

The Village of Melrose water system serves approximately 1,268 people via 475 connections across 1.7 square miles. The water system is comprised of four active ground water wells and one that has been abandoned. The four active wells have a total capacity of 300 gallons per minute (gpm), an elevated tank with a capacity of 250,000 gallons, and a standpipe tank with a capacity of 370,252 gallons.

The Village has requested $500,000 in the ICIP FY 2022- 2026 for a new bulk water fill station and to construct and equip two new wells to replace existing facilities that are over 100 years old and in danger of failure. Assuming the two new wells will both be 60 feet deep, consistent with their existing wells, and $200,000 per well, the total cost per lineal foot for this project is approximately $3,500.

In addition to capital projects, the community will need to pay for engineering design fees and construction phase services, which will likely increase total project costs another 15-25% depending on other permitting requirements and various state agency coordination.

Estancia

The Town of Estancia water system serves approximately 1,795 people via 646 connections across 6.2 square miles. It is comprised of approximately 23 miles of transmission and distribution lines with a failing elevated tank and two stand pipe tanks. The Town has a booster station which can provide pressure for residential connections once the elevated tank is decommissioned. Four wells supply the Town, with a total capacity of approximately 600 gpm and well depths ranging from 70 to 400 feet.

For the ICIP FY 2022- 2026, the Town is requesting $1,975,000 for planning, design, and construction to improve portions of the town's aged and deteriorated water distribution pipelines, meters, and other related facilities.

Desired improvements include repair and/or replacement of existing pipelines and design and construction of new pipelines. Looped lines and reduction of restrictions will result in improved operation and efficiency of the Town's water distribution system. Due to the aged and unreliable manual water meters, Estancia believes a substantial volume of water usage is going unaccounted for. The Town is moving forward with the design and implementation of an advanced radio-read meter system in order to capture accurate water data, automate billing, and reduce operator time currently dedicated to monthly meter reading.

The exact lineal footage of waterline to be replaced or constructed is not stated in the request from Estancia. However, in the current market, to purchase and install 6-inch PVC pipe is estimated at $65 per lineal foot. The ICIP request includes planning and design; therefore, a more specific calculation as to the specific lineal footage of piping to be installed cannot be accurately calculated at this time. Meter replacement with advanced electronic radio read meter system complete and installed, is estimated at approximately $1,000 per service (or $646,000 for all services in Estancia)– this includes required improvements including setters, cans, lids, service line and surface restoration where required, and integration into the municipal accounting software.

Springer

The Town of Springer water system serves a population of approximately 1,363 people via 603 connections. The town is supplied from surface water with an average day diversion of 1 million gallons. It has a single water treatment plant and two storage tanks, one with a volume of 500,000 gallons and the other with 150,000 gallons.

For the ICIP FY 2022- 2026, the Town is requesting $1,265,000 to replace and upgrade the water distribution lines and replace all pertinences including hydrants and overflows. These improvements are necessary as many of the water lines in the Town are very old with waterlines breaking regularly.

Milan

The Village of Milan water system serves approximately 3,669 people across 4.3 square miles. The Village is served by three active ground water wells and three water tanks with storage capacity of 250,000, 500,000, and 1 million gallons. The water system was registered in 1977.

For the ICIP FY 2022- 2026, the Village is requesting $800,000 to purchase and equip water meters and valves throughout the Village to assist in fixing broken valves and minimizing water loss. This equates to about $1,100 for meter replacement.

Magdalena

The Village of Magdalena water system serves a population of approximately 1,571 people via 434 connections across 6.2 square miles. Its water system is comprised of three production wells with a capacity of 250 gpm, as well as three bolted steel storage tanks with a total storage volume of 450,000 gallons. The Village has seen a significant decrease in the well capacity of their Trujillo Well from 380 gpm to 150 gpm over the last 50 years, and a decrease in the Benjamin Well from 140 gpm to 45 gpm over the last 60 years.

In the ICIP FY 2022-2026, the Village is requesting $1,482,955 to plan, design, construct, and equip water system improvements to include a new water storage tank that holds at least 500,000 gallons for residential consumption, a booster pump station, and a new water line on the south side of U.S. 60 to continue to serve customers east of the Village.

Typically, storage tanks are estimated to cost $1 per gallon for a ground storage tank, but due to inflation, a good assumption for planning purposes is $1.50 per gallon. For an elevated tank, the cost increases to $7.50 per gallon.

Jal

The City of Jal water system serves approximately 3,072 people via 991 connections across 4.8 square miles. It is comprised of five wells, an elevated tank with a volume of 200,000 gallons, three ground storage tanks, and two active booster stations. The total well capacity for Jal is approximately 1,600 gpm, with well depths ranging between 500 and 700 feet.

Since 2016, Jal has spent $10.2 million on water system improvements. For the ICIP FY 2022- 2026, the city is requesting approximately $1.5 million to complete a variety of improvements, including replacing two water wells installed in the 1960s whose production has declined, new transmission lines from the wells to the booster station and from the booster station to the city, a booster pump station, and various rehabilitation and repairs.

Hurley

Hurley's water system serves approximately 1,372 people via 602 connections. The Town of Hurley purchases all of its water from the Freeport McMoran Chino Minos Public Water System via a booster pump station and two storage tanks totaling 340,000 gallons.

For the ICIP FY 2022- 2026, the Town is requesting an additional $3,530,000 to completely replace its existing water system. To date the Town has spent $6,991,480 on system improvements, with the majority of spending taking place since 2014.

Drinking Water Cost Methodology

Capital Improvements

In this section, we will take actual costs from the case studies and add best practices and industry knowledge from Bohannon Huston, Inc. (BHI) to verify costs per improvement type. As the elements for each water system vary, the case studies are helpful as a means to estimate the costs to replace a representative system. We also estimate costs on a per-connection basis, which can be used to determine the funding needed to replace parts or all of system, or to install a new system where one does not yet exist. It is important to note that the total costs of distribution lines for a system cannot be determined precisely without knowing the total length of the service lines.

Table 24 summarizes planning-level estimates for critical water infrastructure to assist with preliminary budgeting. Costs may vary from the numbers provided in these tables based on topography and other challenges associated with individual communities. For instance, costs for new wells vary significantly based on depth. Wells near surface water may be as little as 20 feet deep. However, in Rio Rancho wells are more than 1,500 feet deep, and are more than 2,000 feet deep in Los Alamos.

Table 24: Budgetary Planning Costs for Key Water System Facilities[91]

Item #	Description	Unit	Cost per Unit	Design Life
1	Ground Storage Tank	Gallon	$1.50 - $2.00	50
2	Elevated Storage Tank	Gallon	$8.00 - $9.00	50
3	Drilling and Equipping New Well	Linear Foot	$2,500 - $3,500	50
4	6-inch PVC Waterline	Linear Foot	$60 - $65	75
5	8-inch PVC Waterline	Linear Foot	$80 - $85	75
6	10-inch PVC Waterline	Linear Foot	$100 - $105	75
7	12-inch PVC Waterline	Linear Foot	$120 - $125	75
8	Booster Station (Million-Gallon)	Each	$1.0-1.5 million	50
9	Pressure Reducing Valve Station	Each	$100,000-200,000	50

[91] Booster stations cannot be easily scaled up or down. The estimate here may be somewhat high for small communities with fewer than 1,000 connections.

Table 25 breaks out cost categories required to carry out planned systems upgrades and expansions in the case study communities, as well as total costs and costs per connection. The costs for distribution lines for the each of the case studies in Table 25 are estimates using Google Earth imagery and roadway network information and should be using for high-level budgetary planning only. Following this, Table 26 breaks out the per-year costs for each of these projects. Annual replacement costs were derived by taking the average cost divided by the expected life span of those elements.

Table 25: Total Water System Costs

	Cost to Replace System Facilities[92]	Distribution Lines[93]	Total Capital Costs	Contingency (30%)	Engineering, Construction, and RPR Services (25%)	Total Costs[94]	Total Cost per Connection
Melrose	$2,505,378	$6,283,200	$8,788,578	$2,636,573	$2,856,288	$11,644,866	$24,516
Estancia	$5,060,500	10,501,920	$15,562,420	$4,668,726	$5,057,787	$20,620,207	$31,920
Springer	$6,975,000	$5,385,600	$12,360,600	$3,708,180	$4,017,195	$16,377,795	$27,161
Milan	$4,599,000	$4,488,000	$9,087,000	$2,726,100	$2,953,275	$12,040,275	$11,456
Magdalena	$3,212,500	$6,283,200	$9,495,700	$2,848,710	$3,086,103	$12,581,803	$28,990
Jal	$16,752,500	$9,424,800	$26,177,300	$7,853,190	$8,507,623	$34,684,923	$35,000
Hurley	$2,535,000	$4,488,000	$7,023,000	$2,106,900	$2,282,475	$9,305,475	$15,458

Table 26: Water System Costs per Year

	Total Costs[1]	Total Annualized Capital Cost[2]	Operations & Maintenance (15%)	Total Annual Cost	Number of Connections	Cost per Connection per Year
Melrose	$11,644,866	$232,897	$34,935	$267,832	475	$564
Estancia	$20,620,207	$412,404	$61,861	$474,265	646	$734
Springer	$16,377,795	$327,556	$49,133	$376,689	603	$625
Milan	$12,040,275	$240,806	$36,121	$276,926	1,051	$263
Magdalena	$12,581,803	$251,636	$37,745	$289,381	434	$667
Jal	$34,684,923	$693,698	$104,055	$797,753	991	$805
Hurley	$9,305,475	$186,110	$27,916	$214,026	602	$356

Additional Costs

In addition to the capital cost improvements for new and existing communities, water system operators and state policy makers should include additional costs and expenditures as part of planning and budgeting efforts. **Due to unforeseen challenges in project development and cost escalations, it is recommended that a 30% contingency be applied** to these numbers. Implementation generally requires fees for engineering, construction management, and resident project representative (RPR) services, which can add 25% to project costs. Ongoing maintenance and operations of the system should be considered separately. It is also important to note that state funding cannot be used for

[92] Based on Table 14 number estimates.
[93] Linear foot estimated from Google Earth within developed municipal limits assuming 8-inch water lines.
[94] Does not include costs for pavement removal and replacement.

operations and maintenance costs. **A further cost that should be budgeted is for an operator, which can range between $25,000 to $50,000 for a part-time or full-time staff person**.

Water System Summary

Based on the communities listed above, the average total costs or value of a small-scale water system can be calculated. These values represent the cost required to replace all or parts of an existing system or to create a new system where one does not currently exist.

In addition to the preliminary engineering reports and asset management plans required prior to being awarded funding through certain programs, rate studies for each community are critical documents to assist in the community's ability to appropriately charge their customers based on the median household income for each community. However, systems may still deem these rates too high based on the income of customers.

A key challenge for small water systems is to generate enough revenue to be self-sufficient, as the capital costs to build and sustain a system often exceed a community's ability to adequately finance that system. Therefore, many water systems depend on State grant funds to supplement the infrastructure in these communities. The goal of each community system should be to ensure they have the funds to meet the regulatory compliance for water quality, and additional funds for when emergencies occur to protect the public health and safety of the residents.

Based on the calculations summarized in Table 26, **a recommended annual set-aside to keep a new water system in good working order is about $600 to $800 per connection**. These charges over a 50-year life cycle will allow a community to adequately replace the assets when needed. The operations and maintenance costs for a typical community vary from year to year, though a rough estimate is that ongoing expenses are about 15% of annual capital costs.

Regionalization

Due to a variety of factors, including dwindling or fluctuating water supplies, inability to maintain systems in compliance with regulations, and inability to raise sufficient funds for operations and maintenance, regionalization is an increasingly accepted strategy for community water systems. It can be used complement or replace local water systems through a range of strategies from shared operations to full system consolidation. Though expensive up-front and politically challenging, these projects can provide significant benefits over the long-term, including more sustainable sources of water and increased resiliency. The failure of an individual well or water source is less of an issue as water can be moved across a system. Once implemented, regional water systems also tend to more cost effective for customers, as costs can be shared across a greater number of rate payers. Table 27 shows details for three water system regionalization projects in New Mexico.

Table 27: Highlighted Water System Regionalization Projects

Location / Project	Status	Components	Population Served	Water Delivery	Total Cost	Cost per Person
Navajo-Gallup Water Supply Project	In progress; fully operational by 2028	300 miles of pipeline 19 pumping plants 2 water treatment plants	250,000	37,764 acre-feet per year; 33.7 million gpd	$995 million	$4,000 (2011 dollars)
Eastern New Mexico Rural Water System	Intake structure complete. Transmission line from intake to Melrose at 60% Design. Transmission line from Melrose to Portales design complete.	151-mile-long pipeline Water pumped from Ute Reservoir	73,000	28 million gpd	$500 million	$6,850 (2009 dollars)
EMWT Regional Water System	PER and Long-Range Master Plan Completed. Phase 1 – MacIntosh funding being sought. ($6.8 million, Water Trust Board)	Macintosh water distribution system NM 41 transmission line Willard to Moriarty Extensions to Moriarty and Stanley, Punta de Agua, Manzano, Mountainair, Tajique, and Torreon, Estancia and Chilili	24,000	Between 44,000 and 61,000 acre-feet per year	$200 million	$8,333

As show in Table 27, currently, there are two large regionalization projects underway in the state: the Navajo Gallup Pipeline in western New Mexico, and the Ute Pipeline Project in eastern New Mexico. A third project under consideration is the Estancia-Moriarty-Willard-Torrance (EMWT) Regional Water System. These projects are profiled below.

Navajo Gallup Water Supply Project

The Navajo-Gallup Water Supply Project is a major infrastructure project that, once constructed, will convey a reliable municipal and industrial water supply from the San Juan River to the eastern section of the Navajo Nation, southwestern portion of the Jicarilla Apache Nation, and the city of Gallup via about 300 miles of pipeline, nineteen pumping plants, and two water treatment plants. The Navajo-Gallup Water Supply Project is designed to provide water supply to serve 250,000 people over 40 years through an annual delivery of 37,764 acre-feet of water from the San Juan Basin, or 33.7 million gallons per day. Based on October 2011 prices, the total indexed construction cost estimate for the project is approximately $995 million. The cost of this project once built out is approximately $4,000 per person in 2011 dollars.

The project began in 2009. In 2020, water deliveries to Navajo communities began on the Cutter Lateral. Deliveries to the Jicarilla Apache Nation from the Cutter Lateral are anticipated to begin in 2021. On the San Juan Lateral, construction is underway and is anticipated to be completed in 2028.

Eastern New Mexico Rural Water System (Ute Pipeline)

The Eastern New Mexico Rural Water System Ute Pipeline project is a 151-mile-long pipeline project to provide a sustainable municipal and industrial water supply for several eastern New Mexico communities. Water will be pumped from Ute Reservoir to the cities and towns of Clovis, Portales, Melrose, Texico, Grady, and Elida, as well as to Cannon Air Force Base, and Curry and Roosevelt counties. The combined population to be served by this project is 73,000, with an estimated production capacity of 28 million gallons per day. The cost estimate for the full project was $500 million at the time of the 2009 federal authorization, which equates to $6,850 per person.

Estancia-Moriarty-Willard-Torrance Regional Water System

A more recent regional water project is the Estancia-Moriarty-Willard-Torrance (EMWT) Regional Water System, which, at full implementation, would serve an estimated 24,000 people. Phase 1 of this project is to provide water service to the unincorporated community of MacIntosh, located between Moriarty and Estancia. MacIntosh is noteworthy for low median household income and dramatically falling aquifer levels.

The total project cost is estimate as over $200 million, or approximately $8,333 per capita. Torrance County is considering funding $1 million of this project for fiscal year 2023 in order to complete the design and acquire land, rights-of-way, and water rights. An additional $10 million would be needed for construction in this initial phase.

Wastewater Systems Costs Introduction

As with water systems, we will first define the major system components that play into cost estimates. This report defines the key components of a typical wastewater system as: 1) Conveyance lines (gravity and vacuum), 2) Lift stations, and 3) Wastewater treatment plants (WWTP). Septic systems are privately owned-infrastructure which are the responsibility of the individual property owner to maintain. The information contained below may be used to generate budgetary cost estimates for the installation of a new system where no system or individual septic systems exist, or for improvements and upgrades to an existing system.

Conveyance refers to a community or individual's ability to manage wastewater which has been discharged from their property whether on-site (septic) or into a wastewater network to convey flows away from the point of use for wastewater treatment and then discharge back into a river or aquifer. *Gravity Conveyance* refers to the use of terrain and gravity to convey wastewater flows. Where low spots exist within the infrastructure, lift stations may be installed to pump the wastewater to facilitate gravity drainage. Manholes are generally installed within the conveyance system to allow for maintenance of the sewer line and to clear any debris which may be obstructing flow. *Vacuum Conveyance* refers to systems in switch a vacuum condition is created in the network to pull wastewater to a lift station for conveyance into a force main.

Lift stations input energy into a wastewater network where flows cannot be conveyed via drainage. Wastewater flows into sumps, which then hold a defined volume of wastewater to be pumped through the network. The conveyance pipe, which is under pressure, is also referred to as a force main.

Wastewater treatment plants (WWTP) are facilities where wastewater is collected and treated prior to discharge into the natural environment. Depending on the water chemistry of the influent, various methods may be used to treat the wastewater to the discharge permit conditions. Common elements of a WWTP include: an influent flow, screens, settling basins, aerators, clarifiers, filters, digesters, and disinfection.

Depending on the requirements of the governing agency, as well as the volume of wastewater produced, lagoons may be utilized to collected wastewater flows. Lagoons allow for evaporation. These facilities do not discharge into the natural environment and require that operators periodically remove the sludge that builds up after evaporation occurs. In New Mexico, the majority of systems are lagoons or WWTPs with sequencing batch reactors (SBRs).

System Reporting and Regulatory Requirements

The New Mexico Environment Department issues ground water discharge permits for wastewater treatment plants as well as liquid waste permits for septic systems. There are approximately **431 active discharge permits** in the state with another 83 pending. **There are over 225,000 liquid waste permits** greater than 5,000 gallons per day (gpd), and **an additional estimated 100,000 unpermitted systems in the state**.[95] Ground water permit needs to be reauthorized every five years.

Similar to water system requesting state funds, wastewater systems are required to complete a preliminary engineering report and asset management plan. The purpose of these document is to evaluate system conditions and identify capital improvement needs, including future system deficiencies and the funding needed to meet those needs. These documents may be completed using grant funds as small communities often do not have the capital to complete these prerequisites. These plans are intended to be updated every five years at a cost of approximately $50,000 for small communities.

Wastewater System Challenges

Common challenges faced by small wastewater systems mirror those of drinking water systems and are described below. Many of these challenges compound or add urgency to the infrastructure needs across the state.

Aging Infrastructure

Most communities in New Mexico have aging infrastructure, and only replace pipes and facilities as breaks or failures occur. Typical design life for sewer lines can be upwards or 75 years depending on the pipe material. Wastewater treatment plants may have a 50-year design life, but require inspections about every 1 to 5 years. Lift stations and vacuum systems require pumps, and pumps may need to be replaced every 3 to 5 years. Lagoon liners deteriorate over time with exposure to the sun and are susceptible to punctures if vegetation and burrowing animal populations are not managed properly. Table 28 summarizes the typical design life of key wastewater system components.

[95] While unpermitted wastewater systems are a serious public health risk to for the state, with the potential to contaminate groundwater. Recommendations on how to bring these systems into compliance with regulations is outside of the scope of this study.

Table 28: Wastewater Facility Design Life

Item #	Description	Design Life
1	Wastewater treatment plant	50
2	6-inch PVC Sewerline	75
3	8-inch PVC Sewerline	75
4	10-inch PVC Sewerline	75
5	12-inch PVC Sewerline	75
6	Lift/Vacuum Station[96]	50
7	Manholes[97]	50

Insufficient Revenue Generation

Over time, new infrastructure is required to address failures related to aging infrastructure. As with water supply systems, the costs associated with fixing these failures, as well as compensating system operators and meeting regulatory requirements, often exceed the revenue charge for wastewater service. Consequently, communities must apply for grants or grant/loan monies periodically to make up this difference. Rural communities are particularly likely to have small numbers of connections, and small rate bases, which may not generate enough revenue to both address annual operations and maintenance needs and to save for future capital improvements.

Non-Certified Operators and Lack of Governance

Insufficient funds also mean that many small systems struggle to attract qualified operators. As a result, the level of service for a community may suffer, and systems may be at increased risk of public health violations. The level of expertise of operators typically increases with the size and complexity of a wastewater treatment plant, and small communities struggle to attract experienced operators.

Lack of System Redundancy

Small wastewater systems require redundancy to ensure wastewater security for customers if there is an event that affects operations. For example, if a lift station with a single pump goes down and is not addressed in a timely manner, it could cause sewage to back up into residences. Maintaining redundancies in a WWTP is critical to providing continuous service. If a bar screen fails, materials may enter the treatment train which can impact subsequent plant operations. Adverse effects may subsequently be experienced on the natural or built environment if the discharge of wastewater for a WWTP exceeds permit limits.

Wastewater System Improvement Cases and Costs

As with water systems, the detailed cost discussion that follows will center on a case study from each of the seven COG districts. These case studies reflect actual costs submitted as ICIP requests. We will combine this information with industry knowledge to develop unit type costs for preliminary budgeting purposes. System components for each case study are taken from active discharge permits. Though system costs can be derived for the major components, the inventory does not include information about the lineal feet of distribution lines. For this, we estimated based on Google Earth imagery for the built environment within jurisdiction boundaries.

[96] Pumps have a design life between 3 and 5 years.
[97] Manholes are required every 400 linear feet of sewerline and should be recoated every 25 years.

Though these examples are meant to be representative of the needs confronted by wastewater systems across the State of New Mexico, the infrastructure needs of each individual system will vary. The seven rural communities selected as representative for their region include:

1. Fort Sumner (Eastern Plains)
2. Estancia (Mid Region)
3. Springer (North Central)
4. Milan (Northwest)
5. Williamsburg (South Central)
6. Jal (Southeast)
7. Reserve (Southwest)

It is important to note that the communities of Melrose, Magdalena, and Hurley, which were highlighted in the Water Systems section, do not have active requests for wastewater system improvements in the ICIP. Consequently, Fort Sumner, Williamsburg, and Reserve have been selected to represent the Eastern Plains, South Central, and Southwest regions respectively.

Table 29 provides a summary table of the seven wastewater systems we will explore, and their active ICIP requests. The capital requests can be extrapolated to estimate potential costs to replace an entire wastewater system. These numbers are preliminary and should be used as a means of estimating costs. More detailed information about each wastewater system would be required to better define each system need.

Table 29: Summary of Proposed Wastewater Improvements by Location

Location	Region	Population	Number of Connections	Area (Sq. Mi.)	Connec-tions per Sq. Mi.	Improvements	Requested Funds
Fort Sumner	Eastern Plans	1,668	600	3.35	179	Wastewater treatment plant (WWTP) rehabilitation and replacement	$2,664,300
Estancia	Mid-Region	1,795	646	6.22	104	WWTP modifications and new 11.5 MG lagoon	$525,000
Springer	North Central	1,363	603	2.26	267	New WWTP	$2,662,500
Milan	Northwest	3,669	1,051	4.34	242	Lift station and sewer lines	$4,300,000
Williamsburg	South Central	465	186	0.5	372	Replacement of deteriorated lines, junction boxes, and manholes	$6,446,000
Jal	Southeast	3,072	991	4.82	206	Upgrades to meet environmental standards including an upgraded or renovated WWTP	$22,745,000

Reserve	Southwest	642	250	0.5	500	WWTP and conveyance system improvements	$2,753,400

Fort Sumner

The Village of Fort Sumner wastewater system serves 1,268 people, with a discharge limit of 210,000 gallons. The wastewater system is comprised of approximately 93,000 feet of gravity sewer lines and four lift stations within the collection system. The WWTP is a sequencing batch reactor (SBR) plant that was built in 1997.

The Village has requested $2,664,300 in the ICIP FY 2022- 2026 for WWTP rehabilitation and replacement of head-works, bar screen, electrical wiring, working components of SBRs and digester, sludge disposal, UV disinfection system, operations and maintenance plans, lab equipment, and Supervisory Control and Data Acquisition (SCADA) system. In addition to capital projects, the community will need to pay for engineering design fees and construction phase services. The observed flow of this plant is 50,000 gallons per day or between $50 and $55 per gallon of treated effluent.

Estancia

The Town of Estancia wastewater system serves 1,795 people, and includes three lift stations to convey flows to the WWTP lagoons with a permitted capacity of up to 115,000 gallons per day. The Town's collection system is relatively new, having been constructed in the last 20 years.

For the ICIP FY 2022-2026, the Town is requesting $525,000 for planning, design, construction, and equipping wastewater plant improvements to include an additional 11.5 million gallon holding lagoon. Assuming the entire $525,000 is to be allocated to a new lagoon, that equates to approximately $46,000 per million gallons of lagoon. This estimate includes engineering and design phase assistance.

Springer

The Town of Springer's wastewater system serves a population of 1,363. The Town is permitted to treat up to 300,000 gallons per day utilizing SBR with chain driven bio-disks, solids settling, UV disinfection, and aerated solids digestion.

For the ICIP FY 2022-2026, the Town is requesting $2,662,500 to bring the WWPT into regulatory compliance. The Town received federal and state funding and constructed a new wastewater treatment plant that was designed originally to discharge effluent directly into the Cimarron River. EPA changes in discharge levels forced the town to pursue redesign efforts as the current lagoons are rated as inadequate. A breach in the existing lagoons occurred recently, and the need is considered critical for public safety and to prevent groundwater contamination.

Milan

The Village of Milan serves a population of 3,669. It is requesting $4.3 million to install sewer lines to convert residents from septic to a formal wastewater system and to conduct environmental studies, acquire permits, plan, design, and construct a lift station within the Village. The lift station is necessary to provide reliable wastewater services to the residents of the Village. The construction cost of a lift station for a small community may range between $250,000 and $350,000. Ultimately, the Village will convey all of its wastewater to the neighboring City of Grants for treatment. Once completed, this system will have regionalized, as it will be combined with Grants.

Williamsburg

The Village of Williamsburg, population 465, owns its wastewater system, but conveys effluent to Truth or Consequences for treatment. As such, this system is already regionalized. In the FY 2022-2026 ICIP, the Village is requesting $6,446,000 to for improvements including the replacement of deteriorated lines, junction boxes, and manholes. Manholes are typically required every 400 feet along a collection line alignment. The requested funding includes replacing potable waterlines along with the sewer lines. Wastewater lines are a minimum 8-inch diameter to prevent the lines from clogging. Costs for 8-inch PVC sewer lines may range between $80 and $85 per lineal foot.

Jal

The City of Jal waste disposal site stopped receiving sludge and treated wastewater in July 2015. Closure of the facility was complete in July 2018. As of February 2021, the facility is in post-closure care and the discharge permit is primarily for groundwater monitoring.

Prior to closure, NMED authorized the facility to receive and discharge approximately 775,500 gallons of domestic wastewater treatment plant sludge and approximately 5.2 million gallons of treated wastewater to the 17.9-acre surface disposal site. These wastes originated from the City of Jal's WWTF Holding Impoundments #1 and #2. For the ICIP FY 2022- 2026, the city is requesting approximately $22,745,000 to fully replace its wastewater system. The City's wastewater system serves 3,072 people.

Reserve

The Village of Reserve wastewater system serves 642 people and is permitted to treat up to 75,000 gallons per day for domestic use. Municipal wastewater is treated and discharged to the San Francisco River via an oxic/anoxic activated sludge treatment system. For the ICIP FY 2022-2026, the Village is requesting $2,753,400 to plan, design, acquire property, acquire right-of-way, environmental assessment, construct improvements to the wastewater treatment plant.

Wastewater Cost Methodology

Capital Improvements

The actual dollar amounts from the case studies, in addition to best practices and industry knowledge from BHI, can be used to estimate costs per improvement type that can be generalized to calculate the funding needs for different types of project needs. This analysis assumes that wastewater service connections equal water connections. These costs on a per-connection basis can be used to estimate the funding needed to replace parts or all of system, or to install a new system where one does not exist, such as new development or to meet the needs of an unserved community. Annual replacement costs can also be derived by taking the average cost divided by the life span of those elements. The average costs per lineal footage of distribution line are based on industry knowledge, and lineal footages for each case study location were estimated based on Google Earth imagery for the built environment within jurisdiction boundaries. For this study, it was assumed that the distance of water and sewer lines are the same. It is important to note that the precise costs of conveyance lines cannot be determined without knowing the total length of the service lines. Costs presented below should be used for preliminary budgetary planning only. Impacts to roadways or other infrastructure systems are not accounted for in these estimates.

Table 30 below summarizes planning level estimates for critical wastewater infrastructure to assist with preliminary budgeting. Costs are merely estimates and will likely vary from the numbers provided based on topography and other challenges associated with individual communities.

Table 30: Budgetary Planning Costs for Key Wastewater Facilities

Item #	Description	Unit	Cost per Unit
1	Wastewater treatment plant	EA[98]	$2.5M -$3.5M
2	6-inch PVC Sewerline	Gallon	$8.00 - $9.00
3	8-inch PVC Sewerline	Linear Foot	$2,500 - $3,500
4	10-inch PVC Sewerline	Linear Foot	$60 - $65
5	12-inch PVC Sewerline	Linear Foot	$80 - $85
6	Lift/Vacuum Station	EA	$250,000 - $350,000
7	Manholes	EA	$10,000 - $20,000

Table 31 provides total system costs for the seven case studies, including total costs and cost per connection. Table 32 shows annualized costs for system capital and operational needs, utilizing the estimated design life for project components. This table also includes the estimated cost per connection per year.

[98] For small communities below 500,000 gallons per day.

Table 31: Total System Costs for Wastewater Systems

	Cost to Replace System Facilities[99]	Conveyance Lines and Manholes[100]	Total Capital Costs	Contingency (30%)	Engineering, Construction, and RPR Services (25%)	Total Costs[101]	Total Cost per Connection
Ft. Sumner	$4,900,000	$6,547,200	$11,447,200	$3,434,160	$3,720,340	$15,167,540	$25,279
Estancia	$4,550,000	$10,765,920	$15,315,920	$4,594,776	$4,977,674	$20,293,594	$31,414
Springer	$3,500,000	$5,649,600	$9,149,600	$2,744,880	$2,973,620	$12,123,220	$20,105
Milan	$350,000	$4,752,000	$5,102,000	$1,530,600	$1,658,150	$6,760,150	$6,432
Williamsburg	$1,050,000	$1,161,600	$2,211,600	$663,480	$718,770	$2,930,370	$15,755
Jal	$6,300,000	$11,484,000	$17,784,000	$5,335,200	$5,779,800	$23,563,800	$23,778
Reserve	$4,200,000	$2,508,000	$6,708,000	$2,012,400	$2,180,100	$8,888,100	$35,552

Table 32: Wastewater System Costs per Year

	Total Costs[102]	Total Annualized Capital Cost[103]	Operations & Maintenance (15%)	Total Annual Cost	Number of Connections	Cost per Connection per Year
Ft. Sumner	$15,167,540	$303,351	$45,503	$348,853	600	$581
Estancia	$20,293,594	$405,872	$60,881	$466,753	646	$723
Springer	$12,123,220	$242,464	$36,370	$278,834	603	$462
Milan	$6,760,150	$135,203	$20,280	$155,483	1051	$148
Williamsburg	$2,930,370	$58,607	$8,791	$67,399	186	$362
Jal	$23,563,800	$471,276	$70,691	$541,967	991	$547
Reserve	$8,888,100	$177,762	$26,664	$204,426	250	$818

Additional Costs

In addition to the capital costs improvements for new and existing communities, wastewater system operators and state policy makers should include additional costs and expenditures as part of planning and budgeting efforts–as we recommended with water systems. Due to price escalations and unforeseen challenges in project development, **it is recommended that a 30% contingency be applied** to these numbers. Implementation generally requires fees for engineering, construction management, and resident project representative (RPR) services, which can add 25% to project costs. On-going maintenance and operations of the system should be considered separately. It is also important to note that, like with water systems, state funding cannot be used for operations and maintenance costs. **A further cost that should be budgeted is for an operator, which is a comparable cost to water systems and can range between $25,000 and $50,000 for a part-time or full-time staff person**.

[99] Based on Table 20 estimating numbers.
[100] Linear feet estimated from Google Earth within developed municipal limits.
[101] Does not include costs for pavement removal and replacement.
[102] Does not include costs for pavement removal and replacement.
[103] Cost is annualized over 50 years.

Wastewater System Summary

Based on the communities listed above, the average total costs or value of a small-scale wastewater system can be calculated. These values represent the cost required to replace all or parts of an existing system or to create a new system where one does not currently exist. Based on the calculations summarized in Table 32, **a benchmark set-aside for annual maintenance on a new wastewater system is about $500 to $800 per connection per year**. These charges over a 50-year life cycle will allow a community to adequately maintain assets as needed. The operations and maintenance costs for a typical community vary from year to year, though **a rough estimate is that ongoing expenses are about 15% of annual capital costs**.

Similar to water systems, generating adequate revenue to sustain a wastewater system in good working order is a significant challenge for many small communities. Most communities cannot charge the rates identified in local rate studies based on the income level of their customers, and many wastewater systems therefore rely on State funds to support the infrastructure in these communities. Obtaining these funds requires regular capital outlay requests, but irregular funding creates uncertainty for system planning. The goal of each community should be to ensure they have the funds to meet the regulatory compliance for wastewater quality and support when emergencies occur to ensure the public health and safety of the residents.

2. FUNDING OPPORTUNITIES

SUMMARY OF FUNDING RESOURCES

Researching and applying for project financing can be difficult and requires a specific skillset to understand technical details, budgeting, and reporting requirements. Further, the process is time-consuming and can stretch already busy staff to the limit. Confusion can be compounded when pursuing multiple funding sources that have differing deadlines, priorities, match/leveraged fund requirements, and eligibility criteria. Many small communities, tribes, and water systems or other small utilities may not have the collateral to apply for large loans or they do not have uncommitted internal resources to meet the match commonly required by grants. Because the process can be so daunting, they may choose not to apply at all, missing out on the monetary resources needed to fully finance needed infrastructure. Communities may also simply fall back on the most popular and "easiest" sources of funding, including New Mexico's capital outlay system. However, this haphazard approach is not an answer to infrastructure problems. Urgent projects may only be partially funded year after year—pushing out deadlines for critical infrastructure upgrades and connections, all the time prices and project urgency are increasing.

New Mexico currently has no centralized resource or processes to help potential applicants gain a holistic understanding of their options, ask questions about eligibility or uses, receive referrals to experts who can help with specific issues, and assist with applications and grant writing. This lack of a clear system leaves potential applicants to figure out which funds to pursue, and to parse complicated applications, reporting, and budgeting requirements. For the most part, the state's COG system attempts to fill in this technical support gap, and most communities report having a go-to state employee that they can call for help, but state agencies and support providers have limited staffing and maintaining regular contact with the most rural and remote communities presents a challenge. Further, the State does not have clearly-stated infrastructure priorities that would help communities place their own local needs within the context of a larger strategy, nor a state-level system for objectively prioritizing infrastructure projects for funding. This means that much of infrastructure planning work is done in relative isolation when it could often benefit from a higher-level, more collaborative, and objective approach that would allow communities and the State to compete for larger, more regional financing resources.[104]

[104] An outlier in infrastructure planning is the state's transportation sector, which does have a central database, the Statewide Transportation Improvement Program. Some of the state's COGs also use a prioritization process to sort projects by priority related to overall impact, cost, and other factors in order to determine the best projects to finance with scarce resources.

FUNDING RESOURCES DEFINITIONS

Bond: A bond is a fixed income instrument that represents a loan that functions as an I.O.U. between the lender and borrower that includes the details of the loan and its payments. Bonds are used by companies, municipalities, states, and sovereign governments to finance projects and operations. Owners of bonds are debtholders, or creditors, of the issuer.

Contract: A binding agreement to procure goods and/or services between a buyer and a seller to provide goods or services in return for consideration (usually monetary). Payment based on deliverables and milestones; may need to submit invoices and/or receipts. Reporting is generally frequent.

Cooperative Agreement: Assistance is in the form of an award, but with substantial sponsor involvement, typically described in a set of specific terms. Payment is generally awarded in a lump sum. Reporting terms laid out in the agreement.

Grant: Assistance is in the form of an award, with generally little involvement by the funder. The award instrument refers to general terms and conditions. Payment is usually awarded in a lump sum. Reporting is most commonly annual.

Loan: A type of credit vehicle in which a sum of money is lent to another party in exchange for future repayment of the value or principal amount. In many cases, the lender also adds interest and/or finance charges to the principal value which the borrower must repay in addition to the principal balance.

Loan Guarantee: A loan guarantee is a contractual obligation between the government, private creditors and a borrower—such as banks and other commercial loan institutions—that the Federal government will cover the borrower's debt obligation in the event that the borrower defaults.

Mill Levy: A mill levy is a property tax. It is applied to a property based on its assessed value. The rate of the tax is expressed in mills and is equal to one dollar per $1,000 dollars of assessed value. The tax is applied by local governments and other jurisdictions to raise revenue to cover its budget and to pay for public services such as schools.

Sources: *Department of Energy, Investopedia, Purdue University* **a**

There are steps the State can take to make the process easier of planning and budgeting for projects, and successfully securing funding. This includes, primarily, embedding technical support people at the regional and state levels who can help applicants understand their options and direct them to the appropriate resources. In the longer term, the State could explore streamlining funding processes and deadlines, and set high-level priorities that can help local communities understand where their needs fit within a larger agenda. See the chapter that follows, Recommendations and Action Steps, for additional recommendations. Before delving into the prospect research conducted for this study, consult the text box for definitions of the main funding resources typically available to communities.

GENERAL RESOURCES

A network of support resources is critical for learning the ins and outs of project planning and financing. When it comes to infrastructure, small communities should not attempt to go it alone– particularly those that have not historically had much experience funding complex projects. While there is room for New Mexico to improve the navigation process to access resources, there are technical assistance, planning, and funding experts that can help at various stages along the project development to implementation pipeline, which are listed below. In addition, peer communities that have gone through the process and have recent wisdom to share can be a great resource. Figure 33 provides contact information for some key points of contact that may help communities and systems to find the help they need.

Figure 33: Where to Get Help

General support, fiscal sponsorship, funding (public sector)	
All Pueblo Council of Governors	• Executive Director, Amber Carrillo, acarrillo@indianpueblo.org
Councils of Governments *Check websites for best current point of contact*	• Eastern Plains Council of Governments: https://www.epcog.org/meet-our-team • Mid-Region Council of Governments: https://www.mrcog-nm.gov/31/Programs • North Central New Mexico Economic Development District: https://www.ncnmedd.com/staff • North West New Mexico Council of Governments: http://www.nwnmcog.com/staff.html • South Central Council of Governments: https://www.sccog-nm.com/contact • Southeastern New Mexico Council of Governments: https://www.snmedd.com/meet-our-staff-2/ • Southwest New Mexico Council of Governments: https://swnmcog.org/planning-and-technical-assistance
New Mexico Department of Finance and Administration	• Local Government Division Director, Col. Donnie Quintana, Donnie.Quintana@state.nm.us, 505-490-5788 • Capital Outlay Bureau Chief, Wesley Billingsley, Wesley.Billingsley@state.nm.us, 505-827-3884 • Community Development Bureau Chief, Carmen Morin, CarmenB.Morin@state.nm.us, 505-470-8979 • Community Planning Bureau Chief, Scott Wright, ScottH.Wright@state.nm.us, 505-469-2940
New Mexico Economic Development Department Community, Business & Rural Development *Includes FUNDIT, LEDA, New Mexico Main Street, and Frontier & Native American Communities Initiative*	• Division Director, Mark Roper, Mark.Roper@state.nm.us, 505.827.0323 • FundIt Program Manager and Finance Development Specialist, Johanna Nelson, Johanna.Nelson@state.nm.us, 505-827-0264

New Mexico Indian Affairs Department	• Cabinet Secretary, Lynn A. Trujillo, lynn.trujillo@state.nm.us, 505-476-1618 • Director of Policy and Government Relations, Poqueen Rivera, Poqueen.Rivera2@state.nm.us, 505-470-0688
Indian Health Services	• Director, Division of Sanitation Facilities Construction, Gretchen Tsosie, gretchen.tsosie@ihs.gov, 505-256-6786
U.S. Army Corps of Engineers, Albuquerque District *The Army Corps typically has millions in unspent planning funds each year, which New Mexico can tap into*	• Civil Works: 505-342-3340 • Engineering and Construction: 505-342-3434 • Planning, Project and Program Management: 505-342-3430 • Water Management: 505-342-3385 • Tribal Nations Technical Center of Expertise (TNTCX), Ron Kneebone, Ronald.R.Kneebone@USACE.army.mil, 505-238-4676
USDA Rural Development	• State Director, Patricia Dominquez, patricia.dominquez@nm.usda.gov, 505-761-4950
General support, technical assistance, funding (private sector)	
Southwest Environmental Finance Center *Is building out teaching modules on environmental topics, in particular on water*	• Director, Heather Himmelberger, heatherh@unm.edu, 505-681-7437
Utton Transboundary Resource Center	• Director, Adrian Oglesby, oglesby@law.unm.edu, 505-277-1767
Broadband and Electric	
Department of Information Technology Technical Assistance	• Geospatial Information Officer, Gar Clarke, george.clarke@state.nm.us • Project Manager, Rand Tilton, rand.tilton@state.nm.us
New Mexico Rural Electric Cooperative Association	• Chief Executive Officer, Keven J. Groenewold, kgroenewold@nmelectric.coop
Water	
New Mexico Tech, Aquifer Mapping Program *A statewide aquifer monitoring program, but can be used by communities as a resource to assess groundwater levels for water management decisions*	• Aquifer Mapping Program Manager, Laila Sturgis, 575-835-5327, https://geoinfo.nmt.edu/resources/water/amp/home.html
New Mexico Environment Department	• Drinking Water Bureau, Sustainable Water Infrastructure Group Manager, Jill Turner, jill.turner@state.nm.us, 505-205-6964 • Drinking Water Bureau, Community Services Program Manager, Karen Torres, karenm.torres@state.nm.us, 505-827-0027
New Mexico Rural Water Association	• Source Water Protection Program, Martha Graham, martha@nmrwa.org, 505-977-5733 • Wastewater Specialist, Fred Black, fred@nmrwa.org, 505-977-1902
Rural Community Assistance Corporation (RCAC)	• Assistant Director for New Mexico, Olga Morales, OMorales@rcac.org, 575-382-6992

FINANCING RECOMMENDATIONS AND STRATEGIES

The good news, in terms of project funding availability, is that the federal government is currently recognizing the importance of infrastructure investments as a foundational part of healthy communities and healthy economies. The Cares Act, ARPA, and the 2021 Infrastructure Bill all represent opportunities to invest in infrastructure in a profound way. These federal funds are on top of the State of New Mexico's anticipated $1 billion in revenue gains this year. Combined, these funding resources will mean billions for the State, including its rural, Colonias, and tribal areas. Relief funds from 2020 are already making a difference in some of the state's least well-served regions. For instance, the Navajo Tribal Utility Authority (NTUA) alone invested $76.8 million of Cares Act funds into infrastructure, including: 288 communication projects, 277 water/wastewater infrastructure projects, and 1,199 electric infrastructure projects. The NTUA is planning an additional $707 million in infrastructure projects over three years with ARPA funds. This includes $220 million for water, $216 million for broadband, and $213 million for electrical (and additional $39 million for off-the-grid solar). Now is the time to be ambitious with what is funded, while simultaneously putting in place mechanisms that make project planning and funding easier moving forward.

Coordinating resources, developing strategies to help prioritize projects, and supporting communities to fully finance and staff projects within a reasonable time-frame are all paramount as New Mexico responds to the urgent needs of communities. Technical assistance support placed within each of the seven COGs will help with this process. Some additional considerations are to shift the balance of loan versus grant dollars available to systems and communities based on their ability to take on debt, with small systems receiving 100% grant and larger systems tipping more heavily toward loan. Further, the State could help all applicants become shovel ready by having more flexible planning funds available, which can be used for activities such as design work or master plans. A state-level matching fund to help communities come up with match was a widely-cited need in interviews. Additionally, the State's strict anti-donation clause has had a chilling effect on infrastructure development, particularly in the areas of broadband and electrical where private utility providers are the most involved. The anti-donation clause is discussed further in the box on the following page.

ANTI-DONATION CLAUSE

A factor to keep in mind when considering state funding is New Mexico's Anti-Donation Clause. Anti-aid clauses are broadly designed to limit government corruption by blocking the improper use of state funds in private enterprise. There are three types: 1) Anti-credit clauses, which prevent state governments from loaning their credit to a private business entity, 2) Anti-stock clauses, which prevent state governments from becoming a stockholder in a private venture, and 3) Anti-gift or anti-donation clauses. Forty-five states have some sort of Anti-Donation Clause on the books, but New Mexico has one of the strictest. Only nine state constitutions prohibit aid in all three forms at both the state and local levels of government. A team of research scholars at George Mason University's Mercatus Center who surveyed the status of anti-donation clauses nationally found that New Mexico's anti-aid provisions are effective at providing a legal bullwork. However, the comprehensive nature of the state's Anti-Donation Clause limits how dollars can be used and combined when funding major public-private projects. In a mixed economy, prohibiting public investment in anything that aids private enterprise limits the opportunities to braid funding streams on major infrastructure projects, which may involve a private utility company, for instance, as a critical piece of the project. The Anti-donation clause in New Mexico is, simply put, slowing and complicating complete funding of infrastructure projects.

Source: Matthew D. Mitchell, Robin Currie, and Nita Ghei, "A Summary of the History and Effects of Anti-Aid Provisions in State Constitutions," Mercatus Center, George Mason University, December 2019.

The Infrastructure Investment and Jobs Act

New Mexico sits at the precipice of an historic opportunity to close persistent infrastructure gaps, improving the quality of life of New Mexicans and setting the state up for the future. Accustomed to making decisions in an environment of financial scarcity, New Mexico is now faced with the opposite challenge– a large influx of funding for major infrastructure efforts and a relatively short time frame to spend it. This the greatest opportunity to improve the lives of New Mexicans on a massive scale, perhaps in our lifetimes. Both the State of New Mexico and local communities must be prepared to meet this opportunity with the required planning documents. If spent strategically to maximize impact, the Infrastructure Bill dollars will go a long way to addressing current needs. Using this opportunity to simultaneously put in place processes to support prioritizing and funding projects over the long term, New Mexico will be able to embed lasting resiliency into communities.

New Mexico is guaranteed formula funding via the Infrastructure Bill as follows:

- $2.5 billion for federal-aid highway apportioned programs,
- $225 million for bridge replacement and repairs;
- A minimum of $100 million to improve broadband coverage;
- $90 million for infrastructure development for airports over five years;
- $38 million for an electric vehicle charging network;
- $38 million to protect against wildfires; and
- $13 million to protect against cyberattacks over five years.

In addition to these funds, remaining dollars will be competitive, with New Mexico being eligible to apply for the following. Additional details on funds in the infrastructure areas of focus are below.

- Electric vehicle charging stations: $2.5 billion in grant funding dedicated to EV charging;
- Wildfires: $8 billion in wildfire risk reduction by providing funding for community wildfire defense grants, mechanical thinning, controlled burns, the Collaborative Forest Restoration Program, and firefighting resources;
- Gas pipeline safety: $1 billion for the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program to modernize natural gas distribution pipelines, reducing incidents and fatalities, and avoiding economic losses; and

Where possible, New Mexico's infrastructure spending should look to offset any inequities in the funding received from COVID-19 relief funding (CARES Act and ARPA). For instance, while the State, counties, and larger municipalities received ARPA funds, land grant and unincorporated communities did not. This means that some of New Mexico's smallest and most rural places were left out of direct stimulus funding payments. This is not to say that these areas did not see benefits from large investments in infrastructure, unemployment relief, and education. However, they did not receive funds directly and therefore their concerns and needs should be included in infrastructure planning moving forward. Further, the State must be mindful of the additional State Revolving Loan Funds coming in. New Mexico already struggles to spend the dollars it receives; the new influx of dollars means that there must be a better strategy for targeting these funds to projects and spending the dollars.

Broadband and Electric

Broadband has leapt to the top of funding priority lists in nearly every U.S. state. Electricity and internet are simply requirements for doing almost any kind of business in the 21st century. In New Mexico, the 2021 legislative session saw unprecedented support for broadband access, with Legislators allocating $110 million in appropriations. These funds will be deployed to build broadband infrastructure, support planning and grant-writing by public entities, expand broadband for schools, and invest in emerging broadband technology. The total appropriation for broadband construction activities was $70 million. However, limitations from the anti-donation clause in the State Constitution prevents state money to finance private provider's broadband projects, which reduces the immediate impact state appropriations will have on expanding infrastructure. Until there is a revision to the Constitution or a finding via the State Supreme Court that the clause can be interpreted more broadly, state appropriations can only support publicly-owned broadband projects.

Federal funds may be less subject to the State's anti-donation clause, so a way to address funding gaps or complications right now could be to use relief funds and Infrastructure Bill funds, as allowable, to upgrade and expand electrical systems, increase renewable energy usage, expand broadband availability, and increase speeds. These funds are not without complications too, however. Federal funding criteria like minimum internet speeds of 100mbps and only funding last mile infrastructure can limit eligibility in a state where some communities have no middle mile infrastructure and many households have no internet at all.

The 2021 Infrastructure Bill allocates $65 billion to improve broadband. The infrastructure package includes funding for three broadband activity categories: 1) Building or improving broadband infrastructure; 2) Collecting data, mapping, and planning state-wide broadband efforts; and 3) Subsidizing the cost of internet subscription services directly to consumers. For New Mexico, the most

relevant broadband infrastructure funding program is the Broadband Equity, Access, and Deployment Program. Congress allocated $42.5 billion to the program. Each state will receive an initial infusion of $100 million. The rest will be competitively granted, with priority on rural areas and states that have low levels of broadband infrastructure. Broadband infrastructure funded through the Equity, Access, and Deployment program must support speeds of at least 100 Mbps for downloads and 20 Mbps for uploads. This means only fiber network projects will be able to receive funding support using current internet technologies. To be eligible, New Mexico must submit a five-year action plan that details its investment priorities, which can be adapted from the existing Broadband Strategic Plan.

The Infrastructure Bill further allocates another $65 billion to electricity and related projects, such as cyber security and building resiliency to extreme weather. Funding allocations run the gamut from research on technologies and extreme weather, to grid upgrades, to electric vehicle charging stations. Much of the electrical infrastructure funding will be made available in annual grants, which in some instances will include a set-aside for small utilities. While no grant notices have yet posted, it is anticipated that applicants will be able to apply for funds for weatherization, monitoring and control, undergrounding equipment, utility pole management, relocation of power lines, use and construction of distributed energy resources and microgrids, and replacing old equipment and power lines. Funding includes measures to improve data collection in the electricity sector. It will also finance programs that support the development, demonstration, and deployment of clean energy technologies. Further, a $3.5 billion national investment in weatherization will help many families reduce their energy costs.

State and tribal entities should enter 2022 prepared to apply for competitive opportunities with high-quality, well-planned broadband and electrical projects in anticipation of competitive grant opportunities being released. This may include coordinating across communities and with utility companies for maximum impact; preparing engineering reports, budgets, and other planning documents; and beginning or continuing permitting processes. For those specifically interested in learning more about broadband funding, see also the **2020 State of New Mexico Broadband Strategic Plan and Rural Broadband Assessment** and the **Federal Broadband Funding Opportunities: A Guide for New Mexico Companies, Utilities, Indian Tribes, and Localities**—combined, these reports dive deeply into the topics of broadband, funding needs, and strategies.

Water

Water systems are faltering nationwide as the proportion of funding has shifted away from the federal government toward individual customers. In 1977, 63% of water infrastructure costs were federally-funded; by 2014, it was only 9%.[105] Put another way, in 1977 the federal government invested $76 per person on water pipes, and only $11 per person by 2014. This shift leaves the burden of operations and maintenance to fall to individual water and wastewater systems, whose only mechanism for improving system sustainability is to raise rates—something that disproportionally impacts low-income households and may not be feasible in many communities. With a widely dispersed and largely low-income population, scarce water resources, and challenging topography, New Mexico feels this shift in the way water systems are funded perhaps more than most states.

Communities in New Mexico are in a generally weak position to self-fund water projects, meaning that external funds are almost always needed. This is in part due to the small size of systems and limited

[105] Elizabeth Miller and David Montgomery, "A Water Crisis Is Growing In a Place You'd Least Expect It," NPR, February 8, 2019, https://www.npr.org/2019/02/08/691409795/a-water-crisis-is-growing-in-a-place-youd-least-expect-it.

capacity both to pursue and to administer dollars.[106] These factors make securing all manner of financing difficult. Small systems do not qualify for large amounts of credit and have limited sources of revenue to pay back loans. Competitive grant and contract funds require technical expertise and significant time to apply, which can be difficult for small systems to manage.

Further, the water financing resources within New Mexico and nationally are complex, with dozens of funding sources, few of which coordinate on deadlines, scoring criteria, or other details. This means that water systems and communities may not even be aware of the full spectrum of funding for which they could qualify, much less have the capacity to pursue the applications. The decentralized structure of water project financing means that some resources have much more demand than dollars, while the State's two Revolving Loan Funds for water and wastewater, for instance, have excess capacity. If the State does not improve its strategy to leverage and use all available dollars effectively, it will continue to lose out on federal dollars at a time when historic levels of funding are available.

There is **$55 billion in total dedicated to water, wastewater, and stormwater projects in the Infrastructure Bill**. Much of the drinking water dollars will come from an **estimated $355 million in Drinking Water State Revolving Loan Funds** to New Mexico. The State Revolving Loan Fund programs will be required to provide up to 30% and no less than 10% of funding as grants and principal forgiveness loans, with 50% is set-aside for rural and financially distressed communities. The bill includes $15 billion nationally to replace lead pipes, not a pervasive issue in New Mexico, and $4 billion nationally to address water contamination from per- and polyfluoroalkyl substances (PFAS), something for which the Department of Health recently started testing and that is expected to be pervasive. Additionally, the Rural and Low-Income Water Assistance Pilot Program will establish a new U.S. EPA grant to provide competitive grants to utilities to assist low-income ratepayers.

Wastewater funds will be in a mix of grants, including $1.4 billion over five years for the EPA Sewer Overflow & Stormwater Reuse Municipal Grant Program; $125 million for Wastewater Energy Efficiency pilots; and $50 million for storm water infrastructure planning/development and implementation grants. Loans will come via an **$11.7 billion national infusion in the Clean Water State Revolving Loan Fund and $1 billion specifically for clean-up of emerging contaminants such as polyfluoroalkyl substances (PFAS).**

OVERVIEW OF TABLES

The tables that follow this section represent an overview of the common grant and loan resources used to finance infrastructure projects. These resources are organized by infrastructure type: broadband, electric, and water/wastewater. One may note some redundancy in funding sources across sections– this was done intentionally to make it easier to see the major funding for a specific infrastructure area. Each entry includes basic information about the opportunity, award amounts, expected deadline, and eligible entities. These summaries were based on information current at the time of research in late 2021, but may be subject to change over time. Prior to beginning any application, please go to the award website to be sure that eligibility, award amounts, and deadlines are still accurate.

[106] New Mexico Legislative Finance Committee, State-Funded Water Projects, 2021. https://www.nmlegis.gov/Entity/LFC/Documents/Program_Evaluation_Reports/State-Funded%20Water%20Projects.pdf.

FULL FUNDING TABLES

Funding Agency	Program Purpose	Eligible Applicants	Funding Range	Assistance				Limitations	Timeline				Deadline / Cycle History	Link
				Grant / Coop. Agt.	Loan / Debt Financing	Tax Credit \ Bond	Other		Quarter 1	Quarter 2	Quarter 3	Quarter 4		
Broadband Funding														
Federal Communications Commission: *Rural Digital Opportunity Fund*	Open to Eligible Telecommunications Providers that offer voice and wireless. Offers subsidies to serve unserved and underserved census blocks. Eligibility determined using Form 477 and the Connect America Cost Model.	☐ State government ☐ Local government ☐ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Operational subsidies for 10 years.				Auction	Phase II will be for census blocks that are partially served by 25 mbps download speeds and unserved blocks not funded in Phase I.		*	*	*	Phase I application was due 15-Jul-20, with the auction ending 25-Nov-20. Phase II has not yet opened.	https://www.fcc.gov/auction/904
New Mexico Department of Finance & Administration: *Capital Outlay Projects Bureau*	A capital outlay project is the acquisition, improvement, alteration or reconstruction of long-term assets that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	No limit on request size.	Grant				Capital outlay funding cannot be used for operating expenses; salaries; materials and supplies; events, brochures, pamphlets and publications; and reimbursements of prior purchases.	*				Submit a request through the Governor's Office or state legislator. Upcoming deadline is 22-Jan-2022.	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/
New Mexico Department of Finance & Administration: *Community Development Block Grant (CDBG)*	Supports project-specific activities to improve or develop community infrastructure and public facilities; 10% of awards may support Colonias through addressing lack of potable water, safe housing, or adequate sewer systems.	☐ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range up to $750,000 over 24 months. Match: 5% for rural communities; 10% for non-rural.	Grant				Entities that receive CDBG funding from the Dept. of Housing and Urban Development (HUD) are not eligible, including: 1) Tribes and Pueblos; 2) Entitlement cities (Albuquerque, Farmington, Las Cruces, Rio Rancho and Santa Fe).	*		*		Deadlines: Threshold requirements must be met by: 3-March-21; Applications due: 20-Aug-21	https://www.nmdfa.state.nm.us/local-government/community-development-bureau/cdbg-information/
New Mexico Department of Information Technology: *New Mexico Broadband Technical Assistance Program (NM TAP)*	Provides technical assistance to help deploy or expand broadband infrastructure and/or services and lay the groundwork for communities to build broadband infrastructure, creating jobs for the construction of the network(s).	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Awards will take the form of technical assistance provided to up to 15 communities or organizations. Slides are available on the website.				Technical Assistance	Targeting areas with the greatest need for broadband technical assistance throughout the state.			*	*	Two sessions were held on 15 and 16 September 2021. Slides are available here: https://www.doit.state.nm.us/broadband/tap.shtml	https://www.doit.state.nm.us/broadband/tap.shtml

New Mexico Environment Department, Construction Programs Bureau: *Capital Outlay Special Appropriations Program*	Provides funding for the acquisition, improvement, alteration, or reconstruction of assets of a long-term character that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range from ~$200,000 - $40,000,000; average range approximately $500,000 - $1,000,000.	Grant				Local governments may apply directly. Other entities involved in the project must work with the local government applicant.			*		Annual release Current deadline: 13-Jan-22	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/
New Mexico Finance Authority: *Local Government Planning Fund*	Provides the capital necessary for proper planning of vital public projects, including infrastructure, water and wastewater preliminary engineering reports, long-term master plans, water conservation plans, economic development plans, or energy audits.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Grants range up to $50,000 and are made on a sliding scale.	Grant				Statewide program.	*	*	*	*	Rolling application period	https://www.nmfinance.com/local-government-planning-fund/
New Mexico Finance Authority: *Public Project Revolving Fund*	Finances public projects such as road projects, water system upgrades, fire and law enforcement equipment, public buildings, healthcare facilities, electric and broadband utilities, and quality-of-life projects with both market-rate and subsidized rate loans.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loans range from $10,000 - $100,000,000+.		Loan			Borrowers may receive "disadvantaged funding" of 0 - 2% interest rates to those with Median Household Incomes that are less than the State's average.	*	*	*	*	Rolling application period	https://www.nmfinance.com/public-infrastructure-capital-financing/
New Mexico Indian Affairs Department: *Tribal Infrastructure Fund*	Provides financial resources for infrastructure development along with providing for the planning and development of infrastructure in tribal communities to improve the quality of life and encourage economic development.	☐ State government ☐ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Planning and design projects: $30,000 - $400,000; Construction projects: $75,000 - $1.6 million.	Grant				Eligibility limited to Indian Nations, tribes, or pueblos located wholly or partially in New Mexico.	*	*			Cycle typically runs Jan to mid-April, annually	https://www.iad.state.nm.us/policy-and-legislation/programs-and-funding/tribal-infrastructure-fund/
New Mexico Public Regulations Commission: *Annual Broadband Program*	The NMPRC encourages eligible telecommunications carriers to apply for the Commission's Broadband Fund Program Grants to fund the construction of facilities that are capable of providing broadband internet access service to areas unserved and underserved by broadband in New Mexico.	☐ State government ☐ Local government ☐ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	No award ranges given. Match: 25%	Grant				The project must be for voice and broadband, last mile service. Speed requirements are 10/1 Mbps or greater for unserved areas, and 25/3 Mbps or greater for underserved areas. Must serve a rural area, defined as 1) any unincorporated area; or 2) any city, town, or incorporated area with a population of 20,000 or less.	*	*	*	*	No deadlines stated, possibly rolling. Check with program contact: Eugene J. Evans, Telecommunications Engineer, eugene.evans@state.nm.us	https://www.nm-prc.org/utilities/telecommunications/nmprc-annual-broadband-program/

U.S. Department of Agriculture, Rural Utilities Service: *Community Connect Grant Program*	Provides financial assistance to eligible applicants that will provide broadband service in rural, economically challenged communities where service does not exist.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Awards range from $100,000 - $3,000,000 for at least two years. Match: 15%	Grant				Eligibility is limited to rural areas that lack any existing broadband speed of at least 10 Mbps downstream and 1 Mbps upstream.				*	Most recent deadline: 23-Dec-20 Typically an annual release	https://www.rd.usda.gov/programs-services/community-connect-grants
U.S. Department of Agriculture, Rural Utilities Service: *Community Facilities Direct Loan & Grant Program*	Offers financial support to develop essential community facilities in rural areas, including funds for e-connectivity. An example of recent support is a project resurfacing streets, streetscape, rehabilitation of water, sewer, stormwater systems, and relocating electric and telecommunications underground.	■ State government ■ Local government ■ Tribal government □ Tribal agencies □ Utilities companies ■ Nonprofit organizations □ For-profit organizations	Awards: Grants: $30,000,000 available; average: $39,000. Loans: $2,500,000 available: average: $1,774,639; Guaranteed Loans: $500,000,000 available; average: $2,891,112.	Grant	Loan / Loan Guarantee			Limited to rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
U.S. Department of Agriculture, Rural Utilities Service: *Distance Learning and Telemedicine (DLT) Grant Program*	Helps rural residents tap into the potential of modern telecommunications and the Internet for education and health care, two of the keys to economic and community development.	■ State government ■ Local government ■ Tribal government □ Tribal agencies □ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Awards range from $100,000 - $3,000,000 for at least two years Match: 15%	Grant				Limited to rural areas with populations of 20,000 or less.		*			Annual release Most recent deadline: 04-June-21	https://www.rd.usda.gov/programs-services/distance-learning-telemedicine-grants
U.S. Department of Agriculture, Rural Utilities Service: *OneRD Guarantee Loan Initiative - Community Facilities Guaranteed Loan Program*	The Community Facilities Guaranteed Loan Program provides loan guarantees to develop essential community facilities in rural areas. Facility examples: 1) Telecommunications end-user equipment; 2) Water infrastructure facilities; and 3) Purchase and installation of renewable energy systems.	Lenders and other non-regulated lending institutions that are approved may apply. Eligible borrowers may include: □ State government ■ Local government ■ Tribal government ■ Tribal agencies □ Utilities companies ■ Nonprofit organizations □ For-profit organizations	A total of $500,000,000 was available in 2021; Loans approved in 2021 will receive an 80% guarantee. The maximum amount of a guaranteed loan is $100 million, including guaranteed and unguaranteed portions.		Loan Guarantee			Limited to rural areas with populations of 50,000 or less. The lender may be located anywhere in the U.S.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/onerdguarantee

U.S Department of Agriculture, Rural Utilities Service: *ReConnect Loan & Grant Program*	Offers funding options, in the form of 100% grants, 50/50 grant/loan, and 100% loans, to facilitate broadband deployment in rural areas that do not have sufficient access to broadband. 2022 priorities are: assisting Rural communities recover from COVID-19, ensuring rural residents have equitable access to RD programs, and reducing pollution and increasing resilience to impacts of climate change.	■ State government ■ Local government ■ Tribal government □ Tribal agencies ■ Utilities companies ■ Nonprofit organizations □ For-profit organizations	100% grants limited to $25 million; 50/50 awards limited to $25 million for each the grant and the loan; 100% loans limited to $50 million.	Grant	Loan	Bond		* At least 90% of service area must lack sufficient broadband access. * Must be able to provide service to every area premises at appropriate speeds. * Must not be located in a city, town, or incorporated area with a 20,000+ population or urbanized areas adjacent to a city or town with a 50,000+ population.		*			Deadline: 2-Feb-22	https://www.usda.gov/reconnect/program-overview
U.S. Department of Agriculture, Rural Utilities Service: *Rural Broadband Access Loan & Loan Guarantee*	Furnishes loans and loan guarantees to provide funds for the costs of construction, improvement, or acquisition of facilities and equipment needed to provide service at the broadband lending speed in eligible rural areas.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies □ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	In general, Loan Terms are limited to the expected useful life of the assets to be financed, plus 3 years.		Loan / Loan Guarantee			Must: Serve rural area (population up to 50,000); at least 15% of households are unserved; no part of service area has three+ "incumbent service providers;" no part overlaps with the area of current borrowers or previous grantees.			*	*	Most recent: 30-Sep-19 The program is currently undergoing rule changes; no appropriations in 2020-2021.	https://www.rd.usda.gov/programs-services/rural-broadband-access-loan-and-loan-guarantee
U.S. Department of Agriculture, Rural Utilities Service: *Rural Placemaking Innovation Challenge (RPIC)*	Supports entities that provide planning support, technical assistance, and training to foster placemaking activities in rural communities. Funds can be used to create plans to enhance capacity for broadband access.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies □ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Awards range up to $250,000. Match: 15%	Grant				Recipients must be located in rural areas (population less than 50,000) and must not be contiguous and adjacent to a non-rural city.			*		Deadline: 26-July-21 One previous competition was held in 2020.	https://www.grants.gov/web/grants/view-opportunity.html?oppId=333852
U.S. Department of Agriculture, Rural Utilities Service: *Telecommunication Infrastructure Loans & Loan Guarantees*	Financing is available for the construction, maintenance, improvement and expansion of telephone service and broadband in rural areas.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Direct loans range $2,183,000 - $13,659,000 and average $7,921,000. Guaranteed loans range $2,183,000 - $20,360,000 and average $11,271,500.		Loan / Loan Guarantee			Eligible service areas must: be contained within a rural area(s); at least 15% of households in the area(s) are unserved; no part of the area has three+ "incumbent service providers"; no part overlaps with the service area of current RUS borrowers or service areas funded by RUS.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees

U.S. Department of Commerce, Economic Development Administration: *Economic Adjustment Assistance Program*	Grants support communities, including water and sewer system improvements and telecommunications infrastructure (e.g., broadband).	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations ■ Inst. of Higher Education	Awards range from $500,000 - $5,000,000. Project periods range from 12 - 48 months. Match: Awards are expected to fund at least 80%, and up to 100%, of project costs.	Grant						*			Deadline: 15-Mar-22 Applications are accepted on a rolling basis, and funds may be fully expended prior to the deadline.	https://eda.gov/arpa/economic-adjustment-assistance/
U.S. Department of Commerce, National Telecommunications and Information Administration: *Broadband Infrastructure Program*	Grants support covered partnerships for covered broadband projects, defined as competitively and technologically neutral projects for the deployment of fixed broadband service that provides qualifying broadband service in an eligible service area.	■ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards typically range from $5,000,000 - $30,000,000 for a one-year period.	Grant				Eligible applicants are covered partnerships, defined as a partnership between: a State, or one or more political subdivisions of a state; and a provider of fixed broadband service.		*	*		Most recent: 17-Aug-21 Monitor for release summer 2022.	https://www.grants.gov/web/grants/view-opportunity.html?oppId=333684
U.S. Department of Commerce, National Telecommunications and Information Administration: *The Infrastructure Investment and Jobs Act new grant programs*	The Infrastructure Investment and Jobs Act created new grant resources: 1) Broadband Equity, Access, and Deployment Program; 2) Enabling Middle Mile Broadband Infrastructure Program; 3) State Digital Equity Planning Grant Program, 4) State Digital Equity Capacity Grant Program, and 5) Digital Equity Competitive Grant Program.	■ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Award ranges not yet determined.	Grant				States must have a completed five-year broadband action plan prior to applying. Check the notices, once released, for details on applicant eligibility.		*	*		Releases anticipated spring-summer, 2022.	Monitor NTIA website for updates
U.S. Department of Homeland Security: *Building Resilient Infrastructure and Communities (BRIC)*	Funding supports hazard mitigation activities, priorities include to incentivize natural hazard risk reduction activities that mitigate risk to public infrastructure; mitigate risk to community lifelines (e.g., water, energy, communications infrastructure); and increase adoption of the latest building codes.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	$1,000,000,000 is available to make awards that range from $1,000,000 - $50,000,000.	Grant				Local governments must submit subapplications to their state applicant agency. Applicants/subapplicants must have a FEMA-approved Hazard Mitigation Plan by the deadline or at the time of obligation of grant funds for mitigation and capacity building projects.	*				Deadline: 28-Jan-22 Released annually; typically due early winter	https://www.grants.gov/web/grants/view-opportunity.html?oppId=335226

U.S. Department of Housing and Urban Development: *Indian Community Development Block Grant Program (ICDBG)*	The ICDBG Program provides eligible grantees with direct grants for use in developing viable Indian and Alaska Native Communities, including decent housing, a suitable living environment, and economic opportunities, primarily for low and moderate income persons. Community Facilities funding includes infrastructure projects.	☐ State government ☐ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range from $500,000-$4,000,000. While matching funds are not required, applications are awarded points if there is committed leverage on the project.	Grant				There are two categories of funding: Single Purpose Grants, which are competitive, and Imminent Threat program, a $4 million allocation of first-come first-served grants.				*	Most recent deadline: 25-Oct-21	https://www.hud.gov/program_offices/public_indian_housing/ih/grants/icdbg
U.S. Department of the Interior, Bureau of Indian Affairs: *National Tribal Broadband Grant*	This program provides grant funding to hire consultants to perform feasibility studies for broadband deployment, with the goal of supporting informed decisions about broadband planning and ultimately improving quality of life by encouraging the availability of broadband services.	☐ State government ☐ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Up to $500,000 to each of the Federally Recognized Tribes delineated by the Department of the Interior's Bureau of Indian Affairs	Grant							*	*	Most recent deadline: 1-Sept-21	https://www.bia.gov/service/grants/ntbg

Funding Agency	Program Purpose	Eligible Applicants	Funding Range	Assistance				Limitations	Timeline				Deadline / Cycle History	Link
				Grant / Coop. Agt.	Loan / Debt Financing	Tax Credit	Bond		Quarter 1	Quarter 2	Quarter 3	Quarter 4		
Electric Funding														
American Public Power Association: *Demonstration of Energy & Efficiency Developments (DEED) program*	Grants help finance innovative ideas to improve utilities through efficiency, reducing costs, new technologies, new services, and improving processes and practices to better serve customers. Grants may support pilot projects, technology demonstrations, early commercialization, and the development of best practices.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	$125,000 awards for pilot projects, also have a scholarship program to help utilities hire interns, a resource library, and webinars.	Grant				Must be a member. Currently, Farmington Electric Utility System, City of Gallup, and Los Alamos County Utilities are. See website for details on dues.	*		*		Two grant deadlines each year, 15-Feb and 15-Aug.	https://www.publicpower.org/deed-rd-funding
New Mexico Department of Finance & Administration: *Capital Outlay Projects Bureau*	A "capital outlay project" is the acquisition, improvement, alteration or reconstruction of assets of a long-term character that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	No limit on request size.	Grant				Capital outlay funding cannot be used for operating expenses; salaries; materials and supplies; events, brochures, pamphlets, publications; and retroactive reimbursements of previous purchases.	*				Submit a request form through the Governor's Office or state legislator. Deadline is 22-Jan-2022.	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/
New Mexico Department of Finance & Administration: *Community Development Block Grant (CBDG)*	Supports project-specific activities to improve or develop community infrastructure and public facilities; 10% of awards to support Colonias through addressing lack of potable water, safe housing, or adequate sewer systems.	☐ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range up to $750,000 over 24 months. Match: 5% for rural communities; 10% for non-rural.	Grant				Entities that receive funding from the Dept. of Housing and Urban Development are not eligible, including: 1) Tribes and Pueblos; 2) Entitlement cities (Albuquerque, Farmington, Las Cruces, Rio Rancho and Santa Fe).	*		*		Deadlines: Threshold requirements must be met by: 3-March-21; Applications due: 20-Aug-21	https://www.nmdfa.state.nm.us/local-government/community-development-bureau/cdbg-information/
New Mexico Environment Department, Construction Programs Bureau: *Capital Outlay Special Appropriations Program*	Provides funding for the acquisition, improvement, alteration, or reconstruction of assets of a long-term character that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range from ~$200,000 - $40,000,000; average range approximately $500,000 - $1,000,000.	Grant				Local governments may apply directly. Other entities involved in the project must work with the local government applicant.			*		Annual release Current deadline: 13-Jan-22	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/

New Mexico Finance Authority: *Local Government Planning Fund*	Provides the capital necessary for proper planning of vital public projects, including infrastructure, water and wastewater preliminary engineering reports, long-term master plans, water conservation plans, economic development plans, or energy audits.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Grants range up to $50,000 and are made on a sliding scale.	Grant				Statewide program.	*	*	*	*	Rolling application period	https://www.nmfinance.com/local-government-planning-fund/
New Mexico Finance Authority: *Public Project Revolving Fund*	Examples of funded projects include road projects, water system upgrades, fire and law enforcement equipment, public buildings, healthcare facilities, and electric/broadband utilities with both market-rate and subsidized rate loans.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loans range from $10,000 - $100,000,000+.		Loan			Borrowers may receive "disadvantaged funding" of 0 - 2% interest rates to those with Median Household Incomes that are less than the State's average.	*	*	*	*	Rolling application period	https://www.nmfinance.com/public-infrastructure-capital-financing/
New Mexico Indian Affairs Department: *Tribal Infrastructure Fund*	Provides financial resources for infrastructure development along with providing for the planning and development of infrastructure in tribal communities to improve the quality of life and encourage economic development.	☐ State government ☐ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Planning and design projects: $30,000 - $400,000; Construction projects: $75,000 - $1.6 million.	Grant				Eligibility limited to Indian Nations, tribes, or pueblos located wholly or partially in New Mexico.	*	*			Cycle typically runs Jan to mid-April, annually	https://www.iad.state.nm.us/policy-and-legislation/programs-and-funding/tribal-infrastructure-fund/
U.S. Department of Agriculture, Rural Utilities Service: *Community Facilities Direct Loan & Grant Program*	Offers financial support to develop community facilities in rural areas. Examples include resurfacing streets, streetscape, rehabilitation of water, sewer, stormwater systems, and relocating electric and telecommunications underground.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Grants: $30,000,000 available; average: $39,000. Loans: $2,500,000 available: average: $1,774,639; Guaranteed Loans: $500,000,000 available; average: $2,891,112.	Grant	Loan / Loan Guarantee			Rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
U.S. Department of Agriculture, Rural Utilities Service: *Distributed Generation Energy Project Financing*	Loans and loan guarantees to energy project developers for distributed energy projects including renewables that provide wholesale or retail electricity to existing Electric Program borrowers or to rural communities served by other utilities.	☐ State government ☐ Local government ☐ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	The loan amount may be up to 75% of total project costs.		Loan / Loan Guarantee			Serves rural areas (less than 20,000 population). Only for commercial technology, not emerging technologies.	TBD	TBD	TBD	TBD	Reach out to program contact to discuss application procedure.	https://www.rd.usda.gov/programs-services/distributed-generation-energy-project-financing
U.S. Department of Agriculture, Rural Utilities Service: *Electric Infrastructure Loan & Loan Guarantee*	Finances construction of electric distribution, transmission, and generation facilities, including system improvements to improve electric service in rural areas; and demand side management, energy efficiency programs, and on-grid and off-grid renewable energy.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	The average Federal Financing Bank loan guarantee is $32,668,948. Other ranges are not specified.		Loan			Limited to rural areas. In general, a rural area is defined as a town, or unincorporated area that has a population not greater than 20,000. Check with the NM General Field Representative to confirm eligibility.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/electric-infrastructure-loan-loan-guarantee-program

U.S. Department of Agriculture, Rural Utilities Service: *OneRD Guarantee Loan Initiative - Community Facilities Guaranteed Loan Program*	The Community Facilities Guaranteed Loan Program provides loan guarantees to develop essential community facilities in rural areas. Examples of facilities may include: 1) Telecommunications end-user equipment; 2) Water infrastructure facilities; and 3) Purchase and installation of renewable energy systems.	Lenders and approved non-regulated lending institutions may apply. Borrowers include: ☐ State government ■ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	$500,000,000 was available in 2021; Loans approved in 2021 will receive an 80% guarantee. The maximum amount of a guaranteed loan is $100 million, including guaranteed and unguaranteed portions.		Loan Guarantee			Limited to rural areas with populations of 50,000 or less. The lender may be located anywhere in the U.S.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/onerdguarantee
U.S. Department of Commerce, Economic Development Administration: *Economic Adjustment Assistance Program*	Grants support communities, including water and sewer system improvements and telecommunications infrastructure (e.g., broadband).	■ State government ■ Local government ■ Tribal government ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations ■ Inst. of Higher Education	Awards range from $500,000 - $5,000,000. Project periods range from 12 - 48 months. Match: Awards are expected to fund at least 80%, and up to 100%, of costs.	Grant						*			Deadline: 15-Mar-22 Applications are accepted on a rolling basis; funds may be expended prior to the deadline.	https://eda.gov/arpa/economic-adjustment-assistance/
U.S. Department of Energy: *Grid Infrastructure and Reliability*	The Infrastructure and Jobs Act established a grant program to support activities that reduce the likelihood and consequence of impacts to the electric grid due extreme weather, wildfire, and natural disaster.	■ State government ■ Local government ■ Tribal government ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Award amounts to be determined. Total allocation is $5 billion over five years.	Grant				Details on eligible applicants and award distributions are to-be-determined.	TBD	TBD	TBD	TBD	Deadlines are to--be-determined.	Monitor the department website, no release to-date.
U.S. Department of Energy: *Transmission Facilitation Revolving Loan Fund*	This new revolving loan fund will allow the DOE to serve as an "anchor-tenant" for a new transmission line or an upgrade of an existing line. It will allow DOE to issue loans to or enter into public private partnerships with eligible transmission projects.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loan terms and amounts are to-be-determined. Total allocation is $2.5 billion.					This program will permit the DOE to buy a portion of planned capacity, which it then may sell after determining that the transmission project has ensured financial viability. I	TBD	TBD	TBD	TBD	Deadlines are to--be-determined.	Monitor the department website, no release to-date.
U.S. Department of Homeland Security: *Building Resilient Infrastructure and Communities (BRIC)*	Funding supports hazard mitigation activities, priorities include to incentivize natural hazard risk reduction activities that mitigate risk to public infrastructure; mitigate risk to community lifelines (e.g., water, energy, communications infrastructure); and increase adoption of the latest building codes.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	$1,000,000,000 is available to make awards that range from $1,000,000 - $50,000,000.	Grant				Local governments must submit subapplications to their state applicant agency. Applicants/subapplicants must have a FEMA-approved Hazard Mitigation Plan by the deadline to apply, or at grant fund obligation for mitigation projects and capacity building activities.	*				Deadline: 28-Jan-22 Released annually; typically due early winter	https://www.grants.gov/web/grants/view-opportunity.html?oppId=335226

Funding Agency	Program Purpose	Eligible Applicants	Funding Range	Assistance				Limitations	Timeline				Deadline / Cycle History	Link
				Grant / Coop. Agt.	Loan / Debt Financing	Tax Credit	Bond		Quarter 1	Quarter 2	Quarter 3	Quarter 4		
Water Funding														
National Rural Water Association: *Rural Water Loan Fund*	Provides low-cost loans for the following eligible projects: 1) Pre-development (planning) costs for infrastructure projects; 2) Replacement equipment, system upgrades, maintenance and small capital project; 3) Energy efficiency projects to lower costs and improve system sustainability; 4) Disaster recovery or other emergency loans are available.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Loans range up to $100,000 or 75% of the total project cost, whichever is less. Loans have a below market interest rate and a maximum repayment period of 10 years.		Loan			Applicants must serving up to 10,000 persons, or in rural areas with no population limits	*	*	*	*	Rolling application period	https://nrwa.org/members/products-services-portfolio/rural-water-loan-fund/
New Mexico Department of Finance & Administration: *Capital Outlay Projects Bureau*	A "capital outlay project" is the acquisition, improvement, alteration or reconstruction of assets of a long-term character that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	No limit on request size.	Grant				Capital outlay funding cannot be used for operating expenses; salaries; materials and supplies; events, brochures, pamphlets and publications; and retroactive reimbursements of previous purchases.	*				Submit a request form through the Governor's Office or state legislator. Upcoming deadline is 22-Jan-2022.	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/
New Mexico Department of Finance & Administration: *Community Development Block Grant (CBDG)*	Supports project-specific activities to improve or develop community infrastructure and public facilities; 10% of awards to support Colonias through addressing lack of potable water, safe housing, or adequate sewer systems.	☐ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range up to $750,000 over 24 months. Match: 5% for rural communities; 10% for non-rural.	Grant				Entities that receive funding directly from the Dept. of Housing and Urban Development (HUD) are not eligible, including: 1) Tribes and Pueblos; 2) Entitlement cities (Albuquerque, Farmington, Las Cruces, Rio Rancho and Santa Fe).	*		*		Deadlines: Threshold requirements must be met by: 3-March-21; Applications due: 20-Aug-21	https://www.nmdfa.state.nm.us/local-government/community-development-bureau/cdbg-information/
New Mexico Department of Finance & Administration: *Emergency Water Supply Fund*	Expenditures are made to address emergencies that require an expenditure from the fund in order to provide an adequate and safe drinking water supply for residents of communities with a population less than 5,000 who use a drinking water supply system in common.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Up to $118,000 per year is available. Awards range up to $118,000.	Grant	Loan			Funding is appropriated annually and dependent upon legislature approval.	*	*	*	*	Rolling application period	https://www.nmdfa.state.nm.us/board-of-finance/emergency-loans/

New Mexico Environment Department, Construction Programs Bureau: *Capital Outlay Special Appropriations Program*	Provides funding for the acquisition, improvement, alteration, or reconstruction of assets of a long-term character that are intended to continue to be held or used, including land, buildings, machinery, furniture and equipment.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range from ~$200,000 - $40,000,000; average range approximately $500,000 - $1,000,000.	Grant				Local governments may apply directly. Other entities involved in the project must work with the local government applicant.			*		Annual release Current deadline: 13-Jan-22	https://www.nmdfa.state.nm.us/budget-division/capital-outlay-bureau/
New Mexico Environment Department, Construction Programs Bureau: *Clean Water State Revolving Fund*	Provides low-interest loans for wastewater and storm water projects that protect surface water and groundwater resources; projects that control non-point source water pollution; Planning Loans, Design Loans and Construction Loans. Includes Green Project Reserve that supports projects with water efficiency, green infrastructure and/or environmental innovation.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loans available for up to 100% of eligible costs; interest rates of 0% to 1% for public entities, and 2.375% for private entities.		Loan			Private entities are eligible only for limited types of projects.	*	*	*	*	Rolling application period	https://www.env.nm.gov/construction-programs/clean-water-state-revolving-fund-cwsrf/
New Mexico Environment Department, Construction Programs Bureau: *Rural Infrastructure Revolving Loan Program (RIP)*	Provides financial assistance to local authorities for the construction or modification of water supply, wastewater, and solid waste facilities; and guidelines for the department's ranking of water supply, wastewater, and solid waste facility construction projects for highest priority based on public health needs.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Maximum loan amount in any one year is $2,000,000. Interest rate is 2.375% with a loan term of up to twenty years and repayment beginning one year after project completion.		Loan			Applicants must serve areas with a population of fewer than 20,000 or counties with populations of fewer than 200,000.	*	*	*	*	Rolling application period	https://www.env.nm.gov/construction-programs/rural-infrastructure-program/
New Mexico Finance Authority: *Colonias Infrastructure Fund*	Helps certain communities in southern New Mexico that lack basic infrastructure for water and wastewater, solid waste disposal, flood and drainage control, roads and housing.	☐ State government ■ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range from $50,000 - $2,500,000	90% Grant	10% Loan			Limited to communities in southern New Mexico.		*			Annual release Most recent deadline: 03-Mar-21	https://www.nmfinance.com/colonias/
New Mexico Finance Authority: *Drinking Water State Revolving Loan Fund (DWSRLF)*	Provides low-cost financing for the construction of and improvements to drinking water facilities throughout New Mexico to protect drinking water quality and the public health.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loans of up to 30 years at fixed, below-market rates; ranges not specified.		Loan			Loans are limited to local government entities.	*	*	*	*	Rolling application period	https://www.nmfinance.com/water-project-fund/drinking-water-state-revolving-loan-fund/

New Mexico Finance Authority: *Local Government Planning Fund*	Provides the capital necessary for proper planning of vital public projects, including infrastructure, water and wastewater preliminary engineering reports, long-term master plans, water conservation plans, economic development plans, or energy audits.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Grants range up to $50,000 and are made on a sliding scale.	Grant				Statewide program.	*	*	*	*	Rolling application period	https://www.nmfinance.com/local-government-planning-fund/
New Mexico Finance Authority: *Public Project Revolving Fund*	Finances public projects such as road projects, water system upgrades, fire and law enforcement equipment, public buildings, healthcare facilities, electric and broadband utilities, and quality-of-life projects with both market-rate and subsidized rate loans.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ■ For-profit organizations	Loans range from $10,000 - $100,000,000+.		Loan			Borrowers may receive "disadvantaged funding" of 0 - 2% interest rates to those with Median Household Incomes that are less than the State's average.	*	*	*	*	Rolling application period	https://www.nmfinance.com/public-infrastructure-capital-financing/
New Mexico Finance Authority: *Water Project Fund*	Supports five project types: 1) Water conservation or recycling, treatment, or water reuse; 2) Flood prevention; 3) Endangered Species; 4) Water storage, conveyance, or delivery; and 5) Watershed restoration and management.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Loans range from 10% - 40%. Recent funding has ranged from $150,000 - $7,700,000. Match required, dependent on project type and scale.	Grant	Loan			Match amount is, in part, determined by the service area Median Household Income (MHI).			*	*	Most recent deadlines: Letter of Intent: 25-Aug-21; Application: 08-Oct-21	https://www.nmfinance.com/water-project-fund/
New Mexico Indian Affairs Department: *Tribal Infrastructure Fund*	Provides financial resources for infrastructure development along with providing for the planning and development of infrastructure in tribal communities to improve the quality of life and encourage economic development.	☐ State government ☐ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Planning and design projects: $30,000 - $400,000; Construction projects: $75,000 - $1.6 million.	Grant				Eligibility limited to Indian Nations, tribes, or pueblos located wholly or partially in New Mexico.	*	*			Cycle typically runs Jan to mid-April, annually	https://www.iad.state.nm.us/policy-and-legislation/programs-and-funding/tribal-infrastructure-fund/
Rural Community Assistance Corporation (RCAC): *Environmental Infrastructure Loans*	Offers Environmental Infrastructure Loans, which provide technical assistance and financing to help create, improve, or expand the supply of safe drinking water, waste disposal systems and other facilities.	☐ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Environmental loans range up to $50,000.		Loan / Loan Guarantee			Serves rural areas with a population of 50,000 or less. Community size is limited to 10,000 for long-term USDA guaranteed loans and short-term loans for which USDA is the long-term lender. The Median Household Income (MHI) of the system's service area must be less than the County or State MHI, whichever is greater.	*	*	*	*	Rolling application period	https://www.rcac.org/

U.S. Department of Agriculture, Rural Utilities Service: *Community Facilities Direct Loan & Grant Program*	Offers financial support to develop essential community facilities in rural areas, including funds for e-connectivity. An example of recent support is a project resurfacing streets, streetscape, rehabilitation of water, sewer, stormwater systems, and relocating electric and telecommunications underground.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards: Grants: $30,000,000 available; average: $39,000. Loans: $2,500,000 available: average: $1,774,639; Guaranteed Loans: $500,000,000 available; average: $2,891,112.	Grant	Loan / Loan Guarantee			Rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
U.S. Department of Agriculture, Rural Utilities Service: *Emergency Community Water Assistance Grants in New Mexico*	Helps communities prepare for, or recover from, an emergency that threatens the availability of safe, reliable drinking water. Funds may be used for water transmission line grants or water source grants.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Water transmission line grants: up to $150,000; Water source grants: up to $1,000,000.	Grant				Areas must have a median household income (MHI) less than the state's MHI for non-metropolitan areas, and qualify as rural areas with populations of 10,000 or less; Tribal lands in rural areas; or Colonias.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/emergency-community-water-assistance-grants/nm?pid=
U.S. Department of Agriculture, Rural Utilities Service: *OneRD Guarantee Loan Initiative - Community Facilities Guaranteed Loan Program*	Helps develop essential community facilities in rural areas, which may include telecommunications end-user equipment, water infrastructure facilities, or purchase and installation of renewable energy systems.	Lenders and other non-regulated lending institutions that are approved may apply. Eligible borrowers may include: ☐ State government ■ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	A total of $500,000,000 was available in 2021; Loans approved in 2021 will receive an 80% guarantee. The maximum amount of a guaranteed loan is $100 million, including guaranteed and unguaranteed portions.		Loan Guarantee			Limited to rural areas with populations of 50,000 or less. The lender may be located anywhere in the U.S.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/onerdguarantee
U.S. Department of Agriculture, Rural Utilities Service: *OneRD Guarantee Loan Initiative - Water & Waste Disposal Loan Guarantees*	Provides financing to improve access to clean, reliable water and waste disposal systems in rural areas, including to construct or improve facilities for drinking water, sanitary sewers, solid waste disposal, and storm water disposal facilities.	Lenders and other non-regulated lending institutions that are approved may apply. Eligible borrowers may include: ☐ State government ■ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	A total of $500,000,000 was available in 2021; Loans approved in 2021 will receive an 80% guarantee.		Loan Guarantee			Limited to rural areas with populations of 50,000 or less. The lender may be located anywhere in the U.S.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/onerdguarantee

U.S. Department of Agriculture, Rural Utilities Service: *Revolving Loan Fund for Financing Water and Wastewater Projects (Revolving Fund Program)*	The Revolving Fund Program helps nonprofits create revolving loan funds that can provide financing to extend and improve water and waste disposal systems in rural areas. Grant funds may be used to create a revolving loan fund for eligible utility districts operated by: State and local governmental entities and nonprofits. The revolving loan fund may be used for: * Pre-development costs for water and wastewater treatment projects. * Short-term small capital improvement projects that are not part of the regular operations and maintenance.	☐ State government ☐ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Maximum loan per borrower is $200,000 with a 10-year maximum term. Eligible entities are towns below 10,000 people, tribal lands in rural areas, and colonies. Match: 20%		Loan			Eligibility limited to nonprofits that have: * Legal authority to operate a revolving loan fund. * Financial, technical, and managerial capacity to comply with relevant state/federal laws and regulations. * A proven record of successfully operating a revolving fund to rural areas.		*			Generally opens in the summer	https://www.rd.usda.gov/programs-services/revolving-funds-for-financing-water-and-wastewater-projects
U.S. Department of Agriculture, Rural Utilities Service: *Special Evaluation Assistance for Rural Communities and Households (SEARCH) in New Mexico*	Helps very small, financially distressed rural communities with predevelopment feasibility studies, design and technical assistance on proposed water and waste disposal projects.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range up to $30,000.	Grant				Supports rural areas with a population of 2,500 or less, and that a median household income below the poverty line or less than 80% of the statewide non-metropolitan median household income.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/search-special-evaluation-assistance-rural-communities-and-households/nm?pid=
U.S. Department of Agriculture, Rural Utilities Service: *Water & Waste Disposal Loan & Grant Program*	Provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Loans average $2,354,392; Grants average $1,284,000; Guaranteed loans average $1,415,325.	Grant	Loan / Loan Guar.			Areas that may be served include: * Rural areas and towns with populations of 10,000 or fewer -- check eligible addresses * Tribal lands in rural areas * Colonias	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program
U.S. Department of Agriculture, Rural Utilities Service: *Water & Waste Disposal Predevelopment Planning Grants in New Mexico*	Assists low-income communities with initial planning and development of applications for USDA Rural Development Water and Waste Disposal direct loan/grant and loan guarantee programs.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations+	Up $30,000 or 75% of the predevelopment planning costs. Match: At least 25%.	Grant				Eligible areas have median household income below poverty or <80% of the statewide non-metropolitan median household income and are rural areas with populations ≤ 10,000, Federally recognized tribal lands, or Colonias.	*	*	*	*	Rolling application period	https://www.rd.usda.gov/programs-services/water-waste-disposal-predevelopment-planning-grants/nm?pid=

U.S. Department of Commerce, Economic Development Administration: *Economic Adjustment Assistance Program*	Grants support communities, including water and sewer system improvements and telecommunications infrastructure (e.g., broadband).	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations ■ Inst. of Higher Education	Awards range from $500,000 - $5,000,000. Project periods range from 12 - 48 months. Match: Awards expected to fund at least 80%, and up to 100%, of costs.	Grant						*			Deadline: 15-Mar-22 Applications are accepted on a rolling basis, and funds may be expended prior to the deadline.	https://eda.gov/arpa/economic-adjustment-assistance/
U.S. Department of Homeland Security: *Building Resilient Infrastructure and Communities (BRIC)*	Funding supports hazard mitigation activities, priorities include to incentivize natural hazard risk reduction activities that mitigate risk to public infrastructure; mitigate risk to community lifelines (e.g., water, energy, communications infrastructure); and increase adoption of the latest building codes.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	$1,000,000,000 is available to make awards that range from $1,000,000 - $50,000,000.	Grant				Local governments must submit subapplications to their state applicant agency. Applicants/subapplicants must have a FEMA-approved Hazard Mitigation Plan by the deadline to apply or at the time of obligation of grant funds for mitigation projects and capacity building activities.	*				Deadline: 28-Jan-22 Released annually; typically due early winter	https://www.grants.gov/web/grants/view-opportunity.html?oppId=335226
U.S. Department of Housing and Urban Development: *Indian Community Development Block Grant Program*	Provides eligible grantees with direct grants for use in developing Indian and Alaska Native Communities, including decent housing, a suitable living environment, and economic opportunities, primarily for low and moderate income persons. Community Facilities funding includes infrastructure projects.	☐ State government ☐ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range from $500,000-$4,000,000. While matching funds are not required, applications are awarded points if there is committed leverage on the project.	Grant				There are two categories of funding: Single Purpose Grants, which are competitive, and Imminent Threat program, a $4 million allocation of first-come first-served grants.				*	Most recent deadline: 25-Oct-21	https://www.hud.gov/program_offices/public_indian_housing/ih/grants/icdbg
U.S. Department of the Interior, Bureau of Reclamation: *WaterSMART Grants: Drought Contingency Planning Grants*	Grants support entities to leverage their money and resources by cost sharing drought contingency planning to build resilience to drought in advance of a crisis.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range up to $200,000 over a two-year period. Match: 50%	Grant				Applicants must be located in a western U.S. state or territory.				*	Most recent deadline: 06-Jan-21 Typically released annually (anticipated in winter of 2022).	https://www.grants.gov/web/grants/view-opportunity.html?oppId=322320
U.S. Department of the Interior, Bureau of Reclamation: *WaterSMART Grants: Drought Resiliency Projects*	Supports projects that build long-term resilience to drought and reduce the need for emergency response actions.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Award options: * Group I: Up to $500,000 over two years. * Group II: Up to $2,000,000 over three years.	Grant				Applicants must be located in a western U.S. state or territory.				*	Most recent deadline: 05-Oct-21 Typically released annually	https://www.grants.gov/web/grants/view-opportunity.html?oppId=335035

U.S. Department of the Interior, Bureau of Reclamation: *WaterSMART Grants: Small-Scale Water Efficiency Projects (SWEP)*	Supports small-scale water efficiency projects that conserve and use water more efficiently, mitigate conflict risk in areas at a high risk of future water conflict, and accomplish other benefits that contribute to water supply reliability.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Awards range up to $75,000 over a two-year period. Match: 50%	Grant				Applicants must be located in a western U.S. state or territory.		*			Most recent deadline: 18-Mar-21 Annual release (anticipated in spring of 2022)	https://www.grants.gov/web/grants/view-opportunity.html?oppId=331224
U.S. Department of the Interior, Bureau of Reclamation: *WaterSMART Grants: Water and Energy Efficiency Grants*	For projects that seek to conserve and use water efficiently; increase renewable energy production; mitigate conflict risk in areas at risk of water conflict; enable farmers to make improvements, including those eligible for Natural Resources Conservation Service funding; and other benefits that contribute to sustainability in the western United States.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Awards range up to $500,000 for Funding Group I; $2,000,000 for Funding Group II. Match: 50%	Grant				Applicants must be located in a western U.S. state or territory.			*	*	Most recent deadline: 3-Nov-21 Annual release	https://www.grants.gov/web/grants/view-opportunity.html?oppId=327729
U.S. Environmental Protection Agency: *Alternative Source Water Pilot Program*	A new program funded by the Infrastructure Investment and Jobs Act to pilot projects that seek to better use existing water supplies.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Award details TBD. Full allocation is $125 million over five years.	Grant				Applicant and award distribution details are to be determined.	TBD	TBD	TBD	TBD	Deadline is to-be-determined.	Monitor the EPA website, no release to-date.
U.S. Environmental Protection Agency: *Sewer Overflow and Stormwater Reuse Municipal Grants Program*	The Sewer Overflow and Stormwater Reuse Municipal Grants Program was established in 2021. EPA will distribute program funds through a formula to states to provide grants to manage combined sewer overflows, sanitary sewer overflows, and stormwater flows.	■ State government ☐ Local government ☐ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	States may apply up to four percent of their allotment towards their administrative expenses. Award details TBD.	Grant				New formula funding program for states. No background found regarding how New Mexico will distribute this funding.	TBD	TBD	TBD	TBD	Distribution schedule remains to-be-determined	https://www.epa.gov/cwsrf/sewer-overflow-and-stormwater-reuse-municipal-grants-program
U.S. Environmental Protection Agency: *Wastewater Energy Efficiency Grant Pilot*	To help pilot approaches to moving from water treatment to water resource management, while saving energy.	■ State government ■ Local government ■ Tribal government ■ Tribal agencies ☐ Utilities companies ■ Nonprofit organizations ☐ For-profit organizations	Award details TBD. Full allocation is $125 million over five years.	Grant				Applicant and award distribution details are to be determined.	TBD	TBD	TBD	TBD	Deadline is to-be-determined.	Monitor the EPA website, no release to-date.

U.S. Environmental Protection Agency: *Water Infrastructure Finance and Innovation Act (WIFIA)*	Provides long-term, low-cost supplemental loans for regionally and nationally significant water and wastewater infrastructure projects that are creditworthy and have a dedicated source of revenue.	■ State government ■ Local government ■ Tribal government ☐ Tribal agencies ■ Utilities companies ☐ Nonprofit organizations ■ For-profit organizations	Award: Large communities: $20 million minimum; Small communities (population 25,000 or less): $5 million minimum. Up to 49% of costs are funded.		Loan			Projects must be of regional or national significance.			*		Most recent LOI deadline: 23-Jul-21 Released annually	https://www.epa.gov/wifia
U.S. Environmental Protection Agency: *Water Infrastructure Improvements for the Nation (WIIN) Act: Assistance for Small and Disadvantaged Communities Drinking Water Grant*	The objective is to support drinking water projects and activities in underserved, small and disadvantaged communities that are unable to finance projects to comply with drinking water regulations under the Safe Drinking Water Act. Funding also provides assistance to communities to manage drinking water concerns through household water quality testing.	■ State government ☐ Local government ■ Tribal government ☐ Tribal agencies ☐ Utilities companies ☐ Nonprofit organizations ☐ For-profit organizations	Award: Most recent New Mexico allotment was $386,000. An additional $2.6 million was reserved for American Indian and Alaska Native communities.	Grant				The grant program is noncompetitive.		*			No indication yet how funding is to be spent. Projects can include infrastructure; capacity building; and activities needed to respond to a contaminant.	https://www.epa.gov/dwcapacity/wiin-grant-assistance-small-and-disadvantaged-communities-drinking-water-grant

REDUCING COSTS TO CONSUMERS

EXISTING PROGRAMS

It is one thing to bring new infrastructure to a community, it is another to ensure that residents can afford to access it. At the state level, consumer affordability programs are less common because of the anti-donation clause. This policy limits the flexibility and the resources New Mexico has to directly offset the cost of critical services for low-income residents. However, federal programs exist that can help reduce costs to consumers for broadband, electric, and gas, as well as weatherization assistance to support reducing overall energy costs. These are outlined in the table at the end of this section.

The 2021 Infrastructure Bill is expected to help with consumer affordability in important ways. First, it will upgrade and improve utilities services as well as provide resources to connect new customers. Second, it extends and expands important affordability programs. The Affordability Connectivity Benefit is expected to bring down the cost of internet for many New Mexicans. This benefit is adapted from the Emergency Broadband Benefit Program (EBBP) that was established in 2020 in response to the COVID-19 pandemic. However, while the EBBP was created as temporary relief, the Affordability Connectivity Benefit is envisioned to be permanent. The consumer cost reduction under the new program is $30 per month, $20 less than under the EBBP. However, eligibility has been expanded to homes up to 200% of the federal poverty level. Home on tribal lands will continue to receive a benefit of up to $75 per month. With the expanded eligibility**, it is estimated that 785,000 people, or around 38% of New Mexico's population, will be eligible for the Affordability Connectivity Benefit.**

The Infrastructure Bill allocates **$3.5 billion to the national Weatherization Assistance Program, which is expected to benefit 700,000 households nationally**. While perhaps not the first thing that individuals think about when looking to save money on their bills, a retrofitted and weatherized home is more comfortable and saves money each month. According to the U.S. Department of Energy, weatherization produces an **average annual savings of $283 per household**. The EPA has found that every $1 invested in weatherization assistance produces $2.78 in non-energy benefits, including improved health and safety.[107] An estimated 20% of greenhouse gas emissions come from residential homes, meaning the home plays an important role in overall greenhouse gas reduction.[108] Weatherization can help the State reduce overall energy draws, supporting electrical grid stability through reducing usage spikes in hot and cold periods, and helping the State with sustainability goals.

CONSUMER AFFORDABILITY RECOMMENDATIONS

Because most consumer benefits do not have automatic enrollment, the State should seek to educate consumers on benefits and how to sign up. To simplify enrolling consumers across the full range of infrastructure-related benefits, we recommend establishing a process of screening and co-enrolling eligible individuals when they sign up for other federal benefits, such as SNAP or WIOA. This approach is common in many states. Additionally, schools, colleges, libraries, and community centers can be resource centers to help individuals and families enroll in benefits.

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[107] "Weatherization Program Fact Sheet," U.S. Department of Energy, 2019, https://www.energy.gov/sites/prod/files/2019/07/f64/WAP-Fact-Sheet-2019.pdf.
[108] Goldstein, Benjamin, et al, "The carbon footprint of household energy use in the United States," Proceedings of the National Academy of Sciences of the United States of America, August 11, 2020, https://www.pnas.org/content/117/32/19122.

CONSUMER SUBSIDIES PROGRAMS

Funding Agency	Program Purpose	Eligible Applicants	Funding Details	Limitations	Deadline / Cycle History	Link
Broadband						
Federal Communications Commission: *Emergency Broadband Benefit Program (Soon to be the Affordability Connectivity Benefit)*	The Emergency Broadband Benefit Program provides support for broadband services and certain devices to help low-income households stay connected during the COVID-19 pandemic. Eligible low-income households may receive a discount off the cost of broadband service and certain connected devices, and participating providers can receive a reimbursement for such discounts. *The new Affordability Connectivity Benefit will replace this program, but sign-up details are not yet available*.	Limited to eligible households and participating providers. *Under the Affordability Connectivity Benefit, eligible households will be up to 200% of poverty or households on tribal land.*	A discount of up to $50 per month towards service for eligible households, up to $75 per month for households on qualifying Tribal lands, and up to $100 off for a laptop, tablet, or desktop computer. *The Affordability Connectivity Benefit will be $30 per month; tribal benefits will not change*.	For low-income households only.	Rolling application period, until the fund runs out of money or six months after the end of the COVID-19 health emergency. *Enrollment is still open for the EBBP until the Affordability Connectivity Benefit is launched.*	https://www.fcc.gov/emergency-broadband-benefit-program

Federal Communications Commission: *E-Rate Program*	The schools and libraries universal service support (E-Rate) program helps schools and libraries to obtain affordable broadband. Funding may be requested under two categories: 1) Services to a school or library, and 2) Services that deliver Internet access within schools and libraries (internal connections, basic maintenance of internal connections, and managed internal broadband services).	Eligibility limited to public or private schools (K-12), libraries, and groups of schools and libraries (e.g., consortia, districts, systems).	Discounts range from 20 to 90 percent of the costs of eligible services.	Discounts depend on the level of poverty and whether the school or library is located in an urban or rural area.	Most recent deadline: 25-March-21. Monitor for opening in early 2022.	https://www.usac.org/e-rate/
Federal Communications Commission: *High Cost Program*	Offers 11 funds to provide support to build out infrastructure or provide service to communities that currently receive little or no communication services.	Utility companies	TBD; Typically determined via an auction / bidding process.	Dependent on fund, but typically services disadvantaged, low-income areas.	See website for relevant deadlines.	https://www.usac.org/high-cost/
Federal Communications Commission: *Lifeline*	Provides a discount on phone and broadband service for qualifying low-income households to ensure that all Americans have the benefits of those services, including being able to connect to jobs, family, and emergency services.	The program serves individuals who: 1) Have an income of ≤135% of federal poverty guidelines; 2) Use SNAP or Medicaid; 3) Qualify through a dependent; 4) Live on tribal lands.	Up to $9.25 per month per consumer served.		Rolling application period	https://www.usac.org/lifeline/
Electric						
U.S. Department of Agriculture, Rural Utilities Service: *Energy Efficiency and Conservation Loan Program (EECLP)*	Loans to finance energy efficiency and conservation projects for commercial, industrial, and residential consumers.	Eligible entities include: State government, Local government, Tribal government, Tribal agencies, Utilities companies, Nonprofit organizations, and For-profit organizations	Past awards have ranged from $4,000,000 - $46,000,000.	Limited to rural areas. Check with the NM General Field Representative to confirm eligibility.	Rolling application period	https://www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program

U.S. Department of Agriculture Rural Utilities Service: *Energy Resource Conservation*	The Energy Resource Conservation (ERC) Program enables current Rural Utilities Service (RUS) borrowers to make funds available to their consumers for energy conservation and renewable energy projects by deferring payment of principal and interest.	Eligibility is limited to existing Rural Utility Service borrowers with direct loans. Loans must not be Federal Financing Bank loan guarantees.	Ranges, depending on the specific program.	Have Water and Environmental, Electrical, and Telecommunicat-ions programs.	Check the specific program website for current deadlines.	https://www.rd.usda.gov/programs-services/energy-resource-conservation
U.S. Department of Agriculture, Rural Utilities Service: *High Energy Cost Grant Program*	Provides assistance for energy facilities, including renewable energy systems and energy efficiency improvements, serving extremely high energy cost communities.	Eligible entities include: State government, local government, tribal government, tribal agencies, utilities companies, nonprofit organizations, and for-profit organizations	Awards range from $100,000 - $3,000,000.	Eligible areas must qualify as extremely high-cost energy communities, meeting one or more of the following: 1) Extremely high average annual household expenditure for home energy, and 2) Extremely high average per unit energy costs.	Most recent deadline: 06-Jul-21. Annual release during spring / summer in recent years.	https://www.rd.usda.gov/programs-services/high-energy-cost-grants
U.S. Department of Agriculture, Rural Utilities Service: *Rural Energy Savings Program (RESP)*	Loans support entities who provide energy efficiency services in rural areas to help consumers implement cost effective, energy efficiency measures.	Eligible entities include: State government, local government, tribal government, tribal agencies, utilities companies, nonprofit organizations, and for-profit organizations	Awards range from $200,000 - $13,000,000 and average $3,034,147.	Limited to rural areas. Contact the program officer to confirm eligibility.	Rolling application period. Applications accepted on a first come first serve basis until funding is no longer available.	https://www.rd.usda.gov/programs-services/rural-energy-savings-program

U.S. Department of Agriculture, Rural Utilities Service: *Rural Energy for America Program (REAP) Energy Audit & Renewable Energy Development Assistance*	Grants or loan guarantees assist rural small businesses and agricultural producers by conducting and promoting energy audits and providing renewable energy development assistance.	Eligible entities are state government, local government, tribal government, and utilities companies.	The maximum aggregate amount of an energy audit and REDA grant in a federal fiscal year is $100,000.	Eligible small businesses must be located in rural areas.	Deadline: 31-Jan-22 Applications accepted throughout the year.	https://www.rd.usda.gov/onerdguarantee
U.S. Department of Agriculture, Rural Utilities Service: *Rural Energy for America Program (REAP) Renewable Energy Systems & Energy Efficiency Improvement*	This program awards guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements. Agricultural producers may also apply for new energy efficient equipment and new system loans for agricultural production and processing.	Eligibility: 1) Agricultural producers with at least 50% of their gross income coming from agricultural operations (producers may be in rural or non-rural areas), and 2) Small businesses in eligible rural areas.	Separate programs for grants and loans/grants of $20,000 or less, and unrestricted loans/grants.	Awards grants and loans to agriculture producers and small businesses.	Deadlines: 1-Nov-21 or 31-March-22 for the small loans/grants program; and 31-March-22 for the unrestricted program.	https://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency

U.S. Department of Energy: *Weatherization Assistance Program*	Through weatherization improvements and upgrades, the program reduces energy costs by increasing the energy efficiency of homes. The program provides weatherization services to 35,000 homes every year using DOE funds. *The Infrastructure Bill has allocated an additional $3.5 billion to serve 700,000 households.*	Eligible entities include: Households at or below 200% of the poverty income guidelines, or if they receive SSI or TANF. Priority is given to persons over 60 years of age, persons with disabilities, families with children, and high energy using homes.	An assessment that includes an energy audit will determine what weatherization services will be done in the home. Annual average savings of $210-$250 on utility expenses per home.	Contact your state administrator here: https://housingnm.org/home-repair-and-energy-efficiency/energy mart-weatherization-assistance/apply.	Run in New Mexico through the Mortgage Finance Authority Energy$mart program. Applications are accepted on a rolling basis.	https://www.energy.gov/eere/wap/weatherization-assistance-program
U.S. Department of Health and Human Services: *Low-Income Home Energy Assistance Program (LIHEAP)*	The Low-Income Home Energy Assistance Program (LIHEAP) helps keep families safe and healthy through initiatives that assist families with energy costs.	Eligibility is limited to people or families who participate in certain other benefit programs, such as SNAP, SSI, TANF, and families who meet certain income thresholds.	The average benefit is $116 per year.		Apply for benefits here: https://www.yes.state.nm.us/yesnm/home/index. Applications are accepted between 1-April and 30-Aug.	https://www.acf.hhs.gov/ocs/low-income-home-energy-assistance-program-liheap
Water						
U.S. Department of Agriculture: *Rural Decentralized Water System Grant Program*	This program helps LMI individuals to finance the costs of water wells and individually-owned decentralized wastewater systems that they own or will own. Grant funds are to establish and maintain a revolving fund for loans and sub-grants to individuals for water well systems and/or wastewater systems. Households may use the loan and/or sub-grant funds to construct, refurbish, rehabilitate, or replace systems up to the point of entry to a home.	Eligibility is limited to private, nonprofit organizations	No grant minimums or maximums stated. Funds can be loaned or subgranted out, not to exceed $15,000 per transaction.	Program will provide water system infrastructure support to individual homeowners in rural towns of under 50,000 people.	Most recent deadline: 19-July-21	https://www.grants.gov/web/grants/view-opportunity.html?oppId=334025

3. RECOMMENDATIONS AND ACTION STEPS

INTRODUCTION

There are many steps that the State can take to build a system that more efficiently allows communities to plan, fund, and develop high-impact infrastructure projects that serve New Mexicans. Below is a summation of recommendations and action steps. These are derived from recommendations and best practices from published research, experts, and interviews with stakeholders on what is and is not working well. There are no "right" answers when it comes to closing the state's infrastructure gaps, merely strategies that show promise of being effective.

Because the topic of infrastructure is so wide-ranging and relates to many additional areas, including housing, workforce development, education, and licensing, these recommendations are by no means a comprehensive list of all the actions that can or should be taken over time. It does, however, represent options New Mexico can take to improve systems and processes, while better positioning the State and communities to compete for and successfully deploy funding.

Current recommendations can be grouped around three major themes: **1) Add capacity and streamline systems; 2) Set state plans and priorities; and 3) Improve data**.

These break into eight action areas, as follows, with relevant infrastructure areas detailed in the table that follows.

1. Develop state-level funding priorities for infrastructure to guide funding decisions.
2. Improve data collection and publicly report these datasets.
3. Improve planning tools and processes.
4. Implement technical assistance resources at the regional and state levels.
5. Refine state infrastructure funding approaches.
6. Reduce gaps, overlaps, and complication in state funding mechanisms.
7. Put into action a system of regionalization/consolidation strategies.
8. Focus financial resources where they are in the best position to do good; periodically evaluate the cost/benefit of service to high-cost areas as technologies improve.

In the table that follows, we have also made note of the recommended timeline for each step and organized the table according to urgency. Please note that the recommendations below align with scholarship already published, including the State's Broadband Strategic Plan, state and regional water studies, Legislative Finance committee research on state-funded water projects, and dozens of interviews with local, state, and national stakeholders on their recommendations and best practices. The below recommendations do not include specific budget or staffing numbers, which would require a deep dive into specific State departments that was outside the scope of work and not feasible within the time constraints of the study.

RECOMMENDED STRATEGIES

Action/Recommendation	Departments Responsible*	Timeframe[109]	Infrastructure Type(s) Affected
Action 1: Develop state-level funding priorities for infrastructure to guide funding decisions			
Rec 1.1: Encourage better coordination across agencies on infrastructure. Create a strategy team inclusive of infrastructure-related agencies and other stakeholders to promote strategic infrastructure conversations. *A model to follow is Montana's Wastewater and Solid Waste Action Coordinating Team (W2ASACT), which is a group of professionals from state, federal, and non-profit organizations that help to finance, regulate, and provide technical assistance for community water and wastewater systems. They meet multiple times per year to review existing systems, make recommendations on how to streamline them, and to identify unnecessary duplication of requirements that make compliance difficult for communities.*	Governor's Office, Legislature, utilities, water systems, communities	Short-term	
Rec 1.2: Articulate state strategic infrastructure priorities to help guide local project prioritization and decision-making. For instance, *the State of Kentucky has established the following general priorities: 1) Education, 2) Water, and 3) Internet. In Colorado, project prioritization criteria are also general: 1) Immediate, 2) Enduring, and 3) Equitable.* Priorities should be reassessed every 4-5 years to ensure that they are still New Mexico's top needs. Look to the NMDOT's Statewide Transportation Improvement Program and MTPO/RTPO prioritization processes as models for how to design an effective system.	Governor's Office, Legislature	Short-term	
Action 2: Improve data collection and reporting, particularly for broadband and electric			
Rec 2.1: To supplement sometimes unreliable or exaggerated federal broadband data*, the State should follow Georgia's lead and design a state-level broadband data collection system and maps.* Current data are not accurate as to households served, number of providers in a given area, and internet speeds.	DoIT, Broadband Office, local communities	Ongoing, pursuant to implementation of HB 10; SB 93; & SB 144 from 2021	
Rec. 2.2: The PRC should adjust its data collection requirements from electrical providers to make data more broadly useful. Data should be collected on type of customer served (e.g., household, business, public building, agricultural equipment, oil and gas equipment, etc.) to the census tract level. These datasets should be publicly available. Without more granular data, knowledge is limited as to where the electrical grid is not serving households and businesses because available data are not sufficiently granular.	Governor's Office, Legislature, PRC	Mid-term	

[109] Short-term: 0-2 years; Mid-term: 2-5 years; Long-term: over 5 years.

Rec. 2.3: The 16 water planning regions, working with the Water Management Oversight Director and other relevant agencies, should develop their new 40-year water plan– to understand baseline data, water supply and quality changes, and forecasted needs. This supports ongoing work and aligns with the State Engineers Office requirement to develop a 50-year water plan.	Governor's Office, ENV, OSE	Un-implemented pursuant to 72-1-9 NMSA 1978	
Action 3: Improve planning tools and processes			
Rec. 3.1: To qualify for federal broadband funding allocated via the 2021 Infrastructure Bill, the State must create a 5-year broadband action plan per a federal funding pre-requisite. Specific criteria have not yet been released. However, this plan can be adapted from the state's 2020 Broadband Strategic Plan to align with emerging federal requirements.	DoIT, Broadband Office	Short-term, pending federal guidance	
Rec. 3.2: In interviews, a general lack of planning and civil engineering services were repeatedly cited as holding up projects. Two options have been identified to address this issue: 1) Offer engineering services via state-level on-call contracts with planning and engineering firms to support infrastructure work. These contracts would have a set scope in alignment with typical federal and state requirements, and would preserve communities from having to determine scopes of work and pricing themselves. In turn, engineering and planning firms would be guaranteed a certain level of work each year. Alternatively / in addition to, 2) Make state staff and engineers available to help communities as available on engineering plans. State staff would be lower cost than engineering firms.	Governor's Office, Legislature	Mid-term	
Action 4. Implement technical assistance resources at the regional and state levels			
Rec. 4.1: Fund an infrastructure specialist or technical support specialist at each of the COGs to support technical assistance, regional project planning, and project financing strategies.	Legislature	Short-term	
Rec. 4.2: Complete staffing and implementation of the Office of Broadband Access and Expansion, Connect New Mexico Fund, and Connect New Mexico Council to more fully support technical assistance, needs analysis, project planning and design	Governor's Office, Legislature, DoIT	Short-term	
Rec. 4.3: Build community-level capacity for long-term self-sufficiency. Interviews identified a need for management training for small entities so they do not fall into poor project management, negative audit findings, or other outcomes that jeopardize future financing eligibility. Action options include either to set aside a small portion (suggested 0.5% to 1%) of Severance Tax Bond (STB) revenues for a regularized program of project/program management training or a small percentage of each STB funding award should be dedicated towards this purpose.	Governor's Office, Legislature, DFA	Mid-term	
Rec. 4.4: Work with department heads, and/or conduct an organizational and mapping study to determine appropriate staffing levels at State departments critical to infrastructure. In interviews, numerous state staff reported having more work than they can accomplish. A common refrain among staff– including at the Environment Department, Indian Affairs	Governor's Office, Legislature, ENV, DFA, BIA	Mid-term	

Department, and Department of Finance and Administration, among others, is that caseloads exceed the level where they can both proactively support communities and also conduct the monitoring and compliance required by the State and the federal governments.			
Rec 4.5: Consider an Office of Infrastructure and Planning to centralize resource navigation at the state level. This office would coordinate data collection efforts, infrastructure studies, provide general technical assistance, and direct communities and other applicants to relevant agencies to support their projects. It would also assist in grant writing– a process that many interview subjects reported is overwhelming. *Many other states, including Arizona and Colorado, have a far simpler and more centralized process for seeking support on infrastructure projects and have more success funding rural projects.*	Governor's Office, Legislature	Long-term	
Action 5. Refine state infrastructure funding approaches			
Rec 5.1: Support ongoing efforts to revise the anti-donation clause in the New Mexico Constitution. This clause is widely cited as having a chilling effect on infrastructure projects, particularly in the broadband and electrical sectors due to its prohibition on allowing state funds to benefit private companies. Further, it has limited state-driven consumer cost support assistance or similar programs that increase affordability. *Consider an approach similar to Colorado, which allows for project-based suspension of the anti-donation clause if the project is determined by the legislature to be in the service of the public good.*[110]	Governor's Office, Legislature	Short-term	
Rec. 5.2: Consider changes to the use of severance tax bond (STB) revenue, which funds Capital Outlay, to ensure these dollars fully finance projects and that essential needs are prioritized. Some suggestions on how to do this are below: i. Dedicate a portion of STB revenue to rural projects that have no other significant source of funding. Suggested proportion is 60%, but this can be determined by the legislature. ii. Treat STB as the final project funding source, not the first. Applicants must demonstrate that other required funds have been pursued and are either secured or are reasonably guaranteed. In alignment with 5.2.i., smaller communities can demonstrate a lack of ability to qualify for other funds in order to receive STB at a high level. iii. Utilize state-level priorities, in alignment with recommendation 1.2, to guide decision making on which projects receive STB funding at a high level. Priorities can be as general as 1) Education, 2) Water, and 4) Broadband.	Governor's Office, Legislature, DFA, IAD	Long-term	

[110] This separate treatment of the anti-donation clause in Colorado emerged from a 1955 Colorado Supreme Court decision in McNichols v. Denver. The court found that the Colorado anti-donation clause in the state constitution only meant that public funds had to be spent for a public purpose. Given the similarity of wording between the state's constitutions, this approach could theoretically be taken by the New Mexico Supreme Court. Alan Hall, et al, "Understanding the Anti-donation Clause: A Historical Perspective," Rodey Law, May 23, 2014.

iv. Consider carving out a portion of STB funds for broad planning and design work, 2% suggested. This aligns with a request from many interview subjects for more, flexible, planning resources. v. Make each community eligible to receive STB funds on only one or two projects each cycle, reducing the overall number of projects, but ensuring that more projects selected are funded at a higher level.			
Action 6. Reduce gaps, overlaps, and complication in funding			
Rec. 6.1: Utilize the New Mexico FUNDIT model for infrastructure project review and decision-making. FUNDIT is managed by the State Economic Development Department and is not in itself a grant program. Rather, it is a platform that facilitates links between projects and funding agencies and leverages financing opportunities.to ensure that projects are fully financed. As currently designed, FUNDIT connects projects to financing opportunities from over 20 different state and federal entities in a single meeting. *This coordinated approach supports efficiencies in securing resources for projects and may move funders toward better alignment over time through meeting and considering projects together.*	NMEDD, ENV, NMFA, DoIT, IAD, DFA	Mid-term	
Rec. 6.2: Create a state-level match pool to help local projects meet federal match/cost share requirements. Cash match would be repaid by grantees over time so that the fund remains solvent. Interview subjects cited that state and federal match requirements are one of the primary hurdles to securing project funding. These funds should be allocated based on demonstrated need and project urgency in cases where there is excess demand.	Governor's Office, Legislature	Mid-term	
Rec. 6.3: Establish a preferential state funding designation for frontier communities so they are not competing with larger communities for infrastructure project financing. *Montana has done this for deployment of broadband funds so that the most rural and remote communities do not have to compete directly with better-resourced cities and towns*.	Governor's Office, Legislature	Mid-term	
Rec. 6.4: In alignment with recommendation 6.1, move toward a uniform state application process for broadband, water, and wastewater project financing. A common application would be used by relevant state departments when determining priority projects. Depending on specific programs, the relevant department may request additional information from finalists. *Arizona, Georgia, and Montana all have common applications.*	NMEDD, ENV, NMFA, DoIT, DIA, DFA	Long-term	
Action 7. Put into action a system of regionalization/consolidation strategies			
Rec. 7.1: Establish criteria for community water system regionalization and more strongly emphasize system regionalization. The default position of the State should be that regionalization in some form (physical consolidation to shared operations) is feasible until proven otherwise. If a system chooses to not regionalize, they should have to meet the following (or similar) criteria: 1) There is no water system nearby and the existing water source(s) are both sufficient for current needs and forecasted to meet future needs; 2)	Legislature, ENV, OSE, DFA, utilities, water systems, communities	Long-term	

There is evidence that service from neighboring systems is not possible; and 3) Proof that a community water system can remain independent based on costs to maintain, affordable rates and sufficient revenue levels, and demonstration of financial, managerial, and technical abilities.			
Rec. 7.2: The State should prioritize establishing a robust middle mile network for broadband, helping to move away from town-by-town broadband initiatives to ones that are more regional and to facilitate qualification for last mile funding. Appropriate partners would include the State or political subdivisions, Tribal governments, nonprofits, regional planning counsels, Native entities, and economic development authorities, in partnership with technology companies, electric utilities and cooperatives, telecommunications companies and cooperatives.	Governor's Office, Legislature, DoIT, in partnership with a range of entities as appropriate for each region.	Long-term	
Action 8. Focus financial resources where they are in the best position to do good; periodically evaluate the cost/benefit of service to high-cost areas as technologies improve			
Rec. 8.1: To quickly close the digital access gap and support equity, continue efforts already underway to expand resources for Wi-Fi hotspots at schools, libraries, community centers and other locations to help provide reliable internet to those whose homes are not feasible to be served in the short-term. In New Mexico, these efforts currently include projects supported by *the CommUNITY Learning Network and Information Technology Disaster Resource Center, as well as projects funded by the FCC's E-Rate program*.	DoIT, Office of Broadband, utilities, communities	Short-term	
Rec. 8.2: Improve consumer awareness of federal cost subsidy programs using agencies such as workforce offices, higher education, public schools, and community centers. Utilize mechanisms for co-enrollment with other benefits, including WIOA and SNAP. The state should ensure that all residents are aware of and enroll in federal cost reduction benefits available to them– a way to improve affordability and expand access without increasing the State's costs. *These programs include the Affordability Connectivity Benefit, Lifeline, LIHEAP, and Weatherization Assistance.*	Governor's Office, Broadband Office, PRC, ENV, in coordination with communities	Short-term	
Rec. 8.3: The Office of Broadband, DoIT, PRC, and utilities companies should continue to monitor emerging technologies for broadband and electric to serve rural/remote outposts. As the below technologies become cost-feasible and reliable, more homes and communities can be served. Technologies to monitor include: *Electricity examples*, microgrids, off-grid renewable energy; *Broadband examples*, dirigible, white space, millimeter and microwave, LEO satellites. (See Broadband and Electrical sections for descriptions of emerging technologies)	DoIT, PRC, utilities	Ongoing	

** Councils of Government (COGs), Department of Finance and Administration (DFA), Department of Information and Technology (DoIT), Legislative Council Services (LCS), NM Economic Development Department (EDD), NM Environment Department (ENV), NM Finance Authority (NMFA), NM Indian Affairs Department (IAD), Office of the State Engineer (OSE), Public Regulation Commission (PRC)*

The problem of infrastructure gaps in New Mexico is not isolated and touches on a number of additional areas. While outside the immediate scope of this report, the topics below are worthy of mentioning briefly. At a future date, these each may merit additional exploration by the Rural Economic Opportunities Task Force or another entity.

Issue Area	Recommendations
Skills/Jobs mismatch between the workers the state needs for infrastructure projects and those the state has.	• Understand the training and workforce gaps. Building on increased analytical capacity that will come from a recent $2.28 million longitudinal data systems grant award, the Department of Workforce Solutions could complete a report that compares job growth projections in key sectors with data on positions that employers statewide struggle to fill. These hiring gaps could then be compared to higher education enrollments and program availability to map training needs. • Capital asset mapping. An infrastructure asset mapping exercise would have statewide benefit. It would help legislators, policy makers, and economic development entities to understand the number of engineers, planners, construction firms, etc. that work with the state and where they are located to aid in better matching and reduce service gaps. • Reduce the need for out-of-state talent. Provide supports for higher education to adapt or create new programs and outreach plans based on jobs projections and identified staffing shortages. This agrees with federal-level funding priorities to develop workforce training programs aligned to sector strategies and identified employment needs at the Department of Labor, Economic Development Administration, and others. This also aligns with work already underway at the Higher Education Department. • State recruiting efforts. Focus state recruiting efforts on engineering and other infrastructure-related businesses that have been identified as being in short supply.
Improve crisis management	• With so many small communities operating without utility system redundancy, particularly in community water systems and wastewater, the loss of a single operator can quickly spiral into a public health crisis. • Develop a true workforce training pipeline to improve system operation, add in redundancy, and reduce insecurity. Consider apprenticeships as a means of training the future workforce in underserved areas. For instance, water system apprentices could provide water and wastewater system operator redundancy and step in if the operator is sick or unavailable. This approach could generate a pipeline of new operators over the long term and reduce the severity of operations crises. • Emergency Assistance Resources. To support communities from falling backwards in an emergency, consider offering state emergency assistance (funds or personnel), available immediately, to cover situations that do not meet federal emergency assistance criteria.

Project costs and rights of way issues	• Right of way. The issue of utilities right-of-way is significant and expensive in New Mexico. Establish a Right-of-Way Commission, which brings together the following primary stakeholders: 1) Federal government, 2) State government, 3) Local government, 4) Tribal government, and 5) Private landowners to help arrive at a solution to streamline and speed up right-of-way decision-making on utilities projects. • Leasing costs. Explore establishing a cap on what landowners can charge to lease land for features like telephone poles for broadband. Interview subjects working in the electrical and telecommunications sectors reported that a single landowner, can kill a project by charging an excessively high price. • Gap financing. Create a State gap financing account, to ensure that projects can move forward even if costs go up between budget creation and project start, as we are seeing now.

Note that any recommendations in the above tables that involve additional work among State departments should include a proportional investment in staffing for the involved departments. In interviews, we heard repeatedly that staff are stretched too thin to take on additional tasks. Staff across multiple State departments indicated that they would like to be more proactive in supporting communities and building relationships, but there are no people to do so. It is important that, while initial costs can be high, that infrastructure investments tend to earn a return.

Additionally, to ensure equity, any policy that may result in a change of service should involve a strong community and staff engagement process. This involves consulting and working with communities if regionalization is their best path forward, and meeting with state department heads to determine where staffing levels are falling short and by how much.

To sum up the findings from this study, there is much work to be done, but this is an historic time with historic funding availability that can improve New Mexicans' lives for the better. As has been mentioned earlier, it is recommended that the State focus early efforts are on:

1. **Capacity:** Bring up the State and regional technical assistance capacity to a level that can meet demand;
2. **Priorities**: Looking to other states as examples, set broad priorities and criteria that can help shape and guide funding decisions to ensure that resources are allocated strategically and equitably; and
3. **Data**: Ensure that the State has mechanisms to collect accurate data for more informed decision-making and more targeted responses to needs.

We hope that the information and data contained in this report helps the State to move forward in its goals to close infrastructure gaps by 2030. We also invite other stakeholders to use the contents of this report in project planning and proposal development and to provide a general background on each of the infrastructure areas in question.

4. APPENDICES

REFERENCES

GENERAL

The Infrastructure Investment and Jobs Act, New Mexico Fact Sheet, The White House, 2021, https://www.whitehouse.gov/wp-content/uploads/2021/08/NEW-MEXICO_Infrastructure-Investment-and-Jobs-Act-State-Fact-Sheet.pdf

National Renewable Energy Laboratory, https://www.nrel.gov/.

- Has a wealth of studies, maps and other resources on renewable energy topics.

New Mexico Infrastructure Report Card, Report Card for America's Infrastructure (American Society of Civil Engineers), 2021, https://infrastructurereportcard.org/state-item/new-mexico/.

Small Business Development Center New Mexico, 2021 Small Business Infrastructure Survey, November 12, 2021.

BROADBAND AND ELECTRIC

CommUNITY Learning Network Homework Gap Team: https://www.communitylearningnetwork.org/nm-homework-gap-team.html.

- Provides hotspots and devices to homebound students and led by New Mexico Public Education Department (PED) NM Indian Affairs Department (IAD), Public Schools Facility Authority (PSFA), Department of Information Technology (DoIT), Department of Cultural Affairs (DCA) and State Library, Santa Fe Indian School (SFIS), Navajo Nation, Community Advocacy, and Community Learning Network (CLN).

Doña Ana County Internet Connectivity Survey, https://www.donaanabroadband.com/.

- A local example of communities seeking better data on internet connectivity and speed.

Information Technology Disaster Resource Center, projectConnect, https://www.itdrc.org/covid-19/projectconnect.

- Will grant emergency Wi-Fi hotspot requests for students, families, medical providers and others in rural and underserved areas, free of cost.

National Telecommunications and Information Administration (NTIA) Indicators of Broadband Need mapping tool, https://broadbandusa.maps.arcgis.com/apps/webappviewer/index.html?id=ba2dcd585f5e43cba41b7c1ebf2a43d0.

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New Mexico Department of Information Technology, State Office of Broadband, "Federal Broadband Funding Opportunities," 2020, https://www.doit.state.nm.us/broadband/reports/federal_broadband_funding_guide-202006.pdf.

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WATER

Dig Deep, Navajo Water Project, https://www.navajowaterproject.org/

- A non-profit that installs in-ground water tanks, regularly filled by a truck, to bring water to remote tribal homes. A possible model for service until infrastructure can be developed.

Environmental Working Group, New Mexico Tap Water Database, https://www.ewg.org/tapwater/state.php?stab=NM.

New Mexico Department of Health, New Mexico Environmental Public Health Tracking, https://nmtracking.org/.

- Monitors for a range of health impacts, including drinking water system contaminants

New Mexico Environment Department, Drinking Water Bureau, Assistance to Public Water Systems, https://www.env.nm.gov/drinking_water/dwb-assistance/.

New Mexico Environment, Department Drinking Water Bureau, "Capacity Development Program Triennial Report to the Governor State Fiscal Years 2018-2020," September 30, 2020, https://www.env.nm.gov/drinking_water/wp-content/uploads/sites/5/2017/08/NM-SFY-2018-2020-Cap-Dev-Triennial-Gov-Report-2020-09-30.pdf.

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New Mexico State University Water Resources Research Institute, https://nmwrri.nmsu.edu/.

Rural Community Assistance Partnership, Successfully Accessing Water Infrastructure Funding Programs (webinar), https://vimeo.com/552417126.

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Southwest Environmental Finance Center, Tribal Drinking Water Program: https://swefc.unm.edu/home/tribal-program/.

- Customized tools and trainings to help Tribal water systems

Southwest Environmental Finance Center, UNM Water Resources Grand Challenge, https://swefc.unm.edu/home/unm-water-resources-grand-challenge.

- Working to develop a Khan-Academy style platform for nonpartisan information on water resources and related issues.

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United States Environmental Protection Agency, Water-Reuse Action Plan (WRAP), https://www.epa.gov/waterreuse/water-reuse-action-plan

Utton Center Transboundary Resources Center, “Community Water Systems,” Water Matters!, The University of New Mexico, 2015, https://uttoncenter.unm.edu/resources/research-resources/water-matters-2015---full-pdf.pdf.

STATE AND LOCAL POLICIES AND PLANS TO MODEL

What follows are examples of national leaders in rural infrastructure which rose to prominence during the research for this report. Also included are links to COVID-19 relief planning efforts, which may help inform New Mexico's own organization and planning relating to relief funds and the 2021 Infrastructure Bill.

ALASKA

Kotzebue Microgrid Projects, http://microgridprojects.com/microgrid/kotzebue/.

- An example of a small, isolated community utilizing wind and solar energy in a microgrid system with a battery storage backup, used in combination with traditional energy generation from diesel fuel to ensure reliable power.

ARIZONA

The Arizona Corporation Commission, https://www.azcc.gov/utilities.

- The ACC centrally oversees major utilities, including electric, gas, telephone, water, and wastewater.
- All electric companies have to submit a 10-year plan to the State of Arizona.
- All water and wastewater companies must publish an annual report.

CALIFORNIA

Human Right to Water Board, https://www.waterboards.ca.gov/water_issues/programs/hr2w/

- California passed AB685 in 2015, making it the first in the nation to recognize the human right to water.
- The state water board can require water systems that consistently fail to provide safe drinking water to physically or managerially consolidate. This has decreased the number of community water systems by 300 since 2015.
- SB200 provided funding for water system consolidation efforts.

California Association for Local Economic Development, California Rural Infrastructure Finance Guidebook (2019), https://caled.org/wp-content/uploads/2020/01/CALED-2019-CA-Rural-Infrastructure-Finance-Guidebook.pdf.

- Created with funds from a USDA grant, the guidebook aims at helping local community leaders and economic development professionals.
- It includes policy recommendations, models, and financing recommendations utilizing federal and state funds for a range of infrastructure areas.
- It also includes tips on determining priority projects and checklists and questions to help a understand project costs and determine where there may be gaps.

California Infrastructure Plan (2021), https://www.ebudget.ca.gov/2021-Infrastructure-Plan.pdf.

- This plan has Climate Change actions built in.
- The state maintains a Water Resilience Portfolio, focused on actions that can be taken at the local level to meet long-term water security challenges.
- It calls for using COVID-19 relief funds to subsidize the cost of internet for consumers.

COLORADO

Colorado Concern, Together We Build Report (2020), https://coloradoconcern.com/hot-topics/together-we-build/.

- Written by a bipartisan group formed to assist with statewide economic recovery, this report focuses on infrastructure investments in roads/transit, water, energy infrastructure, local commerce, and education as the most critical to the State.
- It recommends prioritizing projects using the criteria: 1) Immediate, 2) Enduring, and 3) Equitable.
- It recommends that Congress enact a temporary reclassification of loan programs to grant to facilitate getting funds out to applicants, while not putting a greater debt burden on them.
- Colorado already has a Broadband Fund, which can handle distributions of funding and has established criteria for grant awards (priorities are rural areas, last-mile service, new projects).

Colorado Department of Local Affairs, Rural Economic Development Initiative, https://cdola.colorado.gov/funding-programs/rural-economic-development-initiative.

- The Rural Economic Development Initiative uses funds from the state's General Fund, average of $700,000-$800,000 per year available for small towns.

Colorado, Rio Blanco County Communications and Broadband Infrastructure Department, https://www.rbc.us/395/Broadband.

- A public private internet partnership, with the County serving Operator, with two local Internet Service Providers.

FLORIDA

Northwest Florida Water Management District, Geographic Information Systems (GIS), https://www.nwfwater.com/Data-Publications/GIS-Mapping.

- Florida has been a leader in mapping its water systems using GIS and LIDAR, and then monitoring them for changes over time.

South Florida Water Management District, https://geo-sfwmd.hub.arcgis.com/.

State of Florida Geographic Information Office, https://www.floridagio.gov/.

GEORGIA

Georgia Broadband Program: https://broadband.georgia.gov/

- A national leader in broadband data, Georgia has been working to improve its understanding of internet access for three years.
- The site features maps that are more accurate than FCC data, funding, and other resources.

Georgia, Broadband Ready Community program: https://broadband.georgia.gov/broadband-community-application-information

- This is an example of a process to help communities complete the preliminary planning work to align with state and federal funding requirements.

IDAHO

The Ammon Model (Broadband), City of Ammon Fiber Optics: https://www.ammonfiber.com/.

- A widely studied broadband model that has promise for medium to larger-sized communities willing to operate their own fiber network.
- Ammon treats broadband as an essential utility.

KANSAS

Kansas Public Water Supply, https://www.kdheks.gov/pws/

- The Public Wholesale Water Supply District Statute (KSA 19-3545) enables the creation of public wholesale water districts.
- The Consolidation of Rural Water Districts Statute (KSA 82a-639) enables counties to consolidate rural water districts.

KENTUCKY

Better Kentucky Plan, https://governor.ky.gov/priorities/better-kentucky-plan

- Kentucky's post-COVID-19 economic recovery plan, which focuses on three areas: 1) Education, 2) Water, and 3) Internet.

Kentucky Drinking Water Systems Summary, posted by the U.S. Environmental Protection Agency, https://www.epa.gov/dwcapacity/kentucky.

- Since 2000, the State has both encouraged and mandated consolidation of water resources.
- It is state statute that new systems must consider connection to existing systems.
- The state ordered feasibility studies to consider regionalization of water districts and water associations—based on findings, the Kentucky Public Service Commission can order consolidation, rate changes, and other charges.
- It has a state-level Water Resource Information System database, from which the State prioritizes funding, and regional water districts pull data from here to prepare water reports and engage in planning. It also has asset management and emergency response tools built in.
- Since 1974, has decreased the number of community water systems from 2,178 to 394, with 98 being large or very large and only 14 being very small.
- Kentucky is considered a model for how to successfully lead a regionalization effort from the state level.

Kentucky Energy and Environment Cabinet, Division of Water, https://eec.ky.gov/Environmental-Protection/Water/Pages/default.aspx.

MAINE

ConnectMaine Authority, https://www.maine.gov/connectme/home.

- A public entity established in 2006 with the goal to connect all Maine residents to broadband.
- ConnectMaine has criteria and formal processes for underserved areas, collecting data, supporting broadband investment, and administering grants.
- The board consists of seven members who represent the public and private sectors.

MONTANA

Montana ARPA website, https://arpa.mt.gov/.

- A one-stop shop for information on allocation of recovery funds by topic area, and grant applications to apply to receive it.
- Montana established a centralized, bipartisan, Infrastructure Advisory Commission to review and make funding decisions for ARPA funds.
- Montana's broadband recovery efforts define and consider "frontier, unserved, and underserved areas" for funding prioritization.
- Montana developed a common application for ARPA funding.

Montana Water, Wastewater and Solid Waste Action Coordinating Team (W2ASACT), http://dnrc.mt.gov/divisions/cardd/wasact

- The W2ASACT is a group of professionals from state, federal, and non-profit organizations that finance, regulate, or provide technical assistance for community water and wastewater systems.

- The group meets multiple times per year to find ways to improve the State's environmental infrastructure.
- W2ASACT works to identify unnecessary duplication of requirements that make compliance difficult for communities.
- Montana also has a common application form for water funding.

NEVADA

State Infrastructure Bank, https://apnews.com/article/nv-state-wire-nevada-government-and-politics-business-2866c243e739463205534f7d89c45512.

- The Nevada State Infrastructure bank was recently expanded by $75 million raised through General Obligation Bonds, which allows applicants to apply for loans or public assistance for infrastructure projects.

NEW MEXICO

New Mexico Governor's Finance Council, Invest New Mexico, Strategic Infrastructure Investment Plan For New Mexico (2003), https://nmceh.org/pages/reports/The_Governor's_Invest_New_Mexico.pdf.

- This document was written under Governor Bill Richardson, but it is the State's most recent infrastructure plan.

UTAH

Utah Recovery Task Force and Plan (includes infrastructure), https://coronavirus.utah.gov/utah-leads-together.

- Utah released four reports in 2020 on how recovery funds should be prioritized.
- Version 4.0 is the most recent. It includes 100-, 250-, and 500-day plans and considers rapid reskilling and workforce training as part of infrastructure.

WEST VIRGINIA

West Virginia Public Service Commission, http://www.psc.state.wv.us/

- Chapter 24, Article 2H of the West Virginia Code (2020) enables the Public Service Commission to order measures, including acquisition, to help distressed water systems.

NOTES ON DATA

RURAL INDICATORS: BROADBAND, WATER, SEWER

To arrive at the data tables to support this project, BBER used two different methods to calculate the indicators of rural areas within New Mexico. The first step to both methods was to download the data tables from https://data.census.gov/ for the 443 places within New Mexico. This included census designated places (CDPs), cities, and villages. According to the U.S. Census Bureau, places with fewer than 2,500 inhabitants are considered rural areas. Thus, the places were marked either as rural or urban based on the population statistics. The next step was to associate each place with its respective county based on the geography.

BBER then proceeded with the following two methods:

- Add numbers of rural places to get county totals: Filter out all places with fewer than 2,500 inhabitants, then add the numbers to obtain the rural area totals for each county. This method allows BBER to look at the individual places that made up the totals as well.
- Subtract totals of urban areas from the total for the respective county: Filter out all the places that have more than 2,500 inhabitants, then subtract the total urban area for each county from the previous downloaded county totals from the U.S. Census.

Due to the sampling and estimate methodology employed by the Census, there is a margin of error for each of the estimates given, which yields results that do not perfectly match mathematically. The individual spreadsheets indicate which Census tables were used for the data.

ELECTRICAL UTILITIES DATA

Access to electricity is not asked in the Census data. Further, electrical providers have geographic overlap throughout the state. This makes determining the county-level access a complicated process. Methodologically, BBER must reach out to all of the providers that service more than one county and ask for subscriber numbers.

Data in this report a combination of Census data (number of occupied housing units), Energy Information Administration data (number of customers per utility and type of utility), and research into each provider's coverage by county (internet searches and phone calls).

- ACS 5-Year Estimates. 2019. TableID: B25048. Census data on occupied housing units by county.
- Energy Information Administration. 2019. "Annual Electric Power Industry Report." EIA-861 detailed data files; residential customers only.
- Provider coverage by area, internet searches, phone calls to providers.

Providers report they have county-level data, but none had it readily available in time for this report. More detailed data at the county level will be forthcoming in the final report.

DEFINITIONS

Access to Running Water (American Community Survey [ACS], 2019)

This question measures access to water resources and plumbing facilities. Complete plumbing facilities is defined as (a) hot and cold running water AND (b) a bathtub or shower. These facilities must be located inside the housing unit but not in the same room. A housing unit is classified as lacking complete plumbing facilities when either of the two facilities is not available.

Access to Sewer (ACS 2015)

Prior to the 2016 ACS, the question included an additional criterion: a flush toilet inside the housing unit. Complete plumbing facilities were defined as (a) hot and cold running water, (b) a bathtub or shower, and (c) a flush toilet. All three facilities had to be located inside the housing unit but not in the same room. A housing unit was classified as lacking complete plumbing facilities when either of the three facilities was not present.

The Rural Community Assistance Partnership (RCAP) has used this data to assess the availability of water and sewer facilities in the U.S. A correlation between lacking complete plumbing facilities and monthly cost for water and sewer facilities was determined.

Access to Broadband (ACS 2019)

This set of questions measures computer and internet usage, as well as broadband coverage. Housing units are classified as having no access to the internet when residents cannot connect to or use the internet using either paid or free services.

The Federal Communications Commission (FCC) uses this data as a proxy for measuring access to broadband. Additionally, they use the data to find out how households react to newer generations of broadband technology (whether deployment is successful).

The Nation National Telecommunications and Information Administration (NTIA) also uses this data to measure broadband access and identify groups that underuse broadband technology.

New Mexico Department of Information Technology Office of Broadband has used these data to assess broadband availability in rural communities. They also identify funding issues and challenges of broadband programs.

RURAL TELECOMMUNICATIONS COMPANIES IN NEW MEXICO

Provider Name	Website
Baca Valley Telephone Company	http://www.bacavalley.com
Century Link	http://www.centurylink.com/
Copper Valley Telephone Coop	http://www.vtc.net
Dell Telephone Coop	http://www.delltelephone.com/
ENMR, aka Plateau Telecom	http://plateautel.com/
La Jicarita Rural Telephone Coop	http://www.lajicarita.com/
Leaco Rural Telephone Coop	http://www.leaco.net/
Mescalero Apache Telecom	http://www.matisp.net/
Navajo, aka Frontier Communications	http://www.frontier.com/
Panhandle Telephone Coop	http://www.ptci.net/
Penaso Valley Telephone Cooperative, Inc.	http://www.pvt.com/
Roosevelt County Rural Telephone Coop	http://www.rcrtc.com/
Sacred Wind Communications	http://www.sacredwindcommunications.com
Tularosa Basin Telephone Company	http://www.tbtc.net/
Valley Telephone Coop	http://www.vtc.net/
Western New Mexico Telephone Coop	http://www.wnmt.com/
Windstream Communications Southwest	http://www.windstream.com/

ELECTRICAL UTILITIES IN NEW MEXICO

Rural Electric Cooperatives		
Name	**Residential Customers**	**Website**
Central New Mexico Electrical Cooperative	16,194	https://cnmec.org/
Central Valley Electric Cooperative, Inc.	5,768	https://www.cvecoop.org/
Columbus Electric Cooperative	3,542	https://columbusco-op.org/
Continental Divide Electric Cooperative	21,057	https://cdec.coop/
Duncan Valley Electric Cooperative	244	https://dvec.org/
Farmers' Electric Cooperative, Inc.	9,934	https://www.fecnm.org/
Jemez Mountains Electric Cooperative, Inc.	25,509	https://www.jemezcoop.org/
Kit Carson Electric Cooperative	24,654	https://kitcarson.com/
Lea County Electric	7,128	https://lcecnet.com/
Mora-San Miguel Electric Cooperative	10,822	https://www.morasanmiguel.coop/
Navopache Electric Cooperative	1,354	https://navopache.org/
Northern Río Arriba Electric	2,586	http://www.noraelectric.org/
Otero County Electric Cooperative, Inc.	15,946	https://www.ocec-inc.com/
Rio Grande Electric Cooperative	242	https://www.riogrande.coop/
Roosevelt County Electric Cooperative, Inc.	3,795	http://www.rcec.org/
Sierra Electric Cooperative, Inc.	3,601	https://www.sierraelectric.org/
Socorro Electric Cooperative, Inc.	10,238	https://socorroelectric.com/
Southwestern Electric Co-op	1,440	https://www.swec-coop.org/
Springer Electric Cooperative, Inc.	2,449	https://springercoop.com/

Public Utilities Companies		
Name	**Residential Customers**	**Website**
City of Aztec	2,655	http://www.aztecnm.gov/electric.html
City of Farmington	34,986	https://www.fmtn.org/181/Farmington-Electric-Utility-System
City of Gallup	8,484	https://www.gallupnm.gov/169/Utilities
City of Truth or Consequences	3,421	http://www.torcnm.org/departments/finance/utilities_-_billing.php
Los Alamos County Utilities	7,807	https://www.losalamosnm.us/government/departments/utilities
Navajo Tribal Utility Authority	9,614	https://www.ntua.com/
Raton Public Service Co.	3,721	https://www.ratonnm.gov/144/Public-Service
Town of Springer	607	https://springernm.com/City_Government.html
Investor-Owned Electric Utility Companies		
Name	**Residential Customers**	**Website**
El Paso Electric Company	88,405	https://www.epelectric.com/
Public Service Company of New Mexico (PNM)	471,935	https://www.pnm.com/
Southwestern Public Service Company (Xcel Energy)	96,964	https://my.xcelenergy.com/

Electric Generation and Transmission Cooperatives	
Name	**Website**
Tri-State Generation and Transmission Association	https://tristate.coop/
Western Farmers Electric Cooperative	https://www.wfec.com/

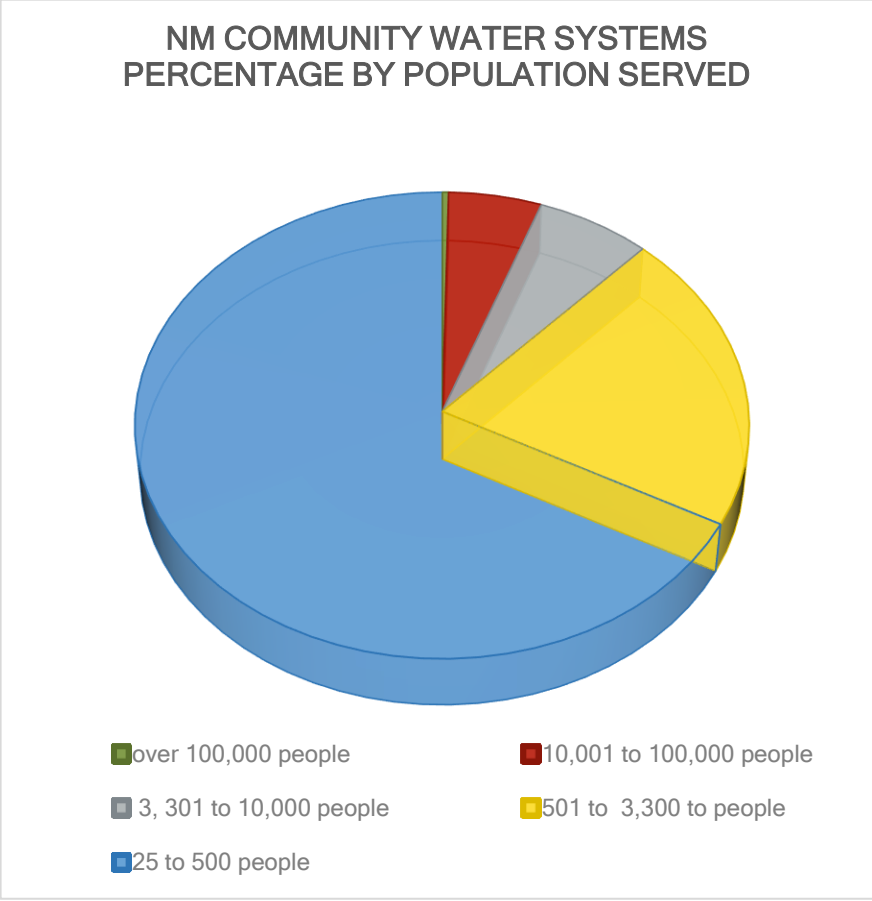
INTERNET SERVICE PROVIDERS IN NEW MEXICO AND TECHNOLOGY TYPE

Provider Name	Technology
Cable One, Inc.	Cable
Charter Communications, Inc.	Cable
Comcast Cable Communications, LLC	Cable
EarthLink Business, LLC	Cable
PVT Networks, Inc.	Cable
Spectrotel, Inc.	Cable
Suddenlink Communications	Cable
TDS Broadband Service LLC	Cable
APXNET	Cable
Chaparral CableVision	Cable
63	DSL (Asymmetric)
Bulls Eye Telecom	DSL
Birch Communications Inc.	DSL
Baca Valley Telephone Company, Inc.	DSL (Asymmetric)
CenturyLink, Inc.	DSL (Asymmetric)
Copper Valley Telephone, Inc.	DSL (Asymmetric)
Cyber Mesa Computer Systems Incorporated	DSL (Asymmetric)
Delcom, Inc.	DSL (Asymmetric)
E.N.M.R. Telephone Cooperative	DSL (Asymmetric)
EarthLink Business, LLC	DSL (Asymmetric)
Frontier Communications Corporation	DSL (Asymmetric)
Global Capacity LLC	DSL
La Jicarita Rural Telephone Cooperative	DSL (Asymmetric)
Leaco Rural Telephone Cooperative	DSL (Asymmetric)
Lobo Internet	DSL (Asymmetric)
McLeodUSA Telecommunications Services, L.L.C.	DSL (Asymmetric)
Mescalero Apache Telecom, Inc.	DSL (Asymmetric)
NetFortris	DSL
Penasco Valley Telephone Coop	DSL (Asymmetric)
Roosevelt County Rural Telephone Cooperative, Inc.	DSL (Asymmetric)
Sacred Wind Communications Inc.	DSL (Asymmetric)
Spectrotel, Inc.	DSL (Asymmetric)
Tularosa Communications, Inc	DSL (Asymmetric)
Valley Telephone Cooperative, Inc.	DSL (Asymmetric)
Valor Telecommunications of Texas, LLC	DSL (Asymmetric)
Windstream	DSL
Yucca Telecom	DSL
WNM Communications	DSL (Asymmetric)

Provider Name	Technology
CenturyLink, Inc.	Fiber
Affiniti, LLC	Fiber
Baca Valley Telephone Company, Inc.	Fiber
Charter Communications, Inc.	Fiber
Cogent Communications Group	Fiber
Cyber Mesa Computer Systems Incorporated	Fiber
Delcom, Inc.	Fiber
Kit Carson Electric Cooperative	Fiber
La Jicarita Rural Telephone Cooperative	Fiber
Level 3 Communications, LLC	Fiber
Mammoth Networks	Fiber
MCI Communications Corporation	Fiber
McLeodUSA Telecommunications Services, L.L.C.	Fiber
Panhandle Telecommunications Services LLC	Fiber
TDS Broadband Service LLC	Fiber
Tularosa Communications, Inc.	Fiber
Yucca Telecommunications Systems	Fiber
Zayo Group, LLC	Fiber
Windstream	Fiber
Continental Divide Electric Cooperative, Inc.	Fiber
E.N.M.R. Telephone Cooperative	Fiber
FastTrack Communications, Inc.	Fiber
Leaco Rural Telephone Cooperative	Fiber
PVT Networks, Inc.	Fiber
Unite Private Networks, L.L.C.	Fiber
NMSURF	Fiber
Kit Carson	Fiber
Valley Telephone Cooperative, Inc.	Fiber
63	Fiber
Black Mesa Wireless LLC	Fiber
Call One, Inc.	Fiber
Comcast Cable Communications, LLC	Fiber
DPAccess, LLC	Fiber
Futurum Communications Corp.	Fiber
Plateau Telecommunications, Inc.	Fiber
Roosevelt County Rural Telephone Cooperative, Inc.	Fiber
Sierra Communications	Fiber
Transtelco, Inc.	Fiber
U.S. TelePacific Corp.	Fiber
Valor Telecommunications of Texas, LLC	Fiber
Visionary Communications, Inc	Fiber

COMMUNITY WATER SYSTEMS IN NEW MEXICO[111]

NM Community Water Systems by Population Served	Number of Systems	Percentage of Systems
over 100,000 people	2	0.3%
10,001 to 100,000 people	30	5.2%
3,301 to 10,000 people	37	6.4%
501 to 3,300 to people	120	20.8%
25 to 500 people	387	67.2%
Total Number of Community Water Systems	**576**	-



[111] Information provided by the New Mexico Environment Department, Drinking Water Bureau, June 2021

MEMBERS OF THE RURAL ECONOMIC OPPORTUNITIES TASK FORCE

Name	Title	Party	Role
Siah Correa Hemphill	Senator	D	Co-Chair
Candie G. Sweetser	Representative	D	Co-Chair
Anthony Allison	Representative	D	Member
Gail Armstrong	Representative	R	Member
Rachel A. Black	Representative	R	Member
Craig W. Brandt	Senator	R	Member
Crystal R. Diamond	Senator	R	Member
Kelly K. Fajardo	Representative	R	Member
Carrie Hamblen	Senator	D	Member
Susan K. Herrera	Representative	D	Member
Leo Jaramillo	Senator	D	Member
Willie D. Madrid	Representative	D	Member
Roger E. Montoya	Representative	D	Member
Michael Padilla	Senator	D	Member
Shannon D. Pinto	Senator	D	Member
Joshua A. Sanchez	Senator	R	Member
Nathan P. Small	Representative	D	Member
Elizabeth "Liz" Stefanics	Senator	D	Member
Ambrose Castellano	Representative	D	Advisory
Rebecca Dow	Representative	R	Advisory
David M. Gallegos	Senator	R	Advisory
Harry Garcia	Representative	D	Advisory
D. Wonda Johnson	Representative	D	Advisory
Tara L. Lujan	Representative	D	Advisory
Patricia A. Lundstrom	Representative	D	Advisory
Antonio Maestas	Representative	D	Advisory
Brenda G. McKenna	Senator	D	Advisory
Mimi Stewart	Senator	D	Advisory

CONTRACTED SCOPE OF WORK

ARTICLE 2

SCOPE OF WORK

The Contractor shall conduct a study of New Mexico's critical rural infrastructure needs and develop a plan for the state to fund critical infrastructure projects as detailed in this article and the Contractor's May 12, 2021 proposal attached to this Agreement. At minimum, the Contractor shall:

(1) collect and collate demographic information relating to infrastructure needs in New Mexico, including the number and geographic distribution of households in New Mexico lacking reliable access to running water, sewer, electricity and broadband. The Contractor shall assess federal decennial census data and other available data in addition to undertaking qualitative analysis through surveys of community leaders on a community's infrastructure needs and goals to develop the demographic information;

(2) analyze and report on the policies of other states that have succeeded in improving infrastructure for residents to learn more about strategies and best practices and, if appropriate, conduct interviews with policymakers and administrators in other states to understand the development and execution of the best practices discovered;

(3) estimate costs to achieve basic infrastructure for all New Mexico residents, including an estimated cost, or range of costs, for achieving infrastructure goals for communities currently underserved;

(4) assess financial opportunities to bridge funding gaps, including cataloging existing opportunities for leveraging public, private or other funding mechanisms to maximize the efficiency and effectiveness of state investments. The Contractor may interview community leaders and elected officials on where funding gaps exist and the barriers to funding critical infrastructure projects in a community;

(5) conduct a long-term affordability analysis of infrastructure investments and the impact on the costs to consumers. The Contractor shall develop an appendix or section outlining existing financial assistance, tax rebates and credits and other mechanisms to offset the cost of utilities for consumers to ensure that consumers not only have access to basic services, but that those services are also affordable;

(6) based on the findings of infrastructure needs, funding gaps and existing funding sources, develop a plan that includes recommendations and action steps for how the state through legislative action may fund and structure state investments in rural infrastructure, with the goal of providing all New Mexicans with reliable running water, electricity and broadband by 2030. The plan will be a roadmap for legislative initiatives in the 2022 legislative session and beyond;

(7) submit a preliminary written report of its findings and recommendations to the LCS for publication to the New Mexico Legislature's website on or before July 31, 2021;

(8) make presentations to and engage in collaborative conversations with relevant interim committees during the 2021 legislative interim to receive feedback on the Contractor's findings and recommendations; and

(9) provide a final written report to the New Mexico Legislative Council on or before December 15, 2021. The final written report shall include:

(a) an executive summary of action steps and recommendations;

(b) a demographic analysis and breakdown of infrastructure gaps;

(c) a survey or annotated bibliography of the Contractor's research and sourcing for data, analysis and recommendations;

(d) a detailed cost analysis for funding infrastructure projects; and

(e) a catalog of funding opportunities and strategies.

PIVOTAL

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