Los Alamos Department of Public Utilities
2022-2027 Update

Water and Energy Conservation Plan

Approved by the Board of Public Utitlities

August 17, 2022

Mission: Provide safe and reliable utility services in an economically and environmentally sustainable fashion.

LOS ALAMOS
Department of Public Utilities

Acknowledgments

The 2022-2027 Water and Energy Conservation Plan was prepared by Abbey Hayward, Water and Energy Conservation Coordinator. The Los Alamos Department of Public Utilities appreciates the support and contributions of the following persons.

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Executive Summary

The 2022-2027 Water and Energy Conservation Plan focuses on goals and objectives, as ranked by the BPU. There is a noticeable need for conservation efforts from both sides of utility services – the supply (DPU) and the demand (Customers) – to achieve these strategic goals.

In 2013, the Board of Public Utilities (BPU) approved of six strategic goals to guide the Department of Public Utilities (DPU). The DPU Senior Management Team (SMT) then developed broad, long-term objectives detailing how the department would meet the strategic goals. Goals are reviewed annually by both BPU and DPU SMT and revised based on achievement(s) of objectives. The DPU strategic goals and objectives were most recently approved on September 15, 2021.

This plan primarily focuses on Goal 5.0 – Achieve Environmental Sustainability, and has a supporting focus on Goal 6.0 – Develop and Strengthen Partnerships with Stakeholders.

Fiscal-year deliverables are established in this plan to make progress toward objectives and overall strategic goals. Deliverables in this plan were developed with suggestions from various community committees, DPU staff, and the BPU.

Strategic objectives for Goal 5.0, in order of highest priority to lowest priority:

1. Be a carbon neutral electric provider by 2040.
2. Provide Class 1A effluent water in Los Alamos County.
3. Reduce natural gas usage by 5% per capita per heating degree day by 2030 and support elimination of natural gas by 2070.
4. Promote electric efficiency through targeted electric conservation programs.
5. Reduce potable water use by 12% per capita per day by 2030.

Strategic objective for Goal 6.0:

1. Communicate with stakeholders to strengthen existing partnerships and identify new potential mutually beneficial partnering opportunities.

Table of Contents

Abbreviations

BPU	Board of Public Utilities
DPU	Department of Public Utilities
SMT	Senior Management Team
DOE	Department of Energy
WAPA	Western Area Power Administration
NMOSE	New Mexico Office of the State Engineer
LANL	Los Alamos National Laboratory
ECA	Electric Coordination Agreement
IRP	Integrated Resource Plan
PEEC	Pajarito Environmental Education Center
ESB	Environmental Sustainability Board
LARES	Los Alamos Resiliency, Energy, and Sustainability (Task Force)
USDM	US Drought Monitor
LRWS	Long-Range Water Supply
WWTP	Wastewater Treatment Plant
PNM	Public Service Company of New Mexico
SAIDI	System Average Interruption Duration Index
CFPP	Carbon Free Power Project
GPCD	Gallons Per Capita Per Day
SFR	Single Family Residence
MFR	Multi-Family Residence
AWWA	American Water Works Association
SJGS	San Juan Generating Station
HDD	Heating Degree Day
WRRF	Water Resource Reclamation Facility

Part I

Background Information and Data of Los Alamos County and Its Utilities

Introduction

Purpose

The Water and Energy Conservation Plan is being updated to best identify and provide target measures for conservation of critical resources needed for a community to thrive in the high desert of New Mexico. In the face of a changing climate, there is increasing pressure for the Los Alamos DPU to provide reliable and efficient sources for its utilities. A hotter and drier climate will strain grid systems and water supplies. There is also increasing pressure on consumers to conserve and efficiently use these same resources to accommodate a growing community and to ensure resources will last.

The DPU operates the county-owned electric, gas, water, and wastewater systems servicing customers, including residents, businesses, schools, and local government facilities. The DPU has provided the community with these services for more than 50 years. Publicly held, DPU is directly accountable to the citizens of Los Alamos County through the local BPU.

This document serves as an evolving plan to meet the following objectives :

- Support DPU's mission, vision, and long-term strategic goals.
- Develop cost-effective conservation programs to move the community toward defined conservation goals.
- Establish consumption baselines for water, electricity, and gas representative of designated customer classes.
- Adopt appropriate and reasonable conservation goals representative of community desires.
- Develop an implementation plan and measurement metrics of conservation efforts.

The Water and Energy Conservation Plan focuses on the planning period of 2022-2027. However, this document will be reviewed and updated biannually to accommodate successes and unforeseen changes to DPU resource supply and consumer needs.

Compliance

This plan serves two separate compliance requirements. The first is to fulfill a federal regulatory requirement as part of Los Alamos County's section of the joint Integrated Resource Plan (IRP) with the Department of Energy (DOE). This compliance piece requires the development and implementation of a water and energy conservation plan that addresses both the supply-side (DPU) and demand-side (customer) of water and energy conservation efforts, which is then submitted to the Western Area Power Administration (WAPA) annually. The second compliance requirement, which is filed with the New Mexico Office of the State Engineer (NMOSE), is conditional pending current projects.

Partners

Los Alamos National Laboratory, Department of Energy

Conservation efforts in this plan are not directed toward the DOE or the Los Alamos National Laboratory (LANL). LANL is a facility that falls under the requirements of DOE, neither of which are under the jurisdiction of DPU. There is a contract to supply DOE with water for LANL and DPU is a partner with DOE in the Electric Coordination Agreement (ECA). Los Alamos County and DOE also have a joint IRP, which guides the ECA. LANL also has a site-wide Water Conservation Program Plan. DPU and LANL will coordinate and communicate conservation efforts and support long-term conservation goals.

Pajarito Environmental Education Center

DPU partners with Pajarito Environmental Education Center (PEEC) on educational outreach efforts in a contracted format. PEEC is very involved with the schools in the county, in addition to its own programming at the Nature Center. DPU and PEEC agree on annual task orders that promote evolving conservation foci for the schools and community members.

Los Alamos Environmental Sustainability Board

The Los Alamos Environmental Sustainability Board (ESB) updates the County's Environmental Sustainability Plan. While DPU and the ESB support one another's plans, this Water and Energy Conservation Plan focuses specifically on the commodities provided by DPU. The Environmental Sustainability Plan goes beyond water and energy usage by establishing goals in other areas crucial to creating a more sustainable community.

Public Input

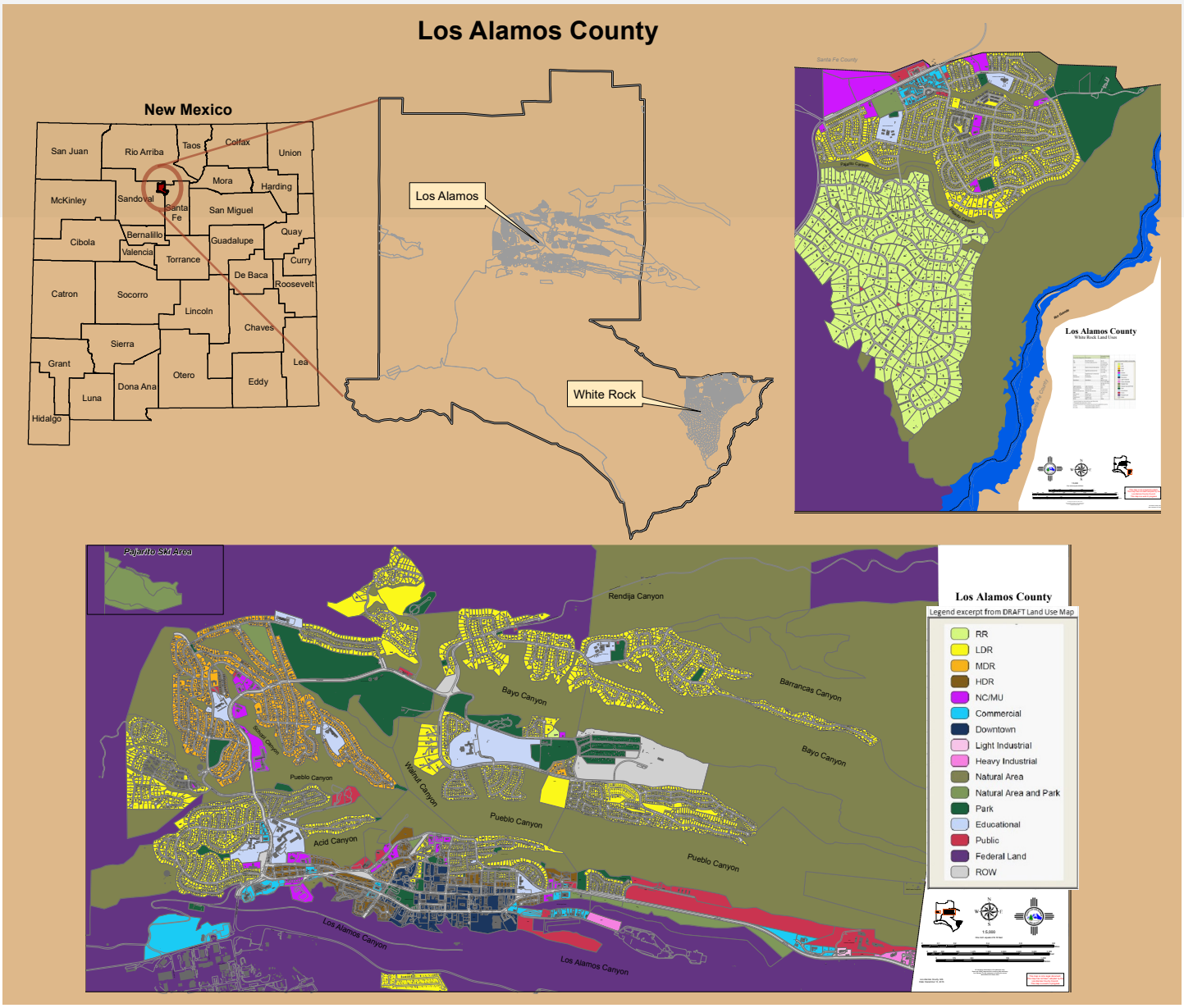
A "Conservation Plan Update Committee" was formed by DPU in early 2020 to begin to address and provide recommendations to the existing Water and Energy Conservation Plan. However, two factors overshadowed the extent of the group's efforts. The first was the onset of the COVID-19 pandemic which slowed the group's first progression as the scope of the pandemic was unknown. The second factor was the formation of the Los Alamos Resiliency, Energy, and Sustainability (LARES) task force by Los Alamos County Council in January 2021. The LARES task force was assembled to address very similar recommendations that the update committee was working toward.

Regarding the suggestions and recommendations from each of these groups, it is important to note: the recommendations from the Plan Update Committee were considered as this committee was specifically formed by the DPU for this very purpose. The LARES Final Report recommendations are not incorporated into this plan update because they go beyond the scope of DPU's responsibilities and reach. However, many of the recommendations will be supported by and potentially partnered with DPU, as efforts align.

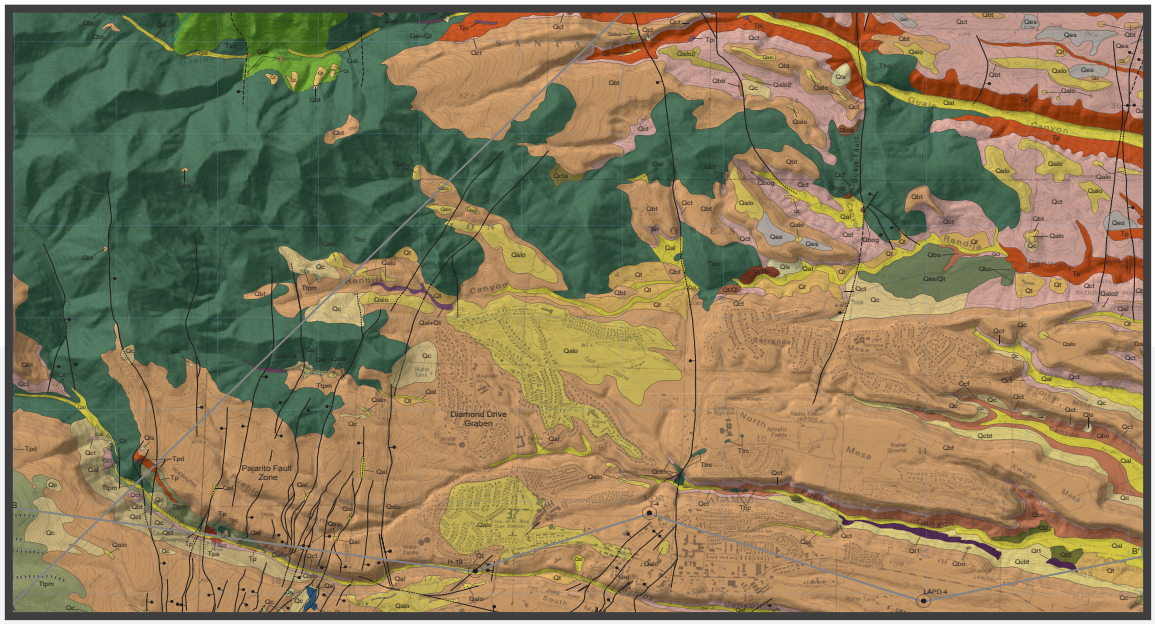
Additional updates to this plan will incorporate suggestions, pending BPU approval, stemming from the "Voice of the Customer" survey created by. This survey is an opportunity for DPU to better understand its customers' perceptions and wants of the DPU.

Local Conditions

Los Alamos County is located in northern New Mexico and comprises the communities of Los Alamos and White Rock. Nestled in a region known as the Pajarito Plateau, the service area ranges in elevation from 6,365 feet in White Rock up to 7,320 feet in the Los Alamos townsite. The population for the county was 19,419 per the 2020 Census. The County is surrounded by various Pueblos including San Ildefonso and Santa Clara, and by protected areas including the Santa Fe National Forest and Bandelier National Monument. Modern-day Los Alamos was incorporated in 1968, after two decades of existing as the Manhattan Project's Site Y. Prior to 1963, no land was privately owned and three federal agencies – the Atomic Energy Commission, the US Forest Service, and the National Park Service – owned and managed all land.



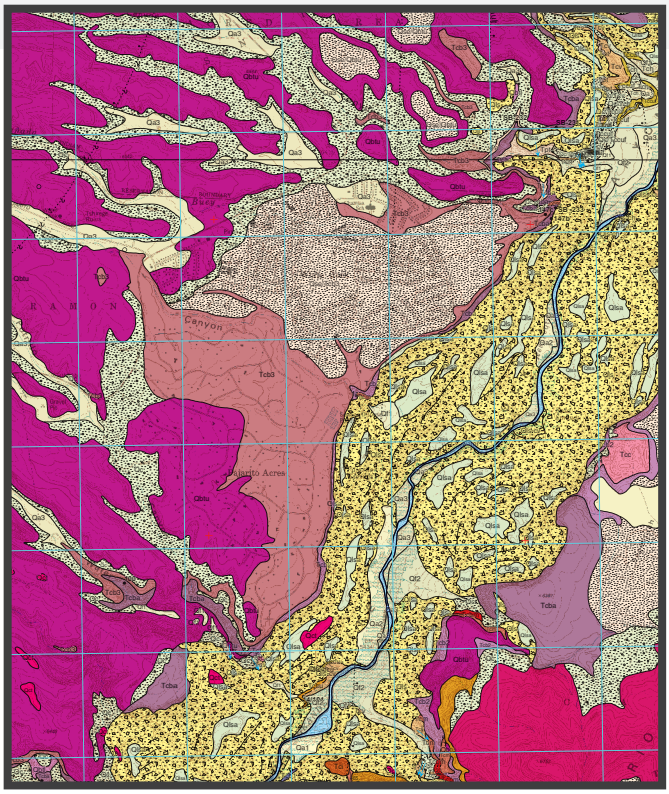
Geographical Considerations



Geologic Map of Los Alamos townsite. Basic interpretation: green designates rhyodacite lava flows; tan designates Bandelier Tuff; yellow, pink, and red designate sedimentary deposits.

Initially chosen for its relative inaccessibility, Los Alamos County is spread across several flat mesas separated by steep canyons. The geology is primarily volcanic, consisting of Upper Bandelier Tuff, basalts, and rhyodacite lava flows, with some areas of sedimentary deposits from alluvial flows and stream deposits as the Rio Grande and previous rivers transformed over time.

The geological deposits impact utility placement. For example, the basalts and certain areas of the Bandelier Tuff are very hard and restrict water well, pipeline (water, gas, or sewer), and buried electricity infrastructure placement. There is an area of White Rock that is unable to be connected to the municipal sewer and gas systems because the geology prevents the infrastructure. Other considerations include areas prone to rockfalls, such as with the rhyodacite (green) flow, and placing utility sources here (maintenance costs, reliability issues, etc.).



Geologic Map of White Rock. Basic interpretation: hot pink designates Bandelier Tuff; dusty pink designates basalts; dotted cream designates interspersed sedimentary deposits with basalts; most other classifications represent sedimentary deposits.

Local Conditions

Demographics and Projections

Population

According to the US Census, the population for Los Alamos County increased by nearly 1,500 people between 2010 and 2020. The current population estimate (as of July 2021) is 19,330 for the county. Because of the geographical limitations of Los Alamos County, population growth is constrained until new housing developments are constructed in White Rock, new apartment buildings are constructed where defunct buildings stand in Los Alamos, or unoccupied homes become available for occupancy (renovated or sold).

Los Alamos is a destination for tourists, and the popularity of vacation rentals, such as Airbnb and VRBO, increases the population of the county by an unknown number as these visitors utilize utility resources.

LANL is the largest employer in the county and in northern New Mexico. Total employment, including students and contract labor, was 13,512 at the end of fiscal year 2021. LANL is planning to hire an additional 2000 employees in fiscal year 2022. Around 40% of these employees live in Los Alamos County.

Population estimates vary depending on the method and predictor. Los Alamos estimates can go off-track quickly depending on the employment goals of LANL. The table below shows population projections from the Geospatial and Population Studies Department at the University of New Mexico. These projections are based on 2010 Census data and migration trends and have not been updated to reflect 2020 Census data. Compare these estimates to the projections in the other table below.

July 2010	July 2020	2025	2030	2035	2040
17,935	18,765	19,164	19,501	19,753	19,941

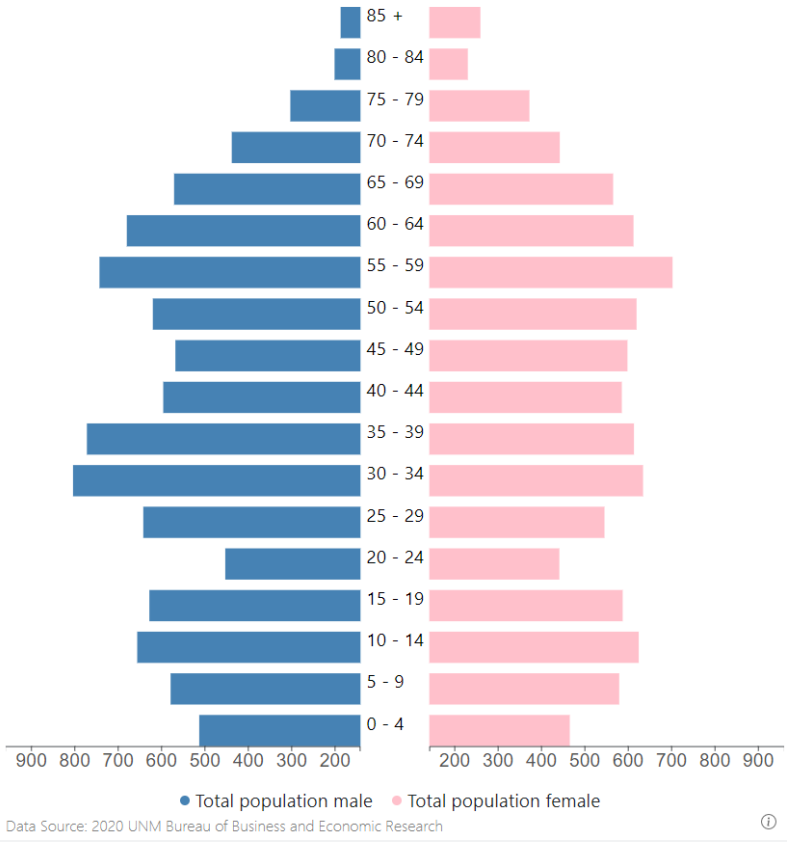
Geospatial and Population Studies Department at the University of New Mexico population projections based on 2010 Census data and migration trends.

The Long-Range Water Supply Plan (LRWS Plan), updated in 2017, has two scenarios for projected water demand based on a different set of population projections. These low- and high-projection cases are based on population estimates prepared for the 2016 update to the State of New Mexico's 16 regional water plans.

Population differences between Los Alamos townsite and White Rock show that Los Alamos is more than twice the size of White Rock. Per the 2020 Census, White Rock has a population of 5,852 while Los Alamos is 13,179.

Year	Population Projection	
	Low	High
2020	17,988	20,000
2030	17,789	20,812
2040	17,123	21,447
2050	16,480	21,874
2060	15,863	22,092

Population projections from LRWS Plan based on estimates for the 2016 version of the State of New Mexico's 16 regional water plans.



Created by the University of New Mexico Bureau of Business & Economic Research, this "population pyramid" is based on 2020 Census Data. The simplest breakdown of this data indicates that Los Alamos County is 24% child-aged (0-19 years), 58% working-aged (20-64 years), and 18% senior-aged (65+ years).

The median household income, in 2020 dollars for the period of 2016-2020, is slightly over $119,000 for Los Alamos County. The percentage of persons in poverty is 3.3% for the county.

The primary language is English; however, nearly 14% of the population speaks another language (at least 20 different ones) including Spanish and several Asian and Pacific Island Languages.

Housing

Most homes were built before the Energy Policy Act of 1992, which increased the energy efficiency of buildings including the required use of low-flow toilets, urinals, faucets, and showerheads as replacement installations and in new-builds.

US Census Bureau compiles housing data in its Table DP04: Selected Housing Characteristics. The latest dataset available for Los Alamos is the 2019: American Community Survey 5-Year Estimates.

It can be assumed from this information that around 7,000 homes in Los Alamos County were built prior to 1994, when enforcement of the Energy Policy Act of 1992 began. It is unknown how many of these 7,000 homes have done upgrades or retrofits. This provides a potentially large customer base to target with specific conservation efforts like improved appliance efficiency, insulation, and weather stripping.

Landscape preferences vary throughout the county, from extensive lawns to complete xeriscaped yards. Precise numbers of each are unknown but increased water usage during the summer months is indicative of landscape maintenance.

Total Housing Units: 8,384


Pre-1940: 24


1940-1949: 621


1950-1959: 1360


1960-1969: 1570


1970-1979: 1875


1980-1989: 1039


1990-1999: 708


2000-2009: 1064


After 2009: 123

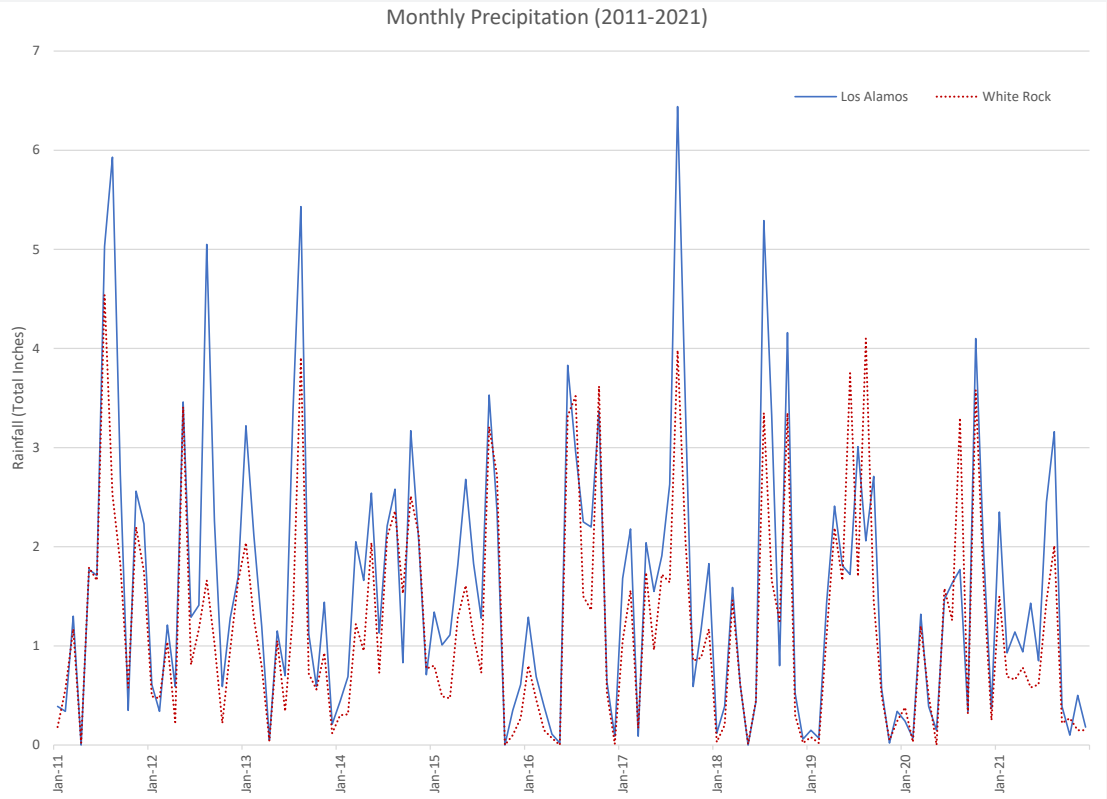
Local Conditions

Climate Trends

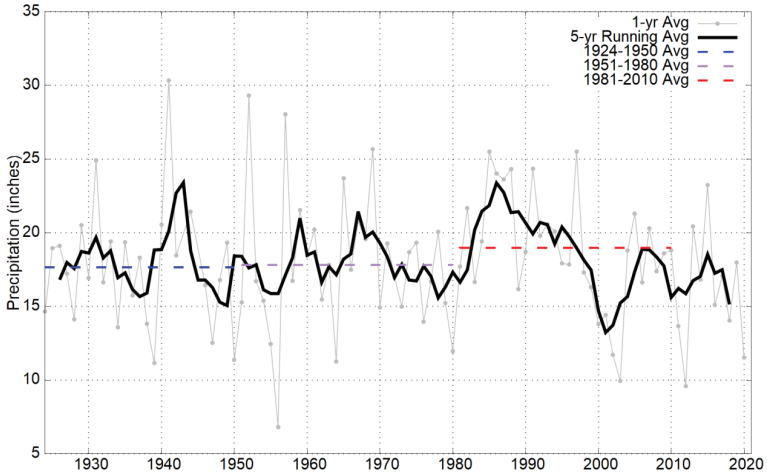
All weather data comes from the LANL Weather Machine, which maintains many weather stations around Los Alamos County. LANL's meteorologists on staff provided data in the following charts. These charts reveal that Los Alamos and White Rock have their own distinct climate systems.

Los Alamos is at a higher elevation – around 1000 feet higher – and closer to the Jemez Mountains than White Rock. Therefore, Los Alamos has a wetter, cooler climate overall. LANL meteorologists recently released the "Los Alamos Climatology 2021 Update," which provides climate statistics for the 30-year, 1991-2020 averaging period. More in-depth information regarding the climate of Los Alamos County can be found in their report.

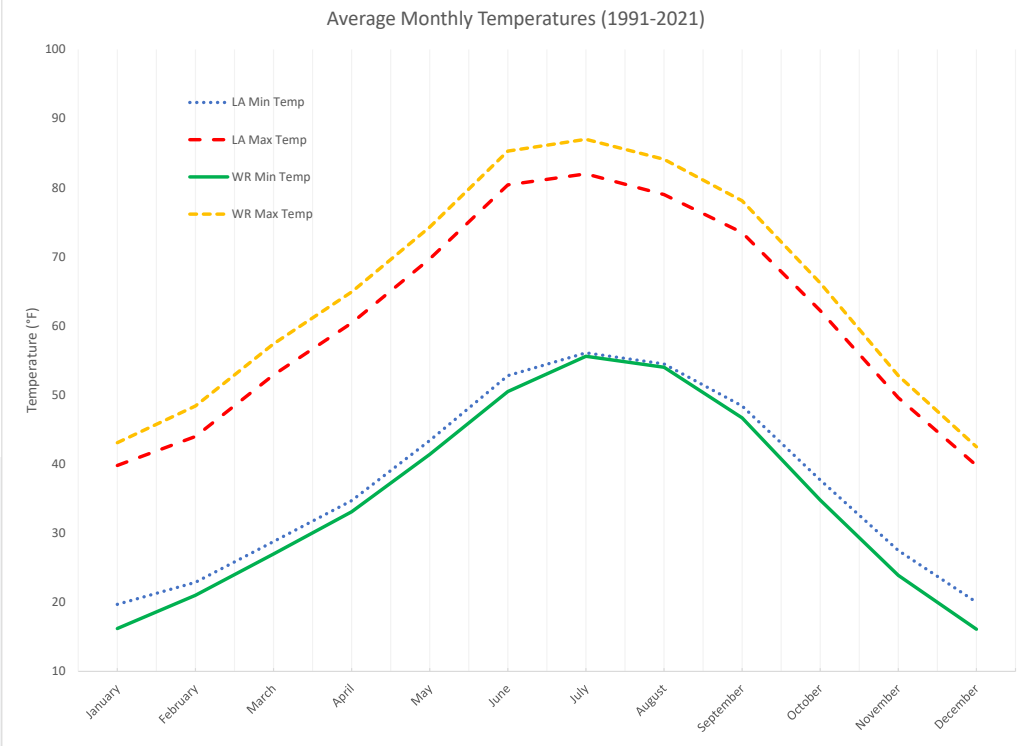
Right: Monthly total precipitation data for Los Alamos (blue solid) and White Rock (red dot) from January 2011 to December 2021. A complete monthly total precipitation chart (1991-2021) can be found in Appendix 2.

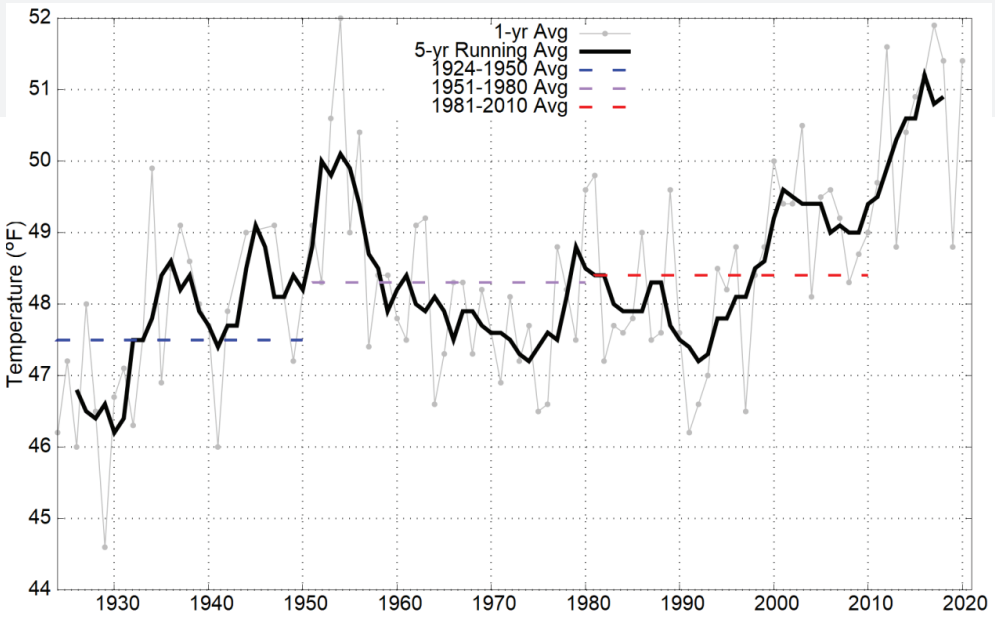


Below: Precipitation history for Los Alamos County (1924-2020) taken from the LANL Climatology 2021 Update, Figure 34.



Prior to 2015, more regular cycles of precipitation associated with the monsoon season (July – September) are visible. After 2015, the precipitation cycle appears more erratic for both Los Alamos and White Rock. The area seems to be experiencing longer periods of no precipitation with intense bursts of heavy precipitation.





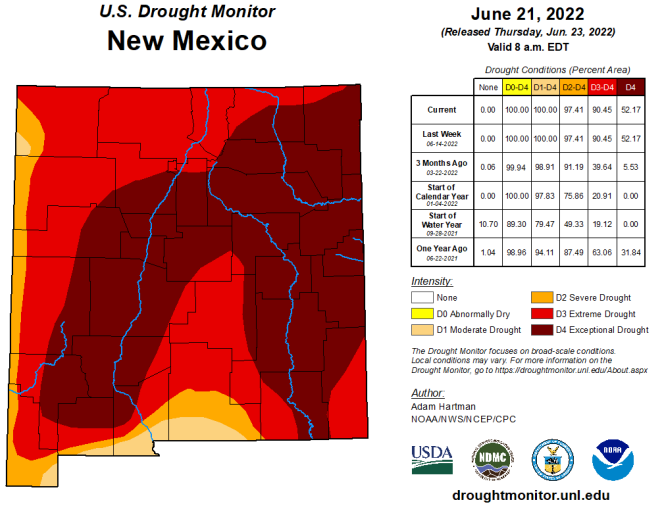
Regarding average monthly temperature, an important note is that the maximum summer temperatures for both communities are creeping toward an average of 90°F for a couple of months, when historically only a few days of the year would reach this temperature. And, although Los Alamos is at a higher altitude, White Rock has lower minimum temperatures when the cold air drains off the Jemez Mountains at night.

The US Drought Monitor (USDM) releases drought maps every Thursday. These maps are based on several numeric inputs, index readings, and satellite-based assessments. It's important to remember that the USDM is not a forecast, but it is a tool to use to trigger drought responses and emphasize the need for conservation efforts.

Top: Average monthly temperatures for Los Alamos (minimum temp is blue dot; maximum temp is red big dash) and White Rock (minimum temp is green solid; maximum temp is yellow small dash).

Middle: Temperature history for Los Alamos (1924-2020) taken from the LANL Climatology 2021 Update, Figure 29.

Right: An example of a USDM Map released June 21, 2022. An interesting note regarding this map: New Mexico recieved rain in the week prior to this map and a majority of the state remains in the worst drought condition category.



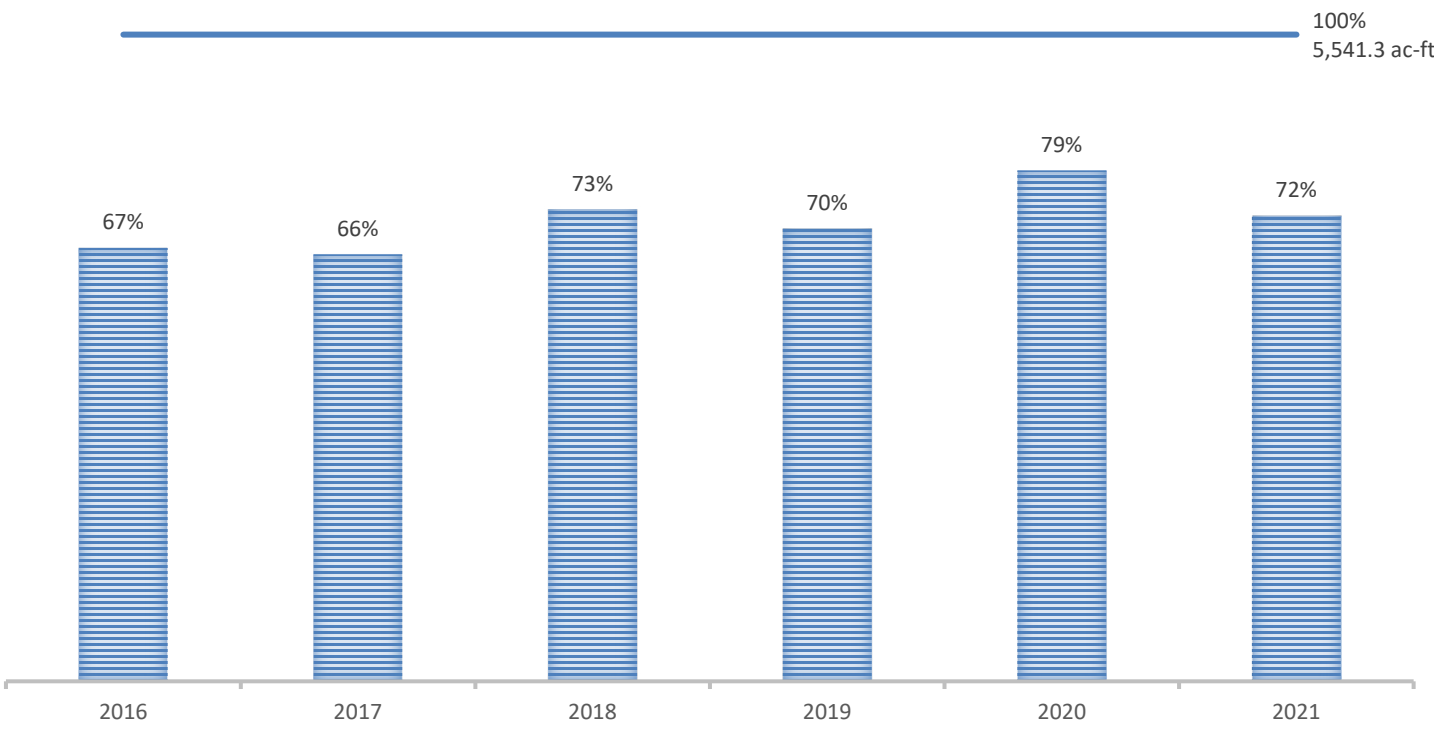
Water Resources and Supply Overview

Water Rights

The DPU provides water service to the users in Los Alamos County, at LANL, and to Bandelier National Monument. DPU began operating the water system in 1998; however, it wasn't until 2001 that ownership and most of the water rights (70%) were transferred from the DOE. The DPU leases the remaining water rights owned by DOE. This agreement was renewed for an additional 10 years in Fiscal Year 2021. Within this agreement, there is no limit to the amount of water that DPU must provide to LANL. LANL's usage has yet to exceed any designated water rights, and it maintains a site-wide Water Conservation Program Plan.

Water rights in use for Los Alamos County total 5,541.3 acre-feet per year and are comprised of a combined right of groundwater and surface water. From the 1960s to the present, total water consumption hovers between 4,000 and 5,000 acre-feet per year.

PERCENTAGE OF WATER RIGHTS UTILIZED



Water rights usage data is tabulated from each water production well meter.

Demand Projections

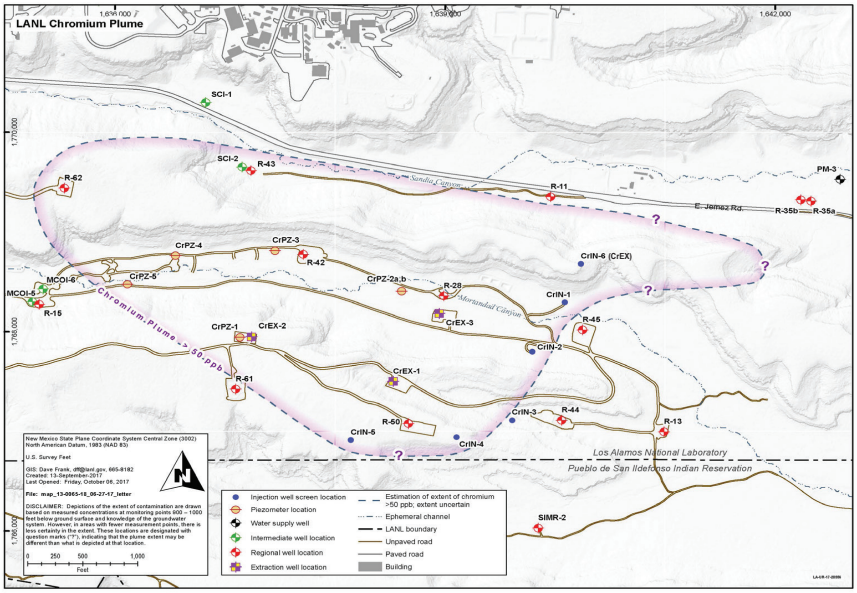
Daniel B. Stephens and Associates, Inc., completed an update to the Long-Range Water Supply (LRWS) Plan and it was approved by the BPU in January 2018. The LRWS Plan focuses on long-term water planning, and projects two possible outcomes as part of its demand forecast. This table shows the projected demands with and without LANL usage based on low (decreasing population) and high (increasing population) estimates.

Year	Population Projection		Projected Demand (ac-ft/yr)		Total Projected Demand-includes LANL (ac-ft/yr)	
	Low	High	Low	High	Low	High
2020	17,988	20,000	2,716	3,020	3,634	3,938
2030	17,789	20,812	2,686	3,143	4,191	4,648
2040	17,123	21,447	2,586	3,239	4,091	4,744
2050	16,480	21,874	2,488	3,303	3,993	4,808
2060	15,863	22,092	2,395	3,336	3,900	4,841

Potential Concerns

Los Alamos County's water rights are junior to several downstream senior water rights holders. With additional growth (population, tourists, and work force) in Los Alamos County and other areas and requirements to sustain endangered species and wetland habitats, there is the potential that protection of the senior water rights could impact long-term allocation of Los Alamos County's water rights, even over the next 40 years. Additional water rights concerns include Rio Grande Offset Requirements and the difficulty in finding willing sellers of water rights, and the potential impact of the Navajo Water Rights Settlement provisions on the San Juan-Chama Project water rights.

Approximate location of chromium plum. Located southest of Los Alamos townsite and northwest of White Rock.



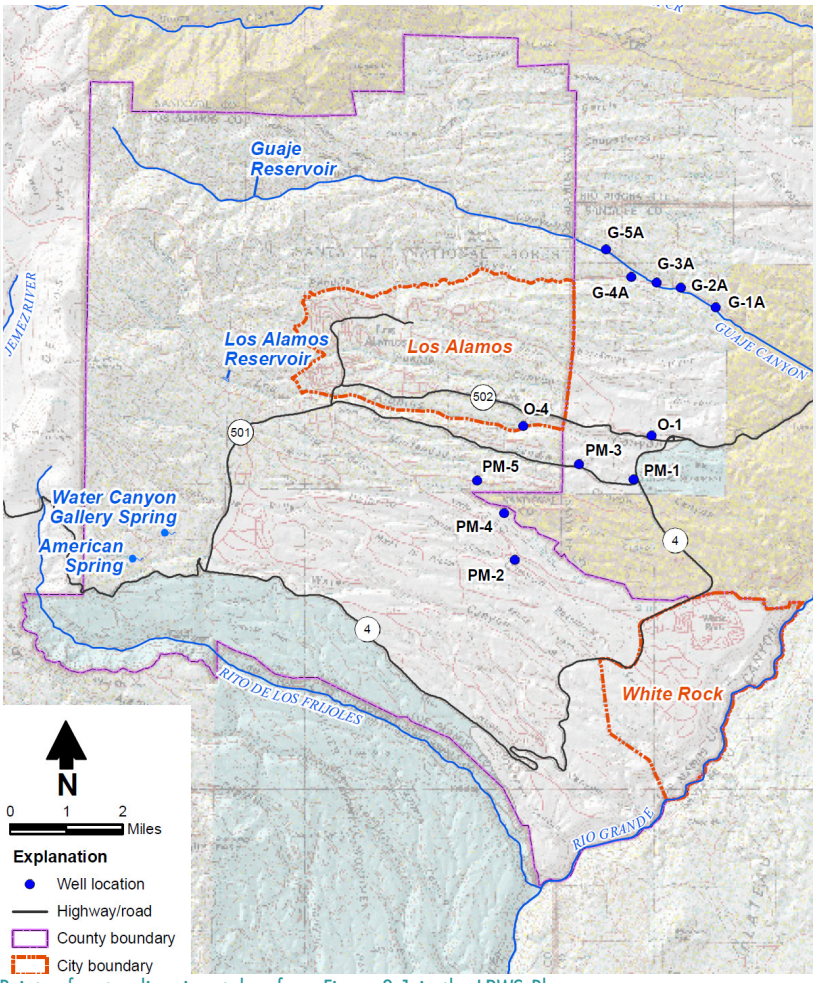
The risk of contamination of the current and/or future groundwater supply for Los Alamos County and its service members should be acknowledged. The DPU protects drinking water sources with sound well placement and construction as well as maintaining top-performing system operations and management. The DOE is currently assessing the extent of and remediation measures for a hexavalent chromium plume that is present in the regional aquifer.

The impacts of a changing climate are one of the biggest factors out of the control of DPU and DOE. Increasing temperatures and decreasing precipitation totals will strain existing water resources. Evaporation of surface water sources and lower recharge rates of groundwater resources need to be realized as possible threats to water availability for Los Alamos County.

"An application for permit to change an existing water right was filed jointly by DOE and the LACWU [DPU] in May 2016, in support of the chromium interim measure project that will run through December 2023...The application requests a change in purpose of use for groundwater to add groundwater remediation and additional groundwater points of diversion to be used for control and future characterization of hexavalent chromium-contaminated groundwater...The projections assume that the water supply remains available in terms of water rights and contamination, and do not take into account the possibility of treating and using contaminated groundwater." -LRWS Plan

Water Resources and Supply Overview

Water Sources



Points of water diversion, taken from Figure 2-1 in the LRWS Plan.

Los Alamos County is currently supplied by 12 active wells that range in depth from 1,519 feet to 3,092 feet. All water is drawn from the regional aquifer beneath the Pajarito Plateau. Currently, groundwater supplies potable water from the Guaje, Pajarito, and Otowi well fields. An additional well has been drilled in the Otowi well field and will be complete in late 2022, pending material availability and supply chain issues. This well, Otowi 2, reaches a depth of 2,520 feet and will be one of DPU's largest water-producing wells, pumping between 1,200-1,300 gallons per minute.

While the County's water rights of 5,541.3 acre-feet include both surface water and groundwater, the DPU supplies its potable water for customers solely from groundwater sources. Surface water sources are primarily used for irrigation purposes and as emergency supplies for wildfires. Surface water sources include: Water Canyon Gallery Spring, Los Alamos Reservoir, Guaje Reservoir, Camp May , and the unused contracted rights in the San Juan-Chama Project.

Los Alamos Reservoir Repair

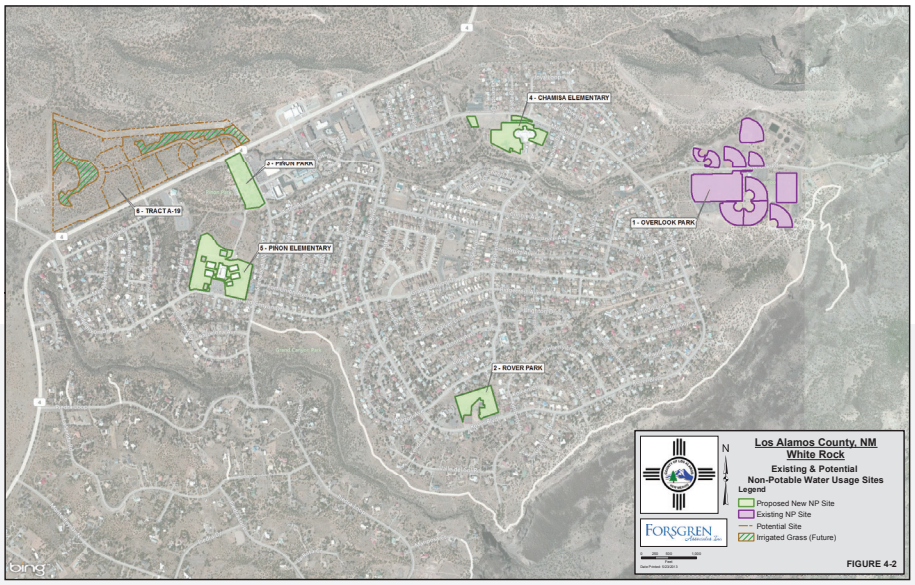
The Los Alamos Reservoir was severely damaged after the Cerro Grande Fire in 2000 and again by the Las Conchas Fire in 2011. The reservoir has been impacted by siltation and transmission pipeline breaks because of intense and catastrophic flooding events ever since. DPU has been awarded a grant from the River Stewardship Program to help address the erosion in this watershed impacting the stream and reservoir quality and to stabilize the access pipeline and roadway. The project will clear debris and use natural channel design to restore the water channel and floodplain above and below the reservoir. It is expected to begin in the summer of 2023.

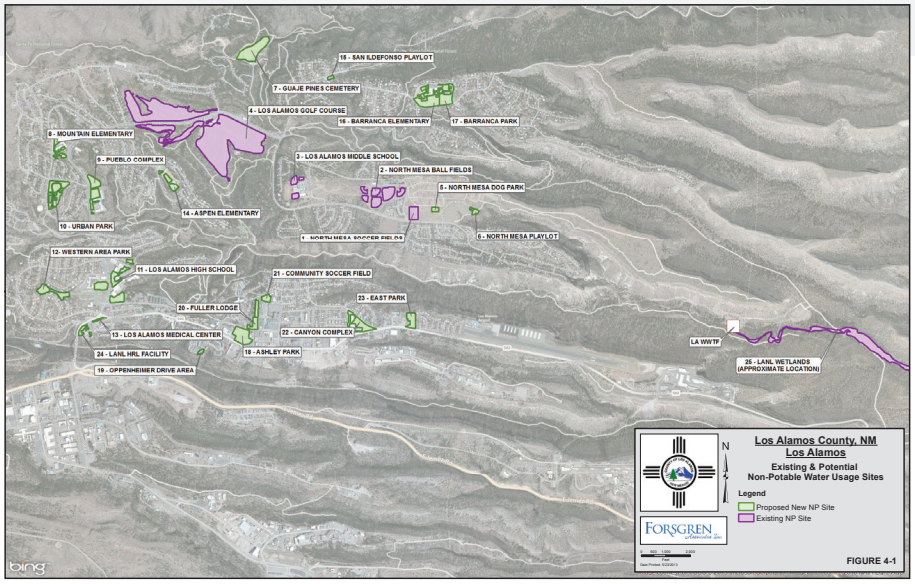
San Juan-Chama Project

The San Juan-Chama Project, in the Colorado River Basin, is geographically separate from the current regional aquifer DPU utilizes for potable water. Should DPU decide to implement access to this project, this source water would help to diversify Los Alamos County's water supply. The County is contracted for 1,200 acre-feet of the San Juan-Chama Project with the US Department of the Interior Bureau of Reclamation. More information about the development of this water right can be found in Section 4.2.1 of the LRWS Plan.

Reclaimed Water

Wastewater is currently treated at the Los Alamos Wastewater Treatment Plant (WWTP) and the effluent is used to maintain a wetland downstream of the WWTP and to irrigate four different sites in Los Alamos: North Mesa Soccer Field, North Mesa Ball Fields, and Los Alamos County Golf Course. Effluent from the White Rock WWTP is used to irrigate Overlook Park. Per the Fiscal Year 2021 DPU Annual Report, 116 million gallons of reclaimed water was used to irrigate green spaces throughout the county.





Locations of non-potable/reclaimed water irrigation sites in White Rock (top) and Los Alamos townsite (bottom). Figures taken from the Non-Potable Water System Master Plan.

Los Alamos' original golf course began using reclaimed water in 1945 (the first in the nation to do so) and White Rock began irrigating Overlook Park with reclaimed water in 1985. DPU continues to evaluate the expansion of reclaimed water use per the guidance of the Los Alamos County Non-Potable Water System Master Plan, last updated in 2013.

The Non-Potable Water System Master Plan was prepared to optimize the use of effluent and surface water for irrigation purposes. This master plan helps DPU review existing infrastructure, evaluate existing and potential future irrigated sites, develop a realistic demand for system build-out, and recommend system improvements. This resource continues to serve as a planning tool for non-potable projects, and, as such, there is no timeline to update the Non-Potable Water System document.

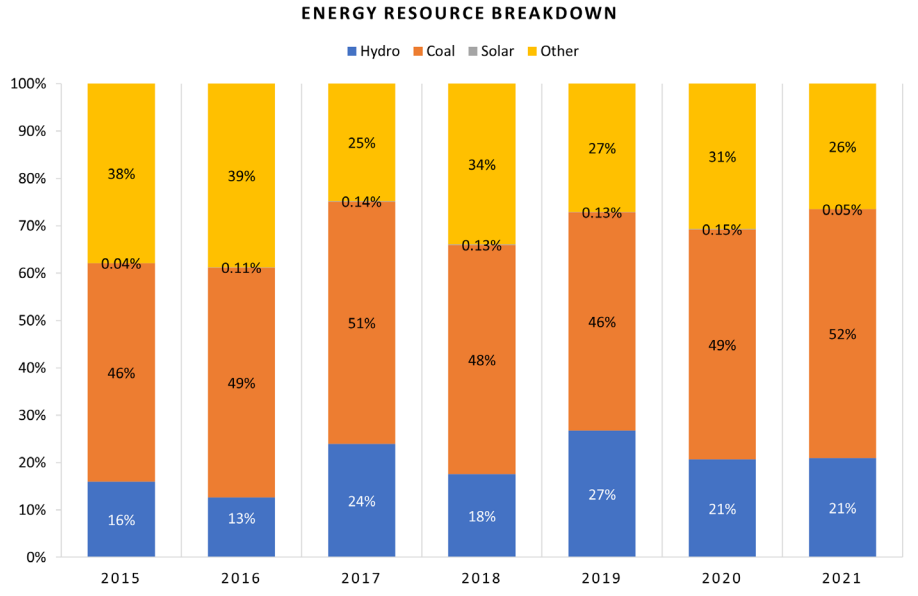
Expansion of the non-potable system is supported by loan/grant funding from the New Mexico Finance Authority Water Trust Board, which is applied for annually.

Electrical Resources and Supply Overview

System Components

The DPU and the DOE are joined in an ECA which allows each entity to combine resources for the Los Alamos Power Pool. The Power Pool purchases, sells, and schedules the power requirements for Los Alamos County customers and LANL. The current ECA expires in 2025 and both parties are working on negotiations for a post-2025 ECA.

Los Alamos County owns and operates the electric distribution system in Los Alamos and White Rock, and manages the Power Pool resources 24 hours a day, 365 days a year. However, the County does not own any transmission systems to get the electricity to its customers. The Public Service Company of New Mexico (PNM) provides the transmission service into Los Alamos County. DOE owns the transmission system within the county that serves both LANL and Los Alamos County. The Power Pool utilizes PNM's network to bring energy to the DOE system, and then the DOE's system feeds the County's switching stations, which distribute power to DPU customers.



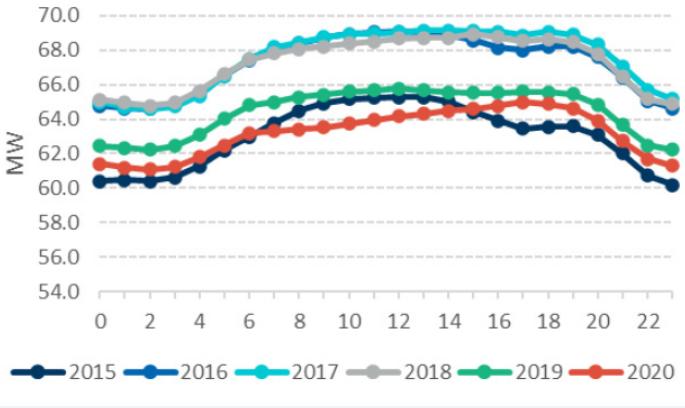
County assets of the Power Pool:

- San Juan Generating Station Unit 4 (coal, 36 megawatts)
- Laramie River Station entitlement (coal, 10 megawatts)
- El Vado hydroelectric facility (hydropower, 8 megawatts)
- Abiquiu hydroelectric facility (hydropower, 17 megawatts)
- Los Alamos Western Area Power Administration entitlement (hydropower, 1 megawatt)
- East Jemez Landfill photovoltaic array (solar, 1 megawatt)
- County transmission agreements
- County purchased power contracts
  - UNIPER, 2 agreements (wind and solar, 15-25 megawatts) *note: active as of 2022, and not relected in above chart

Demand Projections

The Los Alamos County distribution system consists of the townsite substations, which provide power to approximately 7,507 customers and LANL in Los Alamos, and the White Rock substation, which provides power to approximately 2,815 customers.

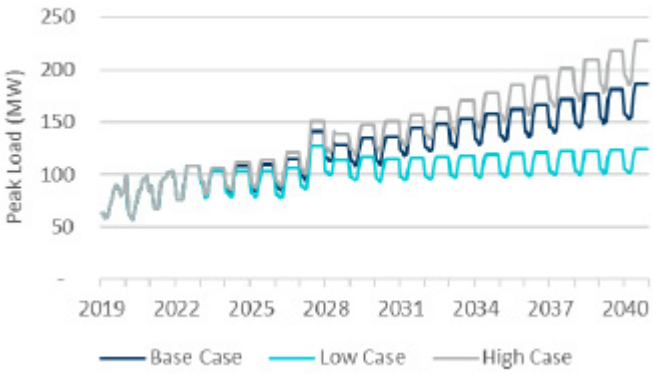
The IRP provides load forecasts and demand projections based on several inputs of the ECA partners. This plan recognizes that Los Alamos County load and demand projections are driven by population growth and commercial activity. The LANL load is driven by mission change and pace of operation.



Los Alamos Power Pool Hourly Demand Summary, 2015-2020.
Taken from the 2022 IRP, Exhibit 48.

The Power Pool will also need to accommodate additional electrical needs for new housing units in White Rock and apartment complexes in Los Alamos townsite. The pace of electrical vehicle adoption and additional electrification as people switch away from natural gas also need to be considered.

Potential Concerns



Los Alamos Power Pool Peak Load Forecast.
Taken from the 2022 IRP, Exhibit 57.

Providing a reliable source of electricity is the overarching concern for both electrical production and electrical distribution. As more and more electrical providers switch to renewable sources, there may be periods where there aren't enough renewable sources to match load. This issue is exacerbated by the slow construction of renewable sources because of material availability and required labor needs. Going forward, production sources need to be balanced: bringing renewable sources online as fossil fuel sources are phased out.

Transmission line concerns affect both production and distribution. Existing transmission lines can only carry so much electricity. As conversions from gas to electric continue, the demand for more electricity will increase, putting strain on existing lines and forcing the need for additional transmission lines from electrical production resources. Sourcing transformers is a concern on the distribution-side of transmission lines. DPU is in the process of replacing transformers and, like most supply-demand issues currently, is having to delay the progress of this project because of the slow pace of the manufacture of transformers.

Another potential concern that can be alleviated with planning is the maintenance, both planned and unforeseen, that takes power production sources offline for a given period of time. While the DPU has a goal response time of 60 minutes, known as SAIDI (System Average Interruption Duration Index), the occasional issue can take longer to resolve.

Electrical Resources and Supply Overview

Renewables

One of the strategic objectives approved by the BPU is for the DPU to become a carbon neutral electric provider by 2040.

Current electric resources utilized by the DPU for the Power Pool and considered renewable/clean energy are the El Vado and Abiquiu hydroelectric facilities, the hydropower provided from the WAPA entitlement, and the East Jemez Landfill photovoltaic array. The energy supplied to Los Alamos County that comes from these renewable resources hovers around 20% annually.

Recently, the DPU entered into two power purchase agreements with Uniper Global Commodities to bring solar and wind energy to Los Alamos County. The first began delivering energy in January 2022. This agreement is for 15 MW of wind and solar energy over 15 years with a subscribed output of 76% renewable energy. The wind portion of this agreement is online, but the solar is delayed due to material shortages. The second agreement is for 25MW and will be delivered from October 2022 to June 2025. Any excess megawatts generated from the first agreement will roll over to be a part of the second agreement. The 25 MW agreement will have a subscription output of 26% renewable energy.

WAPA contracted resources are subject to having an updated conservation plan as well as a current IRP agreement. The IRP agreement, a planning tool to guide the ECA in providing for future resources, was negotiated and extended until the year 2057.

An additional Power Pool resource being pursued, and discussed more thoroughly in Part II, is:

- Carbon Free Power Project (CFPP): a power generation facility that utilizes small modular reactor technology. There is potential to receive up to 8.3 MW from this resource. The facility is scheduled to be operational by 2030 and will be sited at the Idaho National Laboratory.

Non-Renewables

With the goal to become a carbon-neutral provider, the DPU is beginning to phase out its coal-powered resources.

The DPU is a partial owner in the San Juan Generating Station 4 near Farmington, NM. This station was planned to sunset at the end of June 2022. However, with the unavoidable delay in getting replacement renewable resources online and the timing of a power purchase agreement gap (Uniper coming online in October 2022), the BPU proposed to extend the San Juan agreement through the end of September 2022.

The DPU has a life-of-plant entitlement with the Laramie River Station in Wheatland, WY, with plant closure slated for 2040-2042. Opportunities continue to be sought for the DPU to capitalize on its long-term agreement by potentially swapping for renewable resources. In parallel, a negotiation for a hard exit, if an option exists, will be pursued in accordance with the BPU adopted goal.

Gas Resources and Supply Overview

The DPU owns and operates its natural gas distribution system. The regional transmission pipelines are owned and operated by New Mexico Gas Company. There are two sources of supply available for Los Alamos County. From these regional lines, two stations supply Los Alamos townsite and one station supplies White Rock.

Fiscal year 2022 has an average customer base of 7,263 residential units and 430 commercial, municipal, or educational units. These numbers fluctuate for any number of reasons, including households moving, seasonal residents, and businesses changing spaces.

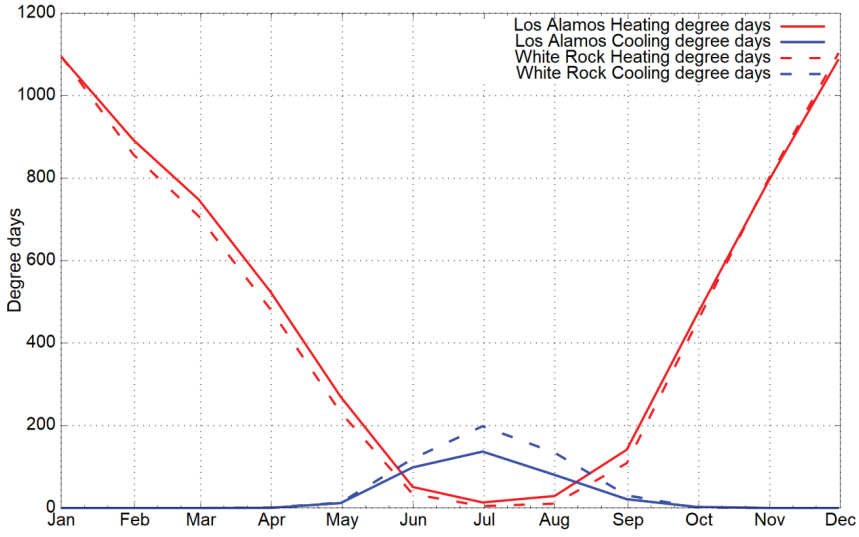
Demand Projections

The DPU has an ultimate goal of eliminating natural gas use by 2070. Demand projections include the reduction of natural gas usage each year. While simple in concept, achieving these reduced projections in practice may be far more challenging. Gas consumption is only predictable at a base level—the amount customers might use to heat water and run appliances. Other uses, primarily heating buildings, are dependent on weather patterns and much less predictable. What may look like a solid success in one year could be followed by failure to meet the reduction in the next due to uncontrollable weather-related circumstances.

Potential Concerns

There are few concerns with the gas supply specifically. Locally, freezing isn't an issue, and the risk of earthquakes damaging pipes is of low concern. However, supply issues from regional sources and systems can impact the Los Alamos system. For example, the failure of gas operations during the deep freeze in Texas in February 2021 caused a regional rate spike.

Another concern is related to the long-term elimination goal. As customers phase out natural gas usage in their homes, eventually gas rates will need to increase significantly for those still using natural gas to cover the DPU's cost of gas. This won't be obvious in the beginning, but it will cost the same to operate the natural gas system for 400 customers as it does 8000 customers. The DPU will need to plan for this transition.



Monthly average heating and cooling degree day (1991-2020).
Taken from the LANL Climatology 2021 Update, Figure 5.

Assessing Supplier Performance: Water

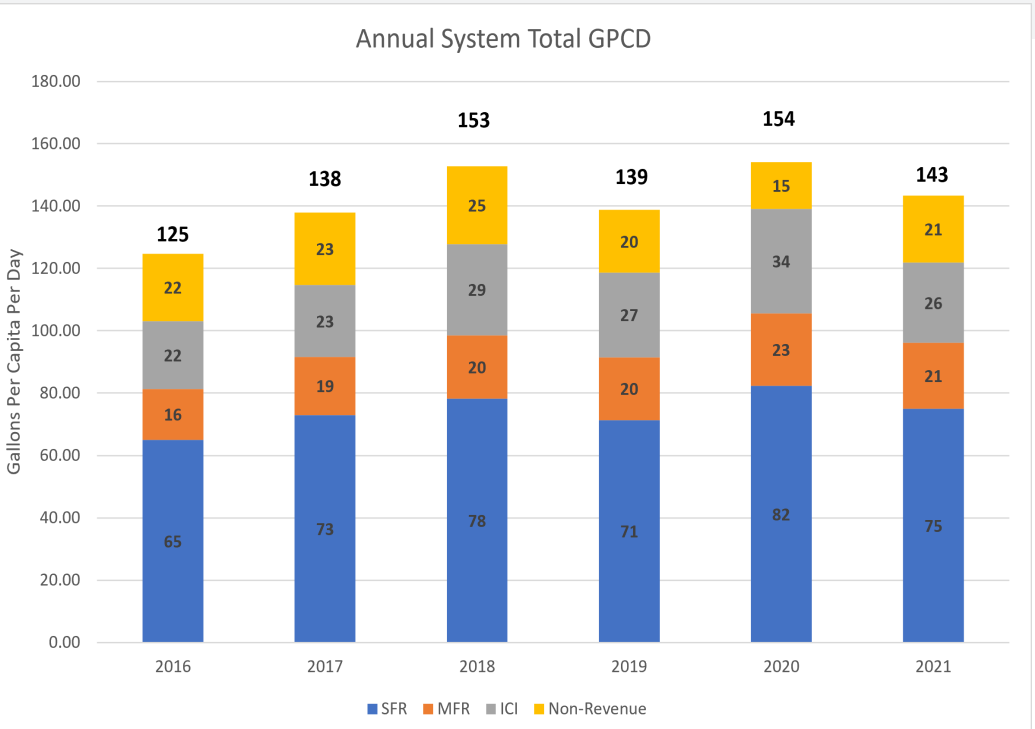
Water demand and consumption is tracked using a variety of metrics. All of the metrics rely on the base data pulled from the utility billing system, Munis.

Leak Detection Surveys

A system leak detection survey is conducted on a 5-year cycle. 20% of the total system is targeted annually. Each year a different part of the system is surveyed, and the leaks are classified into three categories: Class 1-3. Class 1 leaks are deemed hazardous and could result in damage to the utilities. Class 2 leaks display water losses significant enough to be monitored on a regular repair schedule. Class 1 and 2 leaks are repaired immediately. Class 3 leaks are relatively small and are repaired as workloads permit.

Gallons Per Capita Per Day

The NMOSE's Gallons Per Capita Per Day (GPCD) is a spreadsheet calculator completed and submitted annually to the NMOSE as a compliance piece for Los Alamos County water rights. This spreadsheet will be used to compare the County's water consumption with other communities in the southwest to help develop water conservation goals.



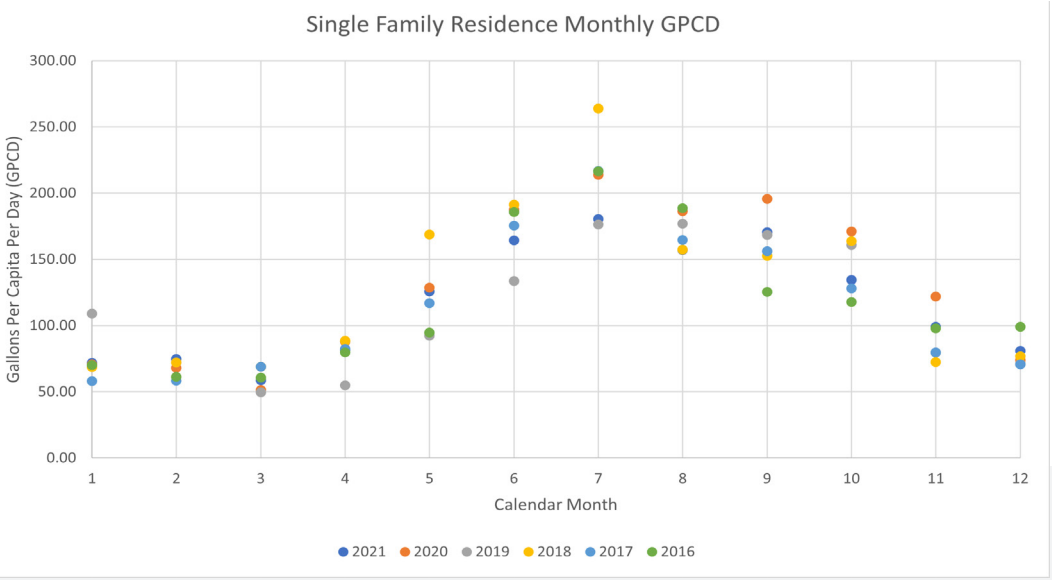
The GPCD charts in this plan report on the years 2016 to 2021. Household data is pulled from the 2010 Census. 2020 Census data was not released at the time of the 2021 GPCD update. Average household size for the reporting period is determined, by Census data, to be 2.33 persons. The populations for Single Family Residence (SFR) and Multi-Family Residence (MFR) are calculated using average household size multiplied by the number of connections associated with each customer category. GPCD for each category is formulated by dividing class consumption by class population. All values are auto-calculated in the NMOSE GPCD spreadsheet.

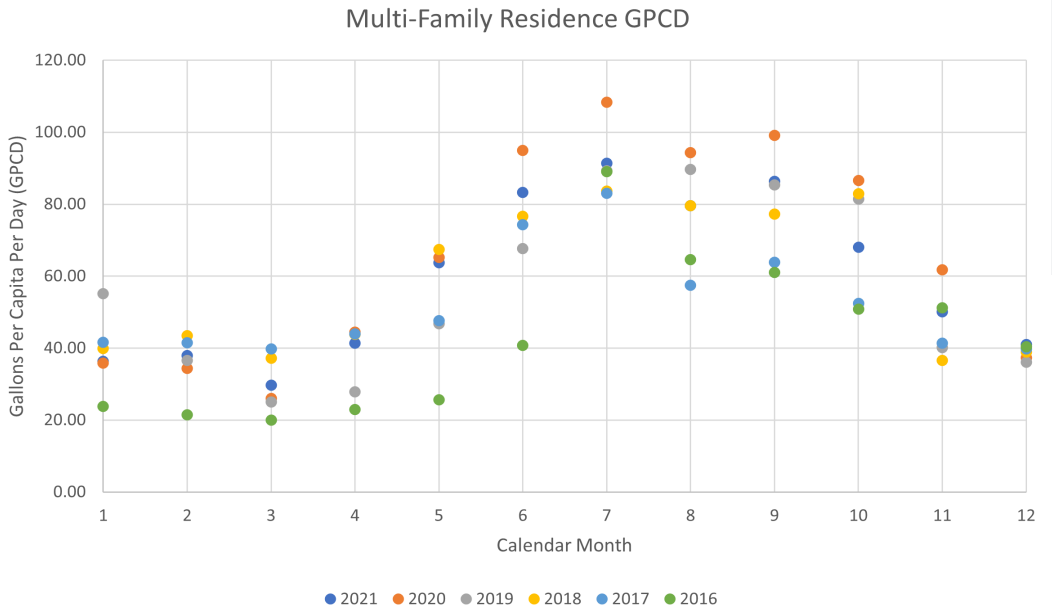
Lower Left: Los Alamos County total system annual Gallons Per Capita Per Day broken down into customer class and Non-Revenue water.

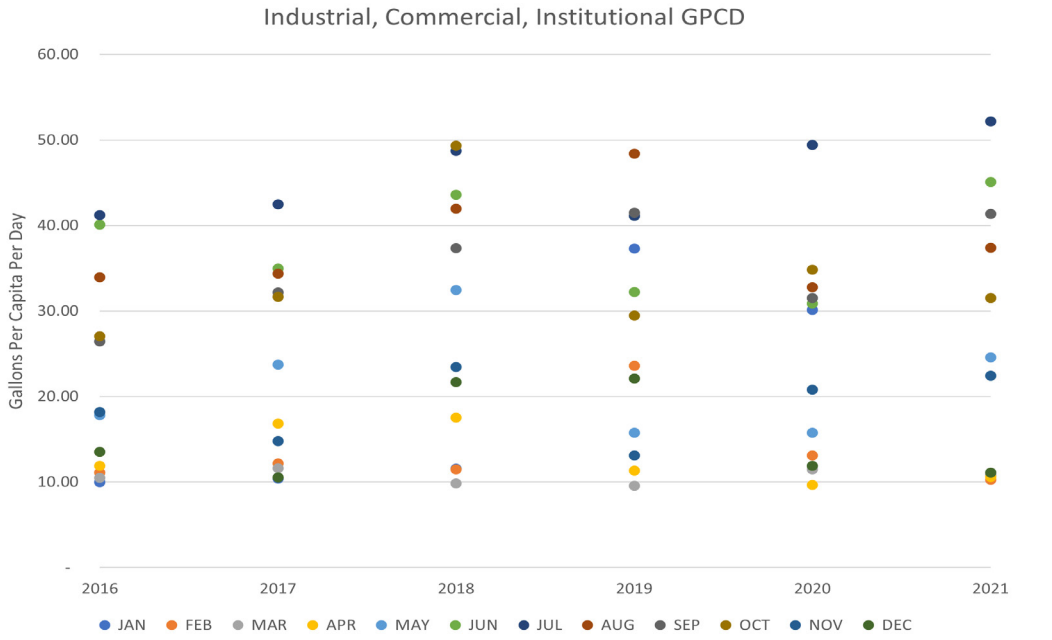
This page: Charts compiled from the NMOSE GPCD calculator. THe top chart graphs the GPCD of Single Family Residences while the middle graphs the GPCD of Multi-Family Residences. The bottom chart graphs all commercial, municipal, and educational facility (refered to as "Industrial, Commercial, Institutional by the calculator) GPCD.

These values are for all of Los Alamos County and are not broken into community. More information on the difference between the two communities can be found in Part II, Goal 5.

Monthly total system GPCD for 2016 - 2021 can be found in Appendix 1 of this plan.



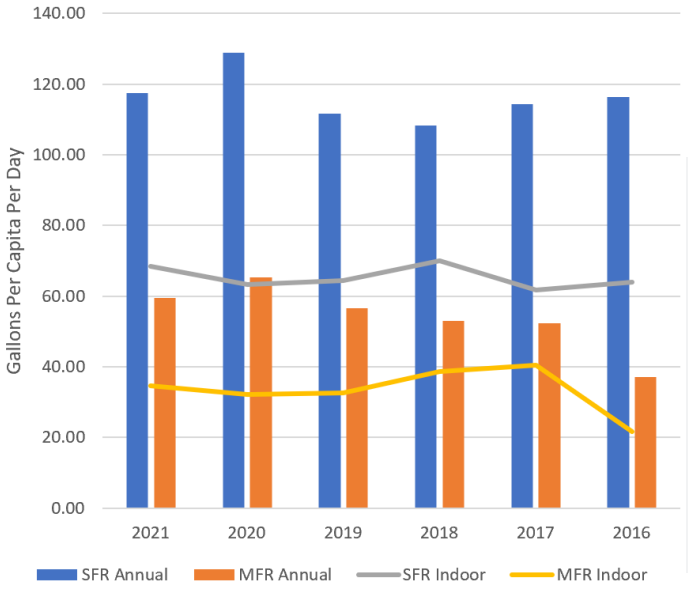




Assessing Supplier Performance: Water

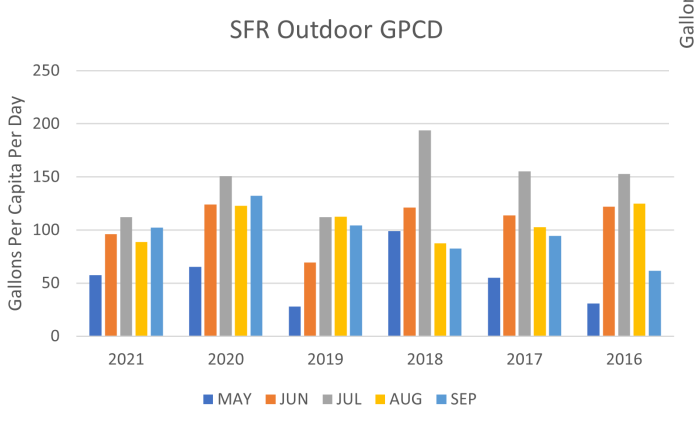
Indoor GPCD

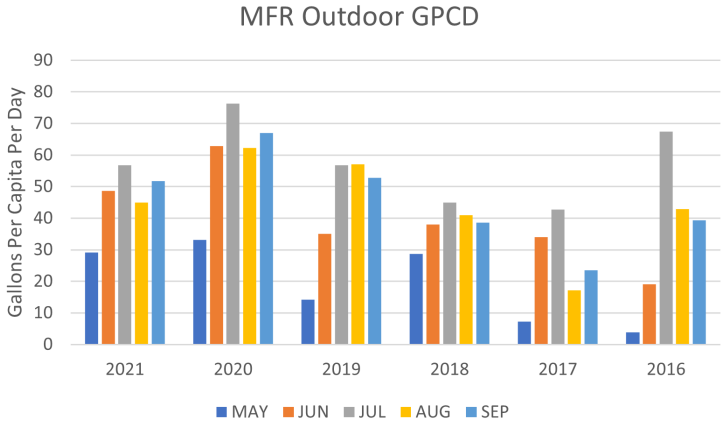
Using the GPCD calculator, indoor and outdoor water usage can be estimated. Indoor water consumption is calculated by averaging the three months - of the four winter months between December and March - with the lowest water use. Indoor GPCD is graphed with the annual GPCD for these two customer classes.



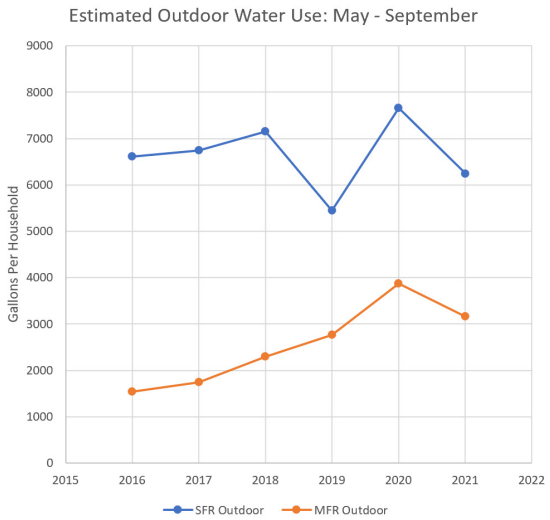
Outdoor GPCD

While reducing indoor water use is a common water conservation strategy, outdoor water use is a significant percentage of total water usage. This is expanded more in Part II, Goal 5 of the conservation program. Outdoor GPCD is calculated by subtracting the average monthly indoor GPCD from the total monthly GPCD. The charts below provide a detailed monthly breakdown of GPCD during peak water-use months (May to September). It is important to notice the difference in scales between these two charts.





Alternatively this line graph displays outdoor water usage in gallons per household instead of GPCD because outdoor water usage is irrelevant of the number of household occupants.



Utilities Water Audit

The American Water Works Association (AWWA) Water Audit is a requirement of the NMOSE to standardize a method of auditing water utilities when calculating the percentage of non-revenue water. The AWWA Water Audit tracks water from the point of withdrawal, or treatment, all the way through to the point of delivery to the customer.

Two of the important figures this audit helps to identify, which the DPU can then work to reduce, are apparent losses and real losses. Apparent losses include all types of inaccuracies associated with metering, data handling errors, and theft of water. Real losses are breaks or leaks in the water system on the supplier side on to the point of customer consumption. Below are results from the 2020 and 2021 (inside red box) audits. The Water Audit Data Validity Score (a measure of the reliability of available data provided in the audit) is the same for both years.

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 72 out of 100 ***

System Attributes:	2020	2021	
Apparent Losses:	21.840	20.429	MG/Yr
+ Real Losses:	122.499	106.564	MG/Yr
= **Water Losses:**	**144.340**	**126.993**	MG/Yr
? Unavoidable Annual Real Losses (UARL):	46.75	46.74	MG/Yr
Annual cost of Apparent Losses:	$126,456	$122,983	
Annual cost of Real Losses:	$709,270	$641,512	Valued at **Customer Retail U**
			Return to Reporting Worksheet to chang
Performance Indicators:			
Financial: Non-revenue water as percent by volume of Water Supplied:	15.7%	14.9%	
Non-revenue water as percent by cost of operating system:	5.9%	3.9%	Real Losses valued at Customer
Operational Efficiency: Apparent Losses per service connection per day:	8.41	7.87	gallons/connection/day
Real Losses per service connection per day:	47.18	41.06	gallons/connection/day
Real Losses per length of main per day*:	N/A	N/A	
Real Losses per service connection per day per psi pressure:	0.73	0.63	gallons/connection/day/psi
From Above, Real Losses = Current Annual Real Losses (CARL):	122.50	106.56	million gallons/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	2.62	2.28	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

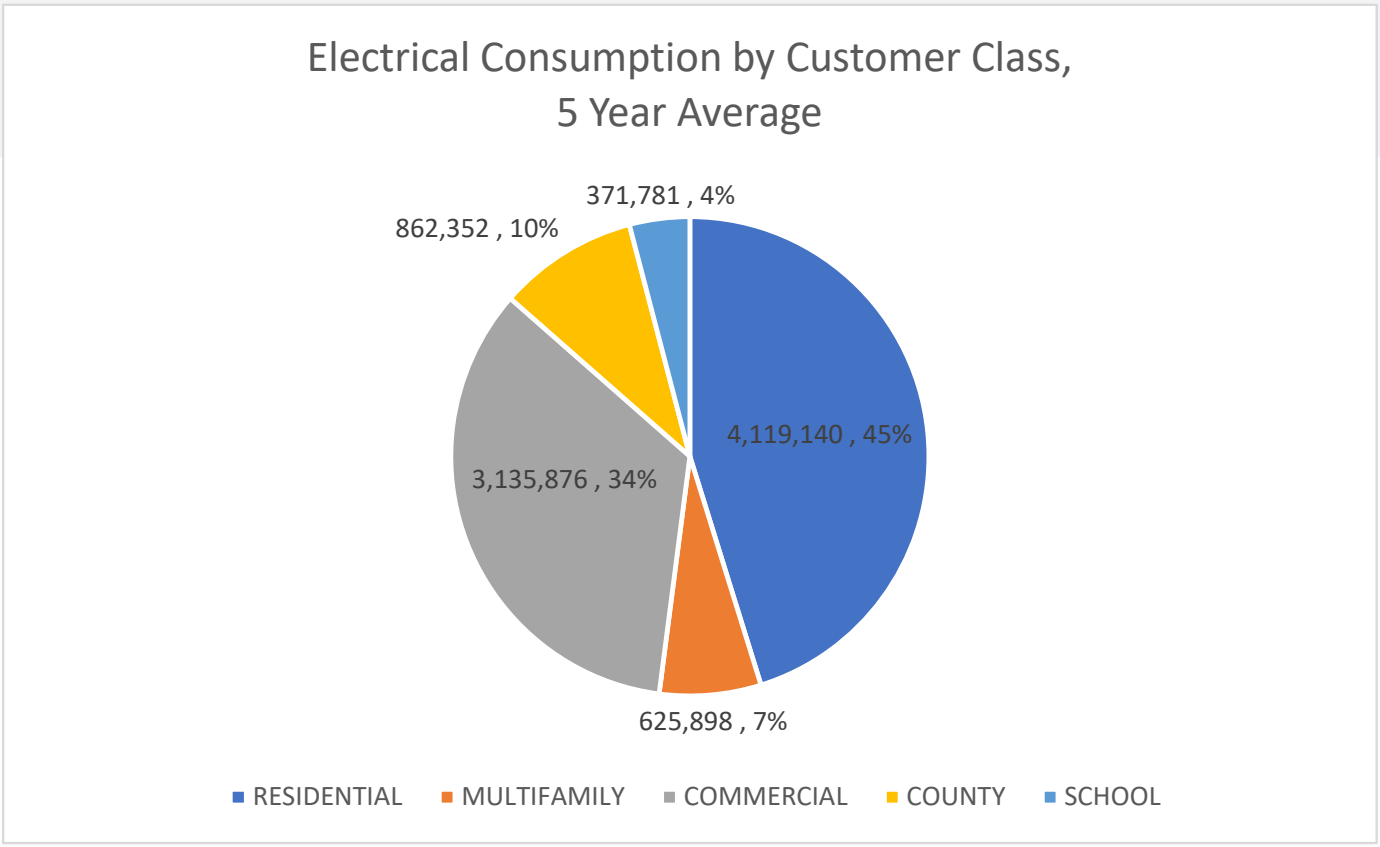
"Apparent Losses" decreased from 2020 to 2021 and this is in part to the installation of the advanced metering system on all water meters, which allow for leaks to be detected sooner and meters to provide more accurate readings. Additional guidance is provided within the AWWA Water Audit to decrease the DPU's non-revenue water and subsequent cost to the system, presented in the table below.

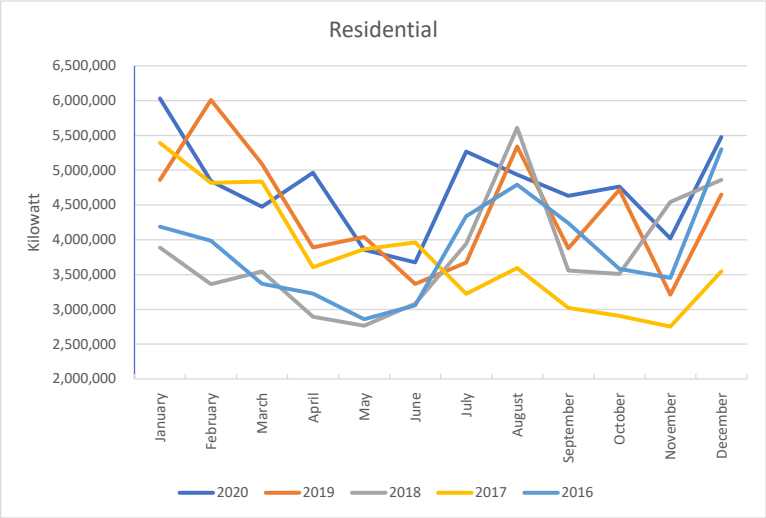
Audit data collection	Short-term loss control	Long-term loss control	Target-setting	Benchmarking
Refine data collection practices and establish as routine business process	Refine, enhance, or expand ongoing programs based upon economic justification	Conduct detailed planning, budgeting, and launch of comprehensive improvements for metering, billing, or infrastructure managment	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Performance Benchmarking -Infrastructure Leak Index is meaningful in comparing real loss standing

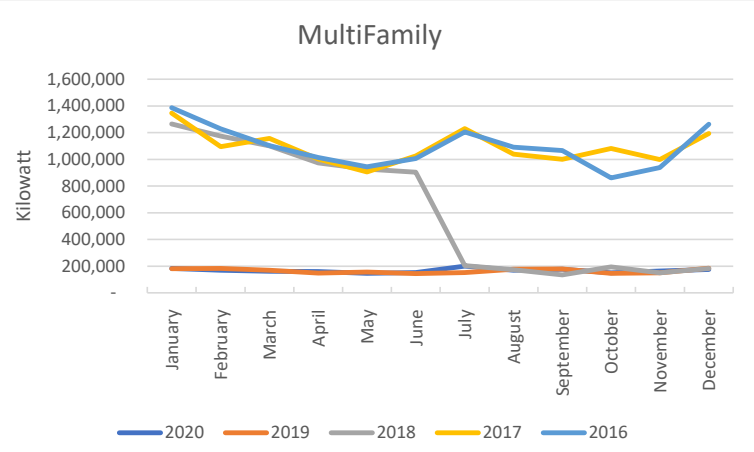
Assessing Supplier Performance: Electric

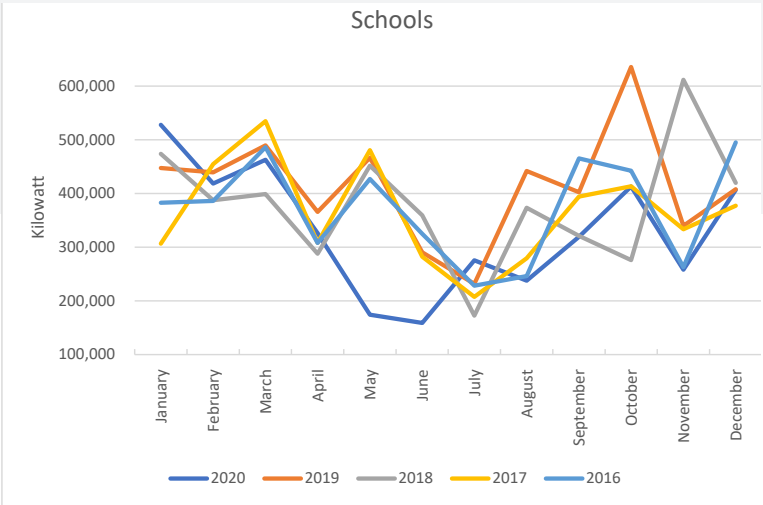
Electrical performance is tracked differently for power supply and electric distribution.
Power supply uses internal spreadsheets that calculate demand and losses. Losses are handled financially.
Electric distribution is tracked primarily through Munis and the consumption reports created using its data.

Below is a pie chart showing the 5-year (2016-2020) average of electrical consumption by customer class. This is an example of one of the consumption charts created through Munis.









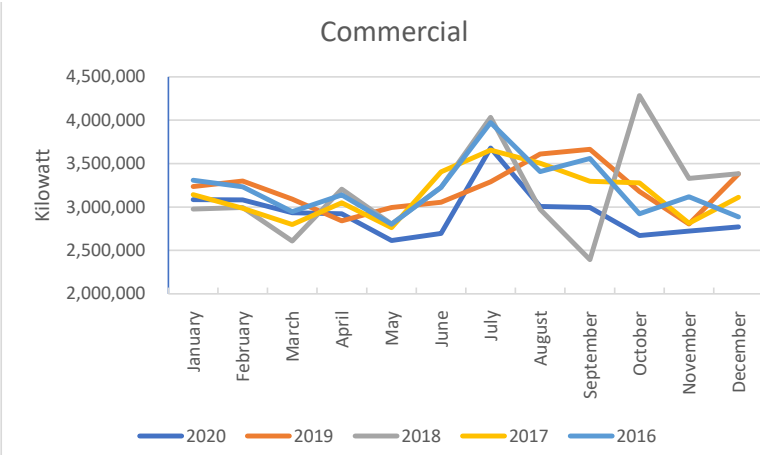
Listed are the consumption charts for each customer class for the last 5 years.

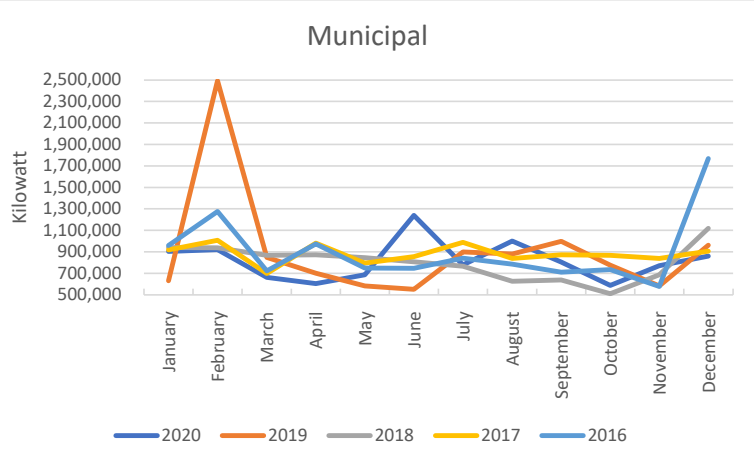
No data collection, tracking, and reporting method is without flaws, but by knowing and understanding the general usage of each customer type, outliers can be identified and determined if it was indeed a change in usage or an issue with data collection and metering.

For example, the DPU switched to the Munis system in July 2018. The Munis system categorizes the definition of "MultiFamily" differently than the previous system. Notice the drop in MultiFamily usage in July 2018 and the uptick in usage for Residential in July 2018 and beyond.

A non-Munis fluctuation is shown with the schools. Electricity usage drops dramatically in March 2020 through June 2020 as the schools were closed due to the COVID19 pandemic.

The Commercial and Municipal spikes in late 2018 and early 2019, respectively, are related to meter reading and billing issues are because of the Munis switch over.



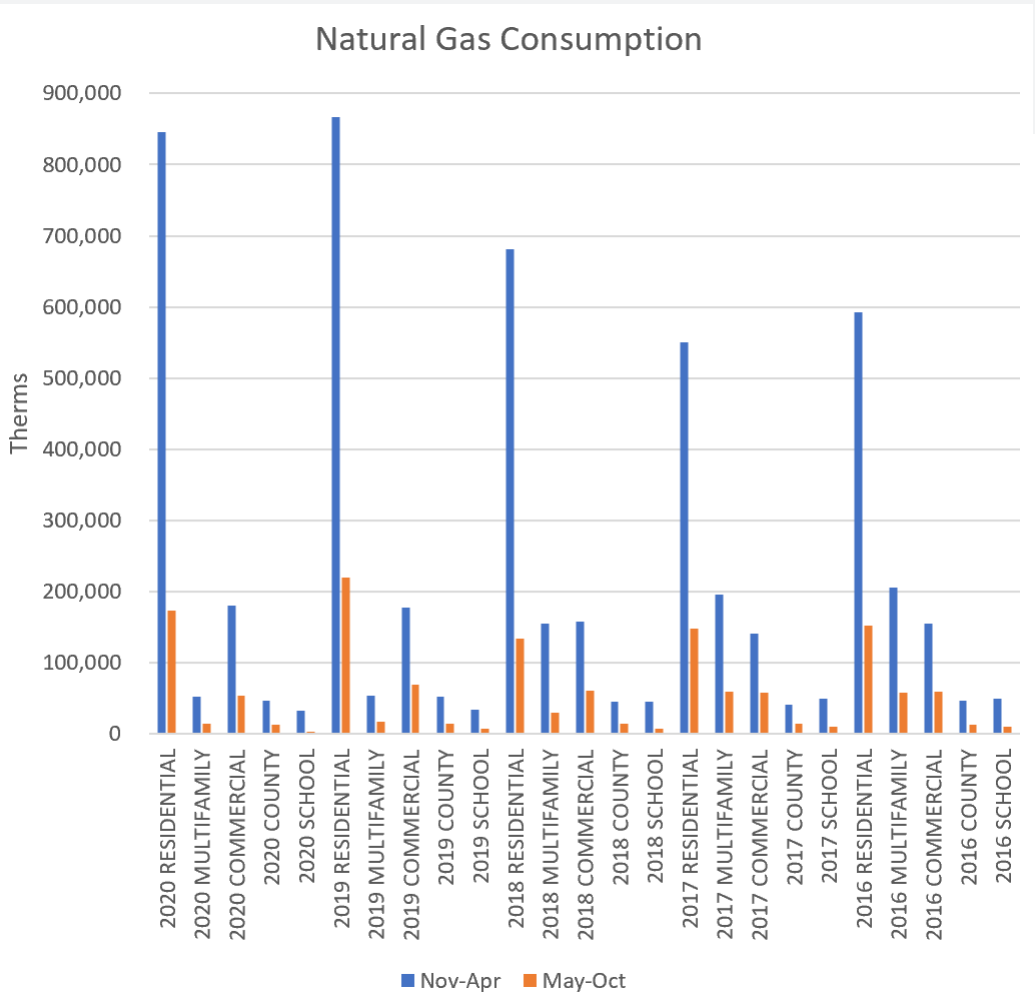


Assessing Supplier Performance: Gas

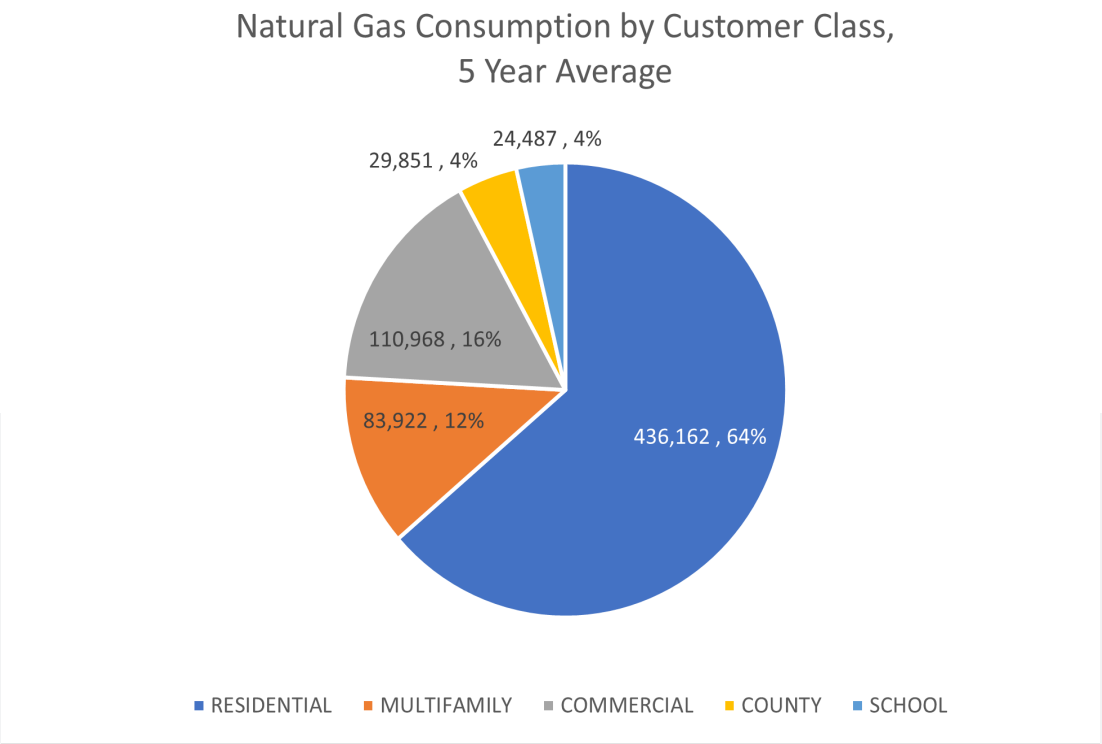
Gas performance metrics are tracked in the DPU's Gas, Water, Sewer internal gas dashboard in addition to the customer consumption monitored through Munis.

The gas industry requires extensive monitoring and reporting. Some examples include:

- An annual gas report submitted to the US Department of Transportation, which discusses pipe material and length as well as damage to and leaks in the natural gas delivery system.
- An annual greenhouse gas report submitted to the US EPA covering emissions relating to natural gas consumption.



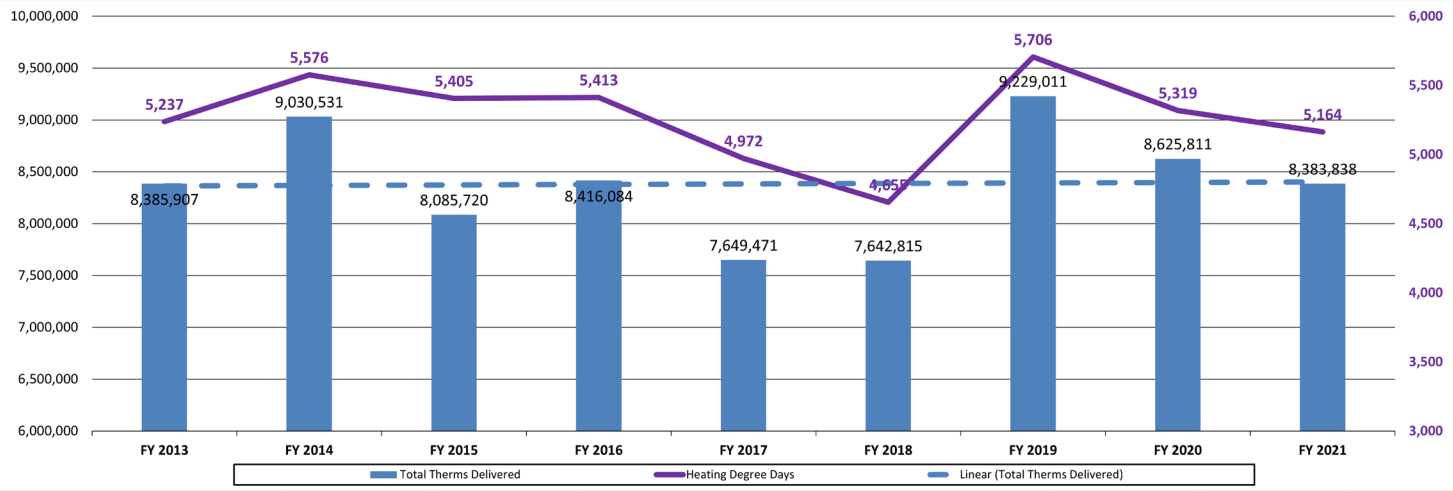
Natural gas consumption by customer class and grouped into months typically needing a heating source (Nov-Apr) and months typically needing low or no heating (May-Oct).



	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Average
Los Alamos	20	17	17	28	69	114	145	149	128	84	48	29	71
White Rock	18	15	15	19	55	117	151	155	123	77	43	25	68

The above pie chart is a 5-year average (2016-2020) of natural gas consumption for each customer class tracked within Munis. Figures are reported in therms and percentage of total. The table is a representation of residential monthly gas consumption between Los Alamos and White Rock. It is a monthly average from FY2019-FY2021.

The complex chart below shows the total therms delivered each Fiscal Year. This chart helps to show that natural gas fluctuates with Heating Degree Days (HDD) and is a good indicator that a significant number of furnaces within Los Alamos remain natural gas fueled.



Therms delivered with heating degree days, taken from DPU internal dashboard.

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Part II

Water and Energy Conservation Plan

Water and Energy Conservation Plan

Purpose

The DPU Water and Energy Conservation Program is facilitated by a full-time staff member, the Conservation Coordinator, who is responsible for implementing and tracking progress (success/failure) of the components of the Conservation Plan (Plan). The Plan is a dynamic document driven by the DPU strategic goals and influenced by public input, whether through committees, surveys, or comments from a variety of channels. These strategic goals are reviewed annually by the BPU and will be revised based on emerging technologies, community priorities, and progress within each objective.

For Los Alamos County to achieve the maximum conservation of utilities, efforts need to come from both the supplier (DPU) and the demand-side (Customer). The following pages focus on each of the strategic goals, ranked from highest to lowest priority, as determined by the BPU. Within each section, projects, programs, and best management practices will be discussed for the DPU and the Customer. Education and outreach topics will also be covered.

Fiscal Year 2023 strategic goals and objectives were approved by BPU on September 15, 2021.
The strategic objectives (primarily from Goal 5.0 – Achieve Environmental Sustainability) in order of highest priority to lowest priority are as follows.

1. Be a carbon neutral electric provider by 2040.
2. Provide Class 1A effluent water in Los Alamos County.
3. Reduce natural gas usage by 5% per capita per heating degree day by 2030 and support elimination of natural gas by 2070.
4. Promote electric efficiency through targeted electric conservation programs.
5. Reduce potable water use by 12% per capita per day by 2030.
6. Communicate with stakeholders to strengthen existing partnerships and identify new potential mutually beneficial partnering opportunities (from Goal 6.0 – Develop and strengthen partnerships with stakeholders).

Note: The Plan's programs and goals promote conservation to the customer primarily through voluntary compliance. Customers can save money and improve their standard of living through water and energy conservation without making significant sacrifices in lifestyle or through large monetary investments.

Education and Outreach

Overview

In the 2022 Voice of the Customer Survey, conducted between January 4 and February 9, 2022, it was determined that customers gave DPU a poor rating on "helping customers conserve electricity, gas and water." Education and outreach are critical components in promoting conservation. To avoid redundancy, several education and outreach deliverables are listed here and will apply to each of the strategic objectives that follow. This list is not exclusive as education will happen as opportunities present themselves.

Utility Bill Inserts

Each month, the DPU includes information with the utility bill. Sometimes these are seasonal topics (e.g., gas safety as winter sets in, saving water in the summer months, etc.) and sometimes they are programmatic in nature (enrolling in the new Automated Metering Self Service portal). The Conservation Coordinator has a goal to include a conservation-themed insert each month. Close to 9,000 customers receive a paper bill, and thus, the inserts. All bill inserts are also placed on the DPU's website for easy viewing and for those that receive electronic billing statements.

Target timeline: Monthly
Audience: 9000

Community Events and Meetings

The DPU will enhance its presence in the community by attending different events that occur throughout the year to promote relevant programming and outreach efforts. Such events include:

- Earth Day: once a year, April
- Farmer's Market: every Thursday, May – October
- ChamberFest: once a year, June
- ScienceFest: once a year, July
- Los Alamos Fair and Rodeo: once a year, September
- Meetings can include Rotary Club, Kiwanis, Habitat for Humanity, etc.

Target timeline: Monthly to seasonal
Audience: 1000/year

School Programs

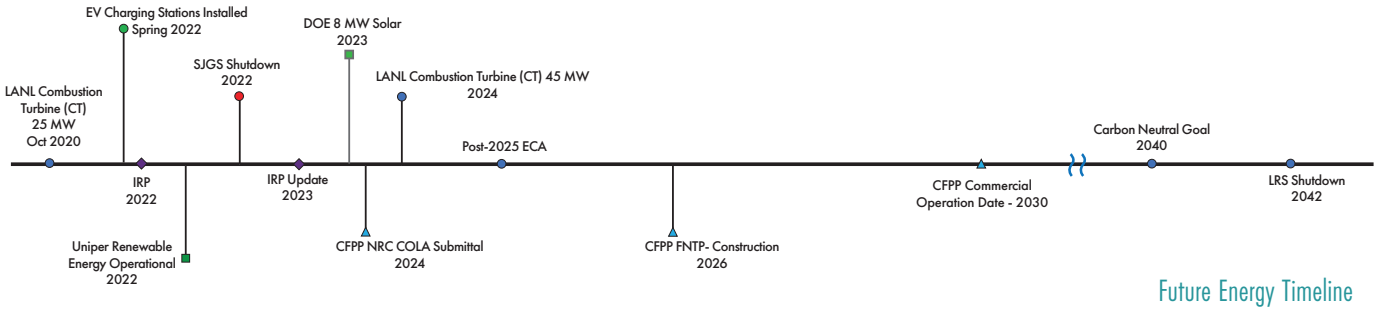
Currently, the DPU has a contract with Pajarito Environmental Education Center (PEEC) to do educational programs both in schools and for the public. PEEC does an excellent job of gearing school programs to current DPU projects. The Conservation Coordinator will also engage in the classroom to enhance promoting conservation in the schools.

Program topics include: The Water Cycle, Water-Wise Gardening, Water Infrastructure, Electricity and Magnetism, Energy Sources, and the Water Festival, among many others.

Target timeline: School year with some summer activity
Audience: 4000

Objective 1: Be a Carbon Neutral Electric Provider by 2040

A "Carbon Neutral Electric Provider" means the DPU will be matching the electricity demand with a carbon free supply on an annual basis.



Future Energy Timeline

Supplier Deliverables

Exit the San Juan Generating Station

The San Juan Generating Station (SJGS) is a coal-powdered facility located in Farmington, NM. The DPU is a partial owner in the SJGS #4 and receives a significant portion of its electrical needs from this resource. An amendment was approved to extend the agreement beyond the original closing date of June 30, 2022, to fill an energy gap created by the delay of new generation resources throughout the west. The new closing date is September 30, 2022. The DPU is working to replace this resource with the clean energy sources listed in this section.

Target timeline: September 30, 2022
Megawatts provided: 36, fossil fuel energy

Carbon Free Power Project

The Carbon Free Power Project (CFPP) is a NuScale Power small modular reactor plant being constructed at the Idaho National Laboratory. CFPP is being spearheaded by Utah Associated Municipal Power Systems (UAMPS), of which the DPU is a member. The DPU is currently subscribed for 2 MW based on a money threshold of $1.2 million. The amount subscribed changes with market fluctuation and could be supplied with 8.3 MW when fully subscribed. This project is the first of its kind in the United States. More information can be found at https://www.cfppllc.com/.

Target timeline: Online by 2030
Megawatts provided: 6.0-8.3, carbon-free energy

Objective 1: Be a Carbon Neutral Electric Provider by 2040

Supplier Deliverables

Investigate Emergent Power Technologies

The DPU will investigate power options as resources and technologies develop. As resources and demands evolve, keeping a diverse energy portfolio is important as is providing a reasonable rate to customers.

Target timeline: ongoing with emphasis on next 5 years
Megawatts provided: 15; 25, renewable energy

Energy Transition Act (SB 489)

The Energy Transition Act, passed in March 2019, is New Mexico legislation that will make New Mexico a leader in renewable energy. The Energy Transition Act "sets a statewide renewable energy standard of 50 percent by 2030 for New Mexico investor-owned utilities and rural electric cooperatives and a goal of 80 percent by 2040, in addition to setting zero-carbon resources standards for investor-owned utilities by 2045 and rural electric cooperatives by 2050." As SB 489 currently stands, this does not apply, but the DPU was one of the first in New Mexico to set a carbon neutral goal.

Target timeline: 2030 – 2050

Smart Energy Provider

The DPU will be reviewing the application requirements for designation as a "Smart Energy Provider" from the American Public Power Association. A Smart Energy Provider is a designation "for utilities that show commitment to and proficiency in energy efficiency, distributed generation, renewable energy, and environmental initiatives." Should DPU decide it's qualified, applications will open in December 2022 and close in April 2023. Designations will be awarded in October or November of 2023 and will last two years, after which, the DPU would need to reapply to ensure maintenance of Smart Energy Provider best practices.

Target timeline: December 2022 – November 2023

Photovoltaics/ Distributed Generation

Per the Fiscal Year 2021 DPU final report, there are approximately 3 megawatts of solar power installed on customers' roofs. The DPU will work with customers to promote education about and installation of additional solar panels while balancing this power load to the Power Pool grid. Distributed generation is programmed to supply 30% of the County's peak daily load locally.

Target timeline: ongoing
Audience: Goal of 6MW of distributed generation solar

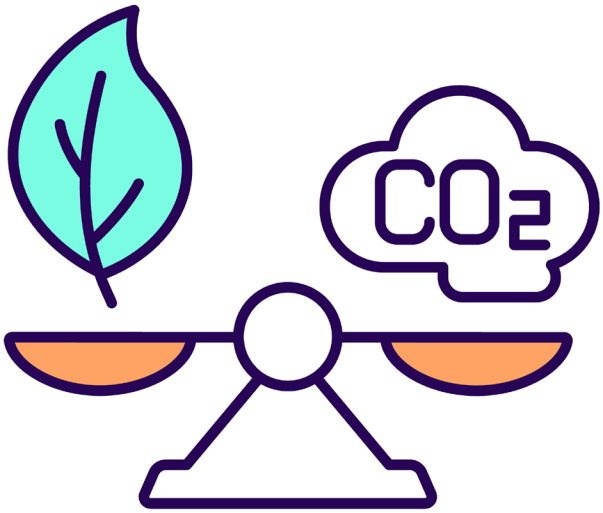
Objective 1: Be a Carbon Neutral Electric Provider by 2040

Customer Deliverables

Updated Building Energy Codes

Adopted in August 2020 by the State of New Mexico's Regulation and Licensing Department, the 2018 iteration of the International Energy Conservation Code (IECC) will reduce emissions from and increase efficiency of residential and commercial buildings. According to energycodes.gov, it is estimated that residential customers could see cost savings of nearly $400 annually (per 1000 ft^2). Commercial customers could see $138 in annual savings with a simple payback of 4.6 years.

Target timeline: variable, as new builds and remodels occur



Objective 2: Provide Class 1A Effluent Water in Los Alamos County

Class 1A Effluent is the highest classification of wastewater/reclaimed water. A filtration system is required to meet Class 1A effluent standards.

Supplier Deliverables

White Rock Water Resource Reclamation Facility

The existing wastewater treatment plant in White Rock is reaching the end of its lifespan. A new Water Resource Reclamation Facility (WRRF) is in the process of being constructed. This new facility was designed in-house to best serve the White Rock system needs. The WRRF is projected to be operational by 2023; however, supply-chain delays could push this date out.

Target timeline: 2023

Customer Deliverable

Sewer Rate Increase

A sewer rate increase was approved in February 2022 to help with the cost of the new White Rock WRRF. The rate increase will be at 2% per year for four years affecting the monthly service fee, the flat rate charge for residential customers, and the variable rates for commercial and non-residential customers. This has been approved by both BPU and County Council and will go into effect October 1, 2022.

Target timeline: Oct. 2022 – Oct. 2025
Audience: all DPU sewer customers

Upgrade Los Alamos Wastewater Treatment Plant

Tertiary filtration equipment is being added to the Los Alamos Wastewater Treatment Plant (WWTP), which will upgrade its effluent classification from 1B to 1A. This project is moving along with the hinderance of increased cost of work impacting wastewater's budget.

Target timeline: 2022-2023

Facility Tours

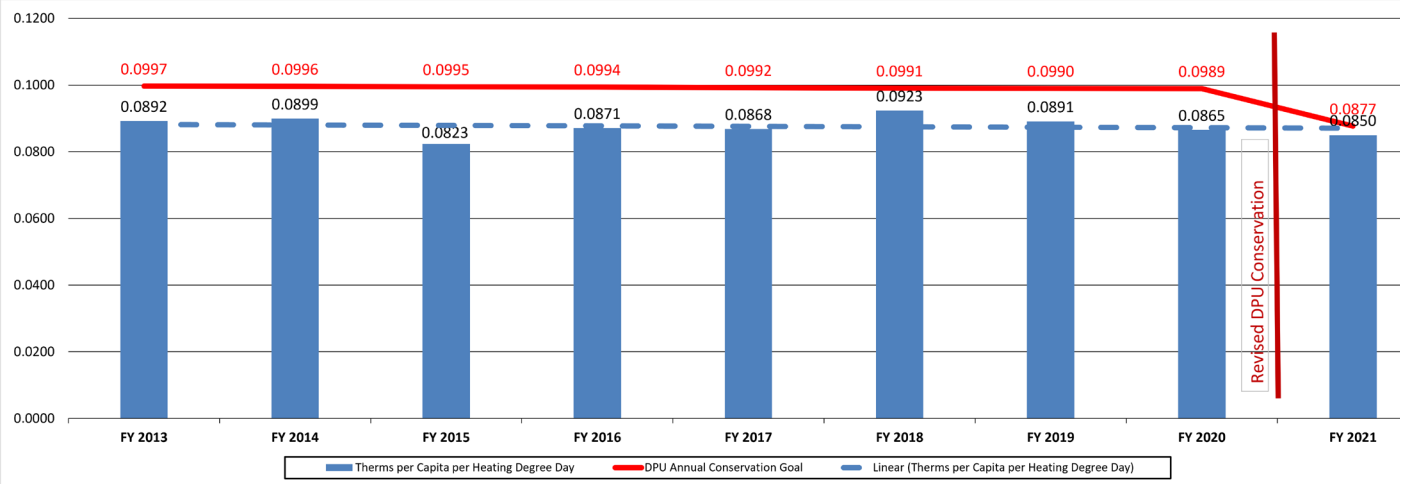
The Wastewater Operators are experts in giving tours. They are excited about what they do and the level at which their facilities operate. Providing tours enables the public to be aware of the full waste cycle and understand the high-quality effluent product.

Tours can be conducted in two ways: in-person and by video. Once the White Rock WRRF is completed and the upgrades to the Los Alamos WWTP are finished, in-person tours can begin. DPU Public Relations staff will work with the operators at each plant to develop a video tour as well. This will expand the touring opportunity to those who cannot easily navigate these types of facilities, school groups with busing shortages, and additional groups as awareness grows.

Target timeline: late 2023, early 2024
Audience: 300 in-person tour, thousands with video

Objective 3: Reduce Natural Gas Usage by 5% by 2030 and Support Elimination by 2070

The full objective is to reduce natural gas usage by 5% per capita per heating degree day by 2030 using a 2020 calendar year-end baseline and support elimination of natural gas usage by 2070.



Graph charting Los Alamos County therms per capita per heating degree day. A "heating degree day" (HDD) essentially means a day when the temperature outside warrants using a heating source to get the inside temperature to 65°F. For example, if the outside temperature is 40°F, it takes 25 degrees to reach 65°F thus the day has a 25HDD. See the chart "Monthly average heating and cooling degree days" in Gas Overview section.

Supplier Deliverables

Replace Meters For Accuracy

The DPU will continue replacing gas meters to provide more accurate readings. A new meter change out goal will be revised for Fiscal Year 2023, increasing the number of meter change outs to 375 per year. All isolated gas risers were replaced between Fiscal Year 2010 and Fiscal Year 2016.

Target timeline: Ongoing

Planning for Cost Adjustments

As customers are encouraged to switch, a plan will need to be developed to offset the cost for the remaining customers. The overall cost of operating the gas delivery system will remain the same, no matter the number of customers; however, the total cost divided among 8,000 customers or by 4,000 customers will be noticeable.

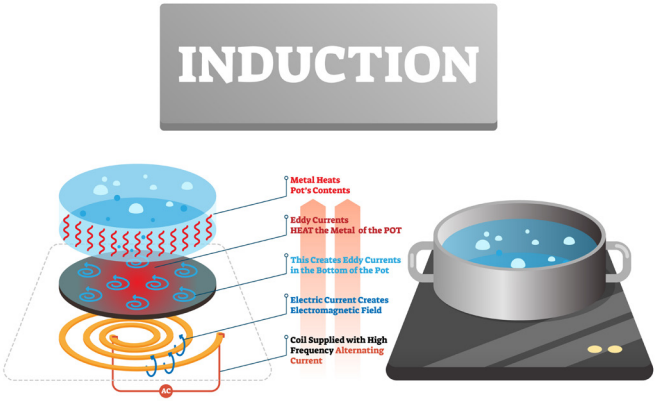
Target timeline: 2070

Objective 3: Reduce Natural Gas Usage by 5% by 2030 and Support Elimination by 2070

Supplier Deliverables

Promote Alternatives to Gas

Funding for new technology demonstrations is provided by the "LA Green" program funds. This is a funding source that customers can opt-in on their utility bill to ensure that DPU is providing some electricity from green sources. This fund is no longer needed because DPU has reliable sources of clean energy. The BPU approved using the remaining money in this fund on projects contributing toward DPU conservation objectives.



Target timeline: See demonstrations below

Induction Cooktop Technology

Target timeline: July-Sept 2022 and beyond
Audience: Goal of 1000 customers

The DPU has two projects under way to provide customers the opportunity to try induction cooking technology before committing to full units. Induction cooking technology uses electromagnets to heat an induction-compliant cooking vessel. These units heat cookware faster than conventional electric cooktops. They also eliminate the indoor air pollution and open flame danger of gas stoves.

The first project is a loaner program for portable induction cooktops. These single burner units will be available to residents of Los Alamos County for a period of two weeks and will include instructions and cookware. This project will begin in July 2022 and will start with six induction cooktop kits.

The second project is to install a full induction stove unit at the White Rock Municipal Complex. DPU staff will document the installation of this unit to better provide customers information on this process. Cooking classes will be taught using this stove and customers will have an opportunity to test the difference between an induction unit and their existing stoves at home. The project will be installed in the late summer of 2022.

Heat Pumps

Target timeline: late 2022 – 2023
Audience: Goal of 500 customers

The DPU is actively working to find locations to demonstrate a heat pump dryer, a heat pump hot water heater, and other heat pump-driven technology. The desired locations will be similar to the location for the induction stove: accessible and interactive (where appropriate) by the public. The DPU wants to provide opportunities for public interaction to best encourage adoption of heat pump technologies.

Objective 3: Reduce Natural Gas Usage by 5% by 2030 and Support Elimination by 2070

Customer Deliverables

Energy Audit Improvement

Comprehensive energy conservation audits consist of a 5-year utility bill analysis, a home or business walk-through with an infrared imager, and a blower door test. Audits allow customers to see consumption history and sources of energy leaks within their home. The results of these audits provide recommendations for conservation practices to reduce energy loss and consumption.

Target timeline: TBD

Rebates

At the present moment, the DPU cannot offer any rebates on appliance conversions or building improvements that will reduce a customer's gas usage. This may change in the future and the DPU will alert customers as soon as any rebate programs are available.

Target timeline: TBD

Utilizing Automated Metering Self Service Data

The DPU installed automated meters for all utilities at most residential and commercial sites. These meters feed data directly to a user-friendly customer dashboard. By utilizing this dashboard, customers can see nearly real-time consumption of utilities. Customers can then incorporate conservation measures (turn down the thermostat in winter or eat more alfresco) to track consumption changes. This system has already helped with leak detection, saving customers money, alleviating dangerous gas situations and reducing unnecessary waste of natural resources.

Target timeline: ongoing
Audience: 10% of utilities customers

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Objective 4: Promote Electrical Efficiency through Targeted Conservation Programs

The Water and Energy Conservation Coordinator will be responsible for the targeted conservation program. The DPU will be balancing adoption of renewables without creating brownouts.

Supplier Deliverables

Promote Energy Efficient Technologies with Demonstrations

See previous "Alternatives to Gas." The technologies being promoted as replacements to natural gas appliances are also highly energy efficient in comparison to conventional appliances.

Other efficient technologies could include: solar power and battery storage, lighting improvements, and programmable thermostats and controllers. The possibility of waiving permitting fees for efficiency improvements is also a consideration

Target timeline: ongoing

Smart Energy Provider

Explained in Objective 1, achieving a Smart Energy Provider designation will show that the DPU is committed to the objective of promoting electrical efficiency on both the supply and demand side of electrical production and distribution.

Target timeline: December 2022 – November 2023

Legislation

Industrial Revenue Bond Act (HB50)

Passed in 2020, this legislation makes transmission line projects eligible for Industrial Revenue Bonds available through cities and municipalities. The bond act will jump start critical transmission line construction, unlocking access to additional renewable energy resources.

Energy Grid Modernization Roadmap (HB233)

This piece of legislation, passed in 2020, directs the New Mexico Energy, Minerals, and Natural Resources Department to develop a strategic plan for energy grid modernization and to create competitive grant programs to implement such projects. This bill will ultimately encourage utilities to propose grid improvements for reliable and up-to-date systems to meet growing renewable energy demands.

The DPU's Electric Production team contributed to the advisory group in 2020 for this legislation and continues to participate in New Mexico Public Regulation Commission's grid modernization webinars.

Objective 4: Promote Electrical Efficiency by Targeted Conservation Programs

Customer Deliverables

Legislation

Solar Market Development Income Tax Credit (Senate Bill 29)

Enacted on March 1, 2020, this piece of legislation provides a tax credit of 10% for small solar systems, including on-grid and off-grid PV systems and solar thermal systems. There is an annual funding cap of $8 million issued on a first-come first-served basis. Customers are encouraged to submit an application to the NM Energy, Minerals, and Natural Resources Department as soon as their system is fully connected and operational.

Community Solar Act (SB0084)

The Community Solar Act was signed into law in April 2021 by New Mexico Governor Michelle Lujan Grisham and the full scope of the program is still under development. This program supports the development of community solar facilities which allows "equal access to the economic and environmental benefits of solar energy generation regardless of the physical attributes or ownership of an individual's home or business" and ensures that at least 30% of projects be allocated for low-income subscribers.

Note: DPU has evaluated this, but the DPU can acquire utility-scale resources directly and community solar as an additional utility service isn't being pursued currently.

Target timeline: March 2020 – December 2027 (SB29)
2022 – 2024 (SB0084)
Audience: homeowners or businesses

Energy Audits

Initally covered in Objective 3, energy audits are an excellent test to identify sources and points of energy inefficiency. Simple audits can be performed by customers or more thorough versions completed by a professional.

Automated Metering Self Service Data

Previously discussed under Objective 3, Customer Deliverables, the Automated Metering Self Service Data system is a very valuable tool for customers to track and manage their consumption. This tool will help customers see the real-time value of energy conservation initiatives such as adjusting heating and cooling temperature settings and the operation of certain appliances.

Rebates

Also previously mentioned under Objective 3, the DPU will communicate with customers when rebates are available directly from the DPU.

However, customers could also take advantage of any national or brand-associated rebates available. The DPU will stay informed of available rebates, should customers inquire.

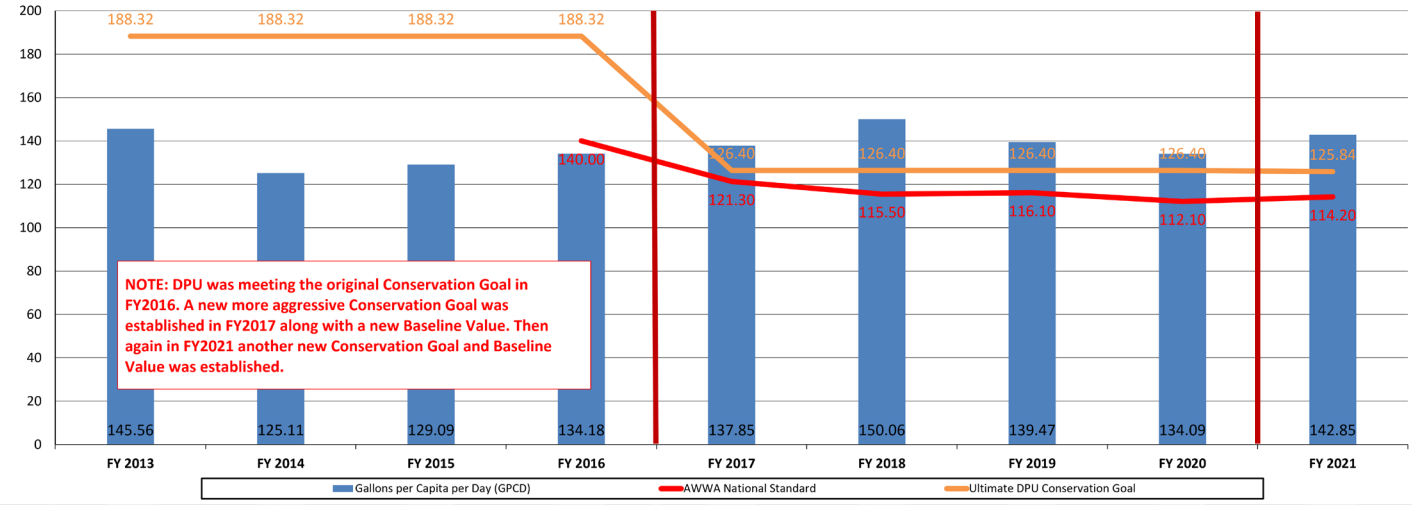
Energy Efficiency Kits

Free Energy Efficiency Kits are available from the DPU and can be picked up at the Pajarito Environmental Education Center or at the Customer Care Center. These kits contain child safety outlet caps, which also help keep drafts out, switch and outlet foam sealers, rope caulk for sealing small gaps, an LED nightlight, an LED bulb, and a furnace filter whistle that alerts customers when it's time to change the filter to maintain efficiency. The items inside this kit are a small sampling of conservation tools that can go a long way in saving energy and money in homes.

Target timeline: ongoing
Audience: 500 households

Objective 5: Reduce Potable Water Use by 12% by 2030

The full objective is to reduce potable water use by 12% per capita per day by 2030 using a 2020 calendar year-end baseline.



Gallons Per Capita Per Day (GPCD) for Los Alamos County, taken from an internal dashboard.

The chart above shows nearly a decade of total GPCD for the Los Alamos County water system. The orange line tracks the DPU's conservation goal over this time. The 2020 baseline GPCD is 143.00. By 2030, GPCD will need to be 125.84 or less to meet the goal. This table lists achievable benchmarks for each year.

BASELINE: 143.00	
2021	141.28
2022	139.57
2023	137.85
2024	136.14
2025	134.42
2026	132.70
2027	130.99
2028	129.27
2029	127.56
2030	125.84

The figure below is from the study completed for the Long Range Water Supply Plan. The conservation savings are from the 2016 GPCD baseline and population predictions. While a little out of date, with the LWRS plan last updated in 2017, the figure provides a good picture of the differences in savings between GPCDs.

Per Capita Water Use (gpcd)	Reduction from 2016 Per Capita Use (%)	Annual Conservation Savings	
		Low Population Projection (acre-feet) [a]	High Population Projection (acre-feet) [a]
130	10	249	346
120	17	426	594
110	24	604	841
100	31	782	1,089
90 [b]	38	960	1,336

[a] Annual water conservation savings that would be achieved based on reductions from the 2016 per capita value of 144 gallons per day in 2060.
[b] This value is equivalent to the City of Santa Fe's per capita demand in 2015.

LRWS Plan projections of potential water conservation savings (taken from Table 5-10, LRWS Plan).

Objective 5: Reduce Potable Water Use by 12% by 2030

Supplier Deliverables

Los Alamos Canyon Restoration

As mentioned in Part I, the Los Alamos Reservoir is nestled in Los Alamos Canyon and was formerly a source of irrigation water and reserve water in the event of wildfire. This water source and its transmission lines were severely damaged by major flooding events and siltation following the build up of hydrophobic soils resulting from two wildfires in 2000 and 2011.

The DPU will be repairing the Los Alamos Canyon using natural channel design. Repairs completed in this manner will allow for a more natural healing that will stand up long-term over manufactured, hard-wall type repairs. Once completed, the Los Alamos Reservoir will again be a viable source of non-potable water to work toward this objective.

Target timeline: Summer 2023
Water supply potential: 8 million gallons

Irrigation of Open Spaces

The DPU works with the Los Alamos County Parks to conduct irrigation audits that result in recommendations to their irrigation schedules and maintenance on existing irrigation systems. Currently, there are nearly 200 acres of open space that could be irrigated with reclaimed water; however, there isn't enough reclaimed water to irrigate this acreage.

Target timeline: ongoing
Water supply potential: 198 acres of irrigated spaces

Non-Potable Water Master Plan

The Non-Potable Water System Master Plan was prepared in 2013 to optimize the use of effluent and surface water for non-residential irrigation purposes. This Master Plan helps DPU review existing infrastructure, evaluate existing and potential future irrigated sites, develop a realistic demand for system build-out, and recommend system improvements. DPU has been and continues to reference the Master Plan for non-potable projects. Increasing the availability of non-potable, reclaimed water will decrease potable water use in non-residential irrigation, a large source of water consumption.

Target timeline: 2013 – ongoing
Water supply potential: 2,184 gallons per minute

Non-Revenue Water

Per the AWWA audit results discussed on page 027, the DPU will work with the offered guidance to reduce its non-revenue water by half by 2030. This starts with an audit of the automated data collection system and works up through an Infrastructure Leak Index

Target timeline: 2030
Water supply potential: reduce non-revenue water by half of EPA National Standard (16.00%)

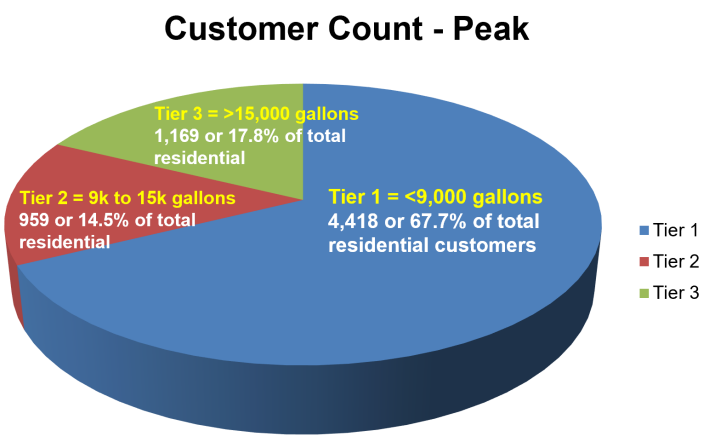
Objective 5: Reduce Potable Water Use by 12% by 2030

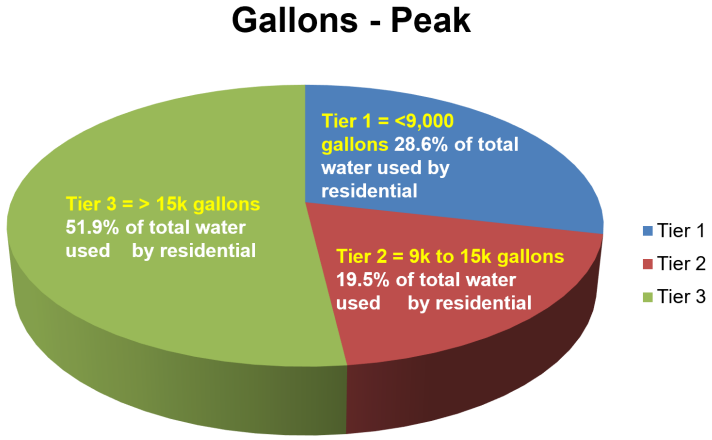
Outdoor Water Usage

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Los Alamos	8,167	7,138	8,227	7,362	4,963	3,815	4,285	3,833	2,861	3,575	5,914	8,534
White Rock	10,182	13,189	12,246	11,332	6,447	4,410	5,014	2,954	3,565	4,378	8,252	11,078

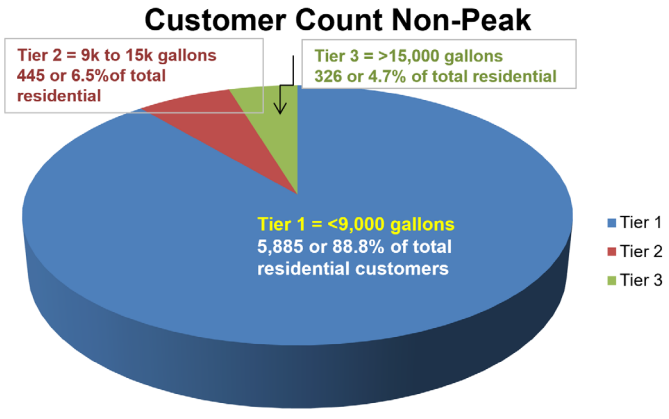
FY2019-FY2021 average monthly water consumption per household, in gallons, for residential customer class. Note the significant increase of water usage for White Rock during peak water months (May through September).

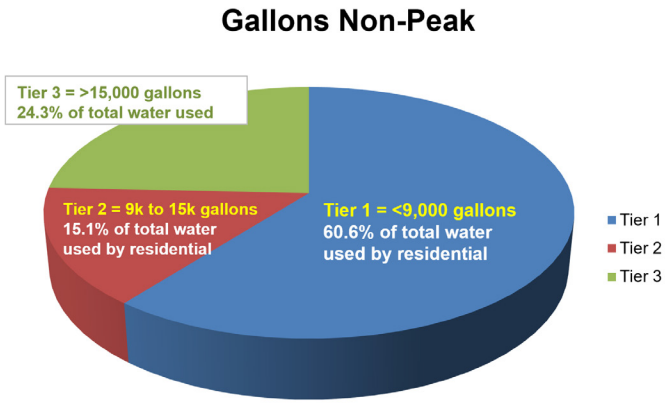
All customer classes can take advantage of the Customer Deliverables on the next page. However, the "residential" customer class is likely to see significant benefits, especially when it comes to outdoor water use. Because there is typically only one meter servicing a household unit, outdoor water use can only be estimated and assumed. The following pie charts are 2019-2021 averages of Residential Water Usage. Peak season is May through September. Non-peak season in October through April. The DPU has a tiered water rate and there is a significant shift in usage between peak and non-peak seasons.





In this dataset, Tier 3 consumers represent 18% of households using 52% of the total water during peak season compared to Tier 3 representing 5% of households using 24% of total water during the non-peak season. Outdoor spaces like lawns and gardens use a lot of water and is a priority target area for reducing potable water consumption.





Objective 5: Reduce Potable Water Use by 12% by 2030

Customer Deliverables

Water Audits

The DPU formerly completed commercial water conservation audits and irrigation audits for utility customers. Responsibility for this task may fall with the new sustainability position recommended by LARES, who may also perform home energy audits. Water audits look at consumption data from utility bills, leaks from faucets and toilets, and water use habits. A report is compiled, and recommendations are provided to the customer. Enrolling in the new Automated Metering Self Service portal is an excellent way for customers to self-audit. This program will send alerts when water consumption is above normal usage levels.

The Certified Landscape Irrigation Auditor (CLIA) certification and the Qualified Water Efficient Landscaper (QWEL) certification through the EPA WaterSense program are ideal in water auditors .

Target timeline: TBD

Water Efficiency Kits

Similar to the energy efficiency kits discussed in Objective 4, the items inside this kit are a small sampling of conservation tools that can go a long way in saving water and money in homes and small businesses. These kits are free and contain such items as a low-flow faucet adapter, a water leak detector, a toilet tank saver, and a drip calculator.

Target timeline: ongoing
Audience: 500 households

Water Rule W-8

The Water Rule W-8 is a voluntary program that encourages customers to conserve outdoor water use through the following best management practices:

- Between May and September, odd and even addresses can use irrigation water on designated days of the week before 10am and after 5pm.
- Water waste and irrigation water runoff should be eliminated.
- Sources of water leaks should be repaired.

Target timeline: ongoing

Promote Xeriscaping

The Los Alamos Master Gardeners have an excellent Demonstration Garden at the corner of Central Avenue and Oppenheimer Drive in Los Alamos townsite. This garden showcases a variety of landscapes with a large focus on xeriscaping, which is a form of landscaping that reduces or eliminates the need for irrigated water. Xeriscaping typically utilizes native plants, which not only conserves water for a customer, but supports a healthy ecosystem.

Target timeline: 2023 and beyond

Automated Metering Self Service Data

Previously discussed under Objective 3, Customer Deliverables, the Automated Metering Self Service Data system is a valuable tool for customers to track and manage their consumption.

Objective 6: Develop and Strengthen Partnerships with Stakeholders

Supplier Deliverables

IRP – DOE/LANL

The DPU and the DOE are joined in an ECA which allows each entity to combine resources for the Los Alamos Power Pool. The Power Pool purchases, sells, and schedules the power required for Los Alamos County customers and LANL. The current ECA expires in 2025 and both parties are working on negotiations for a post-2025 ECA. The IRP is a tool that assists the ECA partners in planning for future resources.

Reclaim Water Users

The DPU will continue to work with the current users of reclaimed water for irrigation to ensure this valuable resource is not being wasted by broken or misaligned sprinklers, or by over watering. The primary consumers of this water source are the County Parks Division and Golf Course.

Sustainability Board/LARES

The Environmental Sustainability Board is established to advise the County Council on environmental sustainability issues and related policies, programs, and services. Several of the points in the Los Alamos County Sustainability Plan overlap with the DPU Goals and Objectives; however, the Sustainability Plan focuses on creating a more sustainable community while the DPU Conservation Plan specifically relates to the supplier and customer of utilities. The DPU and Environmental Sustainability Board will work together where appropriate.

The LARES Task Force, appointed in 2021 by Los Alamos County Council to create recommendations to reduce carbon footprints and enhance sustainability, released a final report in 2022. With each recommendation in the plan, LARES includes a strategy for completion and potential costs.

Many of these recommendations revolve around the creation of new positions. These new positions would be a great partnership opportunity to maximize conservation efforts in Los Alamos County allowing the DPU Conservation Coordinator to focus on the Water and Energy Conservation Plan objectives and the LARES position to focus on their recommendations.

Objective 6: Develop and Strengthen Partnerships with Stakeholders

Memberships

Supplier Deliverables

Alliance for Water Efficiency

In July 2008, the DPU became a charter member of the Alliance for Water Efficiency (AWE), which provides comprehensive information about water efficient products, practices, and programs. Additional services include the development of conservation codes and standards, coordination with green building initiatives, training for conservation professionals, and general water use education.

New Mexico Water Conservation Alliance

The DPU continues to be a member of the New Mexico Water Conservation Alliance (NMWCA), a non-profit dedicated to water conservation issues. Many communities from around the state meet regularly to discuss issues, exchange information, provide education, and work toward a water-secure future for New Mexico.

WateReuse

In April 2021, the DPU joined the New Mexico chapter of WateReuse. The WateReuse Association is solely dedicated to advancing laws, policy, funding, and public acceptance of recycled water. WateReuse is focused on "aiding and accelerating the natural process of cleaning the water to make it suitable for its intended purpose, from irrigation to industrial uses to drinking."

Energy Star Promotional Partner

The DPU became a promotional partner with the Environmental Protection Agency's Energy Star Program in 2008. This partnership provides a unique opportunity to leverage ENERGY STAR™ and receive free energy efficiency updates designed for customer education.

Alliance to Save Energy Member

In 2008, the DPU became a member of the Alliance to Save Energy, which is well known for its national Energy Hog campaign. The bipartisan non-profit is a coalition of business, government, environmental, and consumer leaders advocating to advance federal energy efficiency policy.

Voice of Customer Survey Feedback

Customer Deliverable

The "Voice of the Customer Survey" is specifically designed to help the DPU understand the customer perception of the utility and the services provided. The 2022 Voice of the Customer Survey revealed that customers gave the DPU a poor rating on "helping customers conserve electricity, gas, and water." This aligns with the absence of a dedicated Conservation Coordinator from 2016-2021 and only opens up room for improvement until the next survey.

Target timeline: December 2022 – November 2023

Appendix 1

Public Input: Recommendations from DPU Update Committee

GOALS

1. Eliminate use of natural gas.
2. Find ways to accommodate a massive increase in residential and local solar.
3. Reduce water use by at least 1/3.

RECOMMENDATIONS FOR EDUCATION AND PROMOTION:

1. Customer use of Advanced Metering Infrastructure (AMI) data

The installation of smart meters will eventually allow customer access to AMI data. This could revolutionize individual utility use as customers learn how much they use with various activities. But to be effective, the AMI data presentation must be simple and easily understood. This means there is a need to ensure people have adequate education on how the AMI system works, and some assistance with figuring out what it means. The county should provide interpretation: how is this supposed to work and how does the individual customer make changes?

Advantages: Knowledgeable customers will modify behavior to increase conservation.

Drawbacks: Cost of presentation software and customer access. Some county labor involved with interpretation.

2. Promote "Conservation Will Happen and Will Mean Increased Unit Costs"

If people understand that conservation is inevitable, and that it will mean unit costs will increase, it will inoculate people against a commonly known issue while encouraging a modest race to save both resources and money. Of course, unit costs will probably go up anyway, maybe even more without conservation. See appendix "Cost of Conservation" for further explanation.

Advantages: No cost. Is honest. Provokes conservation on all fronts.

Drawbacks: Will probably open brief heated debate on conservation.

3. Add "Residential Avg Usage" to Electricity, Gas and Water on Utility Bills

Allows each customer to know how their usage compares to residences of similar size. Usage at all single-family homes would be averaged and compared, while duplex- and apartment-style units would have their own comparisons. (Albuquerque does this on their water bills) See appendix "Residential Average Usage" for further explanation.

Advantages: lets above-average users know they can do better.

Drawbacks: Some programming and data processing time.

4. Encourage Programmable Thermostats and Controllers

Should be installed in new construction. County could supply information about energy and cost savings from using these relatively simple and low-cost devices.

Advantages: Decreases usage when appropriate. Saves money and resources.

Drawbacks: Very minor cost increase for device, compensated by savings.

5. Publish Standards on Thermostat/Controller Settings and Energy Savings

Explain how devices are used (all features, etc.) and how do they maximize efficiency? Use ASME standards and area-specific input from the New Mexico Technical Resource Manual to indicate proper settings and explain results. Compare new/suggested measures with previous/baseline measures.

Advantages: Sets baseline to encourage use of improved controllers.

Drawbacks: Some research and writing.

6. General Energy Efficiency Education

Provide information in monthly bill statements or monthly mailings on energy efficiency. Since not everyone gets a bill in

Public Input: Recommendations from DPU Update Committee (continued)

the mail, there should also be online media information feeds.
Advantages: Educated customers generally conserve.
Drawbacks: Some county time and possibly printing costs.
RECOMMENDATIONS THAT MAY INVOLVE REBATES:
7. Pursue Grants for Appliance Rebates and Publicize Existing Local State and Federal Rebates and Tax Breaks
Typically affected appliances are water heaters, furnaces, ranges, washers, dryers, refrigerators, lighting fixtures, evaporative coolers, air conditioners, heat pumps, and smart thermostats. Information could be part of one of the current DPU bill inserts.
Advantages: Replacing older inefficient appliances with newer highly efficient versions should reduce consumption.
Drawbacks: Some investment of time and resources from county staff.
8. Reduce Outdoor Water Use with Xeriscaping Education, Rebates and/or Incentives
With a warming climate, water use on residential landscapes will only increase, and it is already the highest seasonal water use for most residences. Smart plantings and removal of unused turf can greatly reduce the amount of water use. Also, the storage of rainwater and snow melt on the residential property can improve plantings and reduce wear and tear on stormwater runoff infrastructure. This is the biggest bang for the effort--as water use clearly increases during hot months .
Advantages: The county already contracts with an education center, and education is low cost treatment. Easy changes through rebates (removing turf rebate) can result in large water savings almost immediately.
Drawbacks: Rebates or incentives cost money, but only using education can be a slow process
RECOMMENDATIONS ABOUT COUNTY SERVICES:
9. Coordinate and support efforts with Los Alamos Public Schools (LAPS)
LAPS is generally cooperative and certainly wants to save money. There are indications they could save at least 10% on water bills by altering their schedule, and there are probably many other ways to cut utility use and save money.
Advantages: Utilities conserved, LAPS saves money
Drawbacks: Time and effort from both county and LAPS.
10. Free delivery of tumbled glass or mulch when replacing turf
Remove a common obstacle to xeriscape conversion (homeowner doesn't have access to an appropriate truck). Same thing could be accomplished with a loaner truck.
Advantages: Saves water.
Drawbacks: Labor cost if delivered, truck cost if a loaner.
11. Accommodate Purchase-power-only Hybrid Solar
It is now possible to set up residential solar systems that use modest battery backup and do not feed back into the grid, only using county electricity when the battery system is depleted. This solves the county's problem of trying to use the unpredictable electricity produced.
Advantages: Less load on county electrical system without need to adjust grid.
Drawbacks: Some revenue loss, some code and rate complications.
12. Eliminate Most Street Lights
Some (not all) research indicates that streetlights only increase safety at main intersections. This is a complex issue full of wild claims on both sides, but it's certain that removing streetlights saves a lot of energy and improves the night sky.
Advantages: Cuts costs, eliminates substantial CO2, improves night.
Drawbacks: Makes some people feel less safe.
RECOMMENDATIONS INVOLVING CONSTRUCTION:
13. Solar-ready roofs and siting for new construction

Public Input: Recommendations from DPU Update Committee (continued)

Encourage or require new structures to have solar-friendly attributes

Reducing roof penetrations and shading on south-facing areas, aligning structure for southern exposure, installing conduit for future solar infrastructure, enabling passive solar design features such as summer-shaded south facing windows. It is much less expensive to include these features during initial design and construction than add them in the future and can provide long-term energy benefits.

Advantages: Reduce cost of future improvements and improve efficiency.

Drawbacks: Additional construction cost. Perception of government overreach. Restriction of architectural design freedom.

14. Stop issuing natural gas hookups to new construction

Natural gas is primarily used for heating homes and water, and secondarily for stoves. Most homes will probably develop greater electricity capabilities (solar, etc.) and incorporate more energy-saving design. La Senda Unit B used this approach and potentially be a pilot program.

Advantages: Reduces greenhouse gasses.

Drawbacks: May initially be more expensive to heat. Some folks are very attached to gas stoves despite their inefficiency.

RECOMMENDATIONS INVOLVING BILLING OR FEES:

15. No property assessment increase for building improvements that increase water, gas or electric efficiency

Stop charging people indefinite tax for conserving. Already in effect for solar installations.

Advantages: Removes a roadblock to conservation.

Drawbacks: Very minor revenue deferral. Possible legal issues?

16. Waive building permit fees for improvements that cut water use or energy consumption

Window replacements, solar hot water, rain collection systems, etc.

Advantages: Removes a roadblock to conservation improvements.

Drawbacks: Possible increase in staff work, loss of some revenue.

17. Eliminate fees to set up off-grid solar

The county has difficulty using the solar power produced by small home systems. Much goes to waste since it is not delivered to the grid at a time that it can be used. Off-grid solar does not create this problem while it conserves resources. If these homes never use county electricity, and are self-sufficient, then the county does not need to plan on providing it and can reduce the amount of power that is purchased.

Advantages: solar electricity does not go to waste. County doesn't need to try to store this solar energy in County-owned batteries. County does not need to purchase as much electricity. Roof-top solar does not input to the County's electrical infrastructure, and therefore does not 'tax' the infrastructure

Drawbacks: New County Building Codes may be needed to assure that solar owners build to safe standards. Adds a County Building inspection. County loses some homes as customers

18. Granular Tiered Water Rates

Use small, easily understood tiered water rates that start quickly. For example, first 100 Gallons is 50 cents, second 100 gallons 51 cents, etc. When costs increase slightly for every unit used the system is easily understood and immediately effective. Plus, there is no low "dead zone" where consumers feel they have implicit permission to use the amount in the lowest tier.

Advantages: Easy to understand and implement. Initial rate would be lower. No additional cost. Avoids "Implied Permission."

Drawbacks: Some up-front programming cost.

19. Eliminate Service Charge for Water Usage

Remove "In for A Penny" tendency to use water while rewarding the most stringent conservation. The service charge gives the impression that first few thousand gallons of use only increases cost slightly. If all usage is a direct cost, even more conservation is encouraged.

Public Input: Recommendations from DPU Update Committee (continued)

Advantages: Maximizes cost advantage of conservation

Drawbacks: Requires slight adjustment to rates to be value neutral

20. Convert Electric and Gas Services Charges to Minimum Charges

Remove a regressive tax. Virtually everyone uses enough gas and electricity to surpass current service charges. A direct usage-to-cost relationship simplifies understanding of conservation advantages while simultaneously benefiting lowest income bracket.

Advantages: Simplifies rate and saves money for super conservers

Drawbacks: Requires slight adjustment to rates to be value neutral

Appendix:

Cost of Conservation

Most people who consider conservation issues understand that conserving utilities will inevitably lead to higher unit costs, such as price per thousand gallons of water. Further, many otherwise uninterested folks have noticed this effect over the years.

So far, it has not been openly acknowledged or promoted, perhaps because there is a suspicion that it would lead to resistance toward conserving.

However, if it becomes a "meme" it would probably have the opposite effect. Presented as "conservation will happen" and therefore "unit prices will go up" it should provoke a modest Race To The Bottom. Meaning, it would encourage people to cut back on their use to avoid paying more for their utilities. Even more interesting, it means the more aggressive conserver may end up saving quite a bit as time goes by.

It has several advantages, not the least being that it's true. Conservation will happen whether we like it or not. And it will lead to higher unit costs.

Probably it would be best to avoid any heavy-handed or over serious approach. An even-tempered statement that 'this is inevitable' should be enough.

It could also be pointed out that this does not mean the average bill would necessarily go up. Using water as an example, if we all used half as much water, the infrastructure would be less strained, water treatment would be cheaper, the cost of pumping would probably go to less than half due to the longer recharge period in the wells, and it probably would mean far less need to sink new wells. While the cost advantages are muzzy at best, it is in fact possible that under the 1/2-use scenario we would all pay a little less on our water bill.

Finally, it should also be noted that unit prices will probably go up anyway, with or without conservation. And there are scenarios where gas, electricity or water prices would go up even faster without conservation.

The cost of taking this approach would be nearly zero. Basically, zero compared to current methodologies, since it's normal to include flyers in the utility bills -- it would just be additional content.

Residential Average Usage

People naturally compare themselves to their neighbors. If you are the high water/electricity user, and you know it, you are more likely to make changes to reduce your usage. This information works best with an education plan, promoting conservation throughout the community. It effectively and privately guides residents into conforming and conservation.

It's easy data to compile since the county already collects it. It's easy to put this data on utility bills, next to the 'actual' usage from the past year (using two columns in the graph). The county can easily watch the yearly average usage, as this number will decrease from year to year if residents are conserving.

A new routine will need to be written for the Utilities to calculate the information. This may need funds to accomplish, if the county does not have a programmer on staff to write the script. The statements need a new format to add the average data to the graphs.

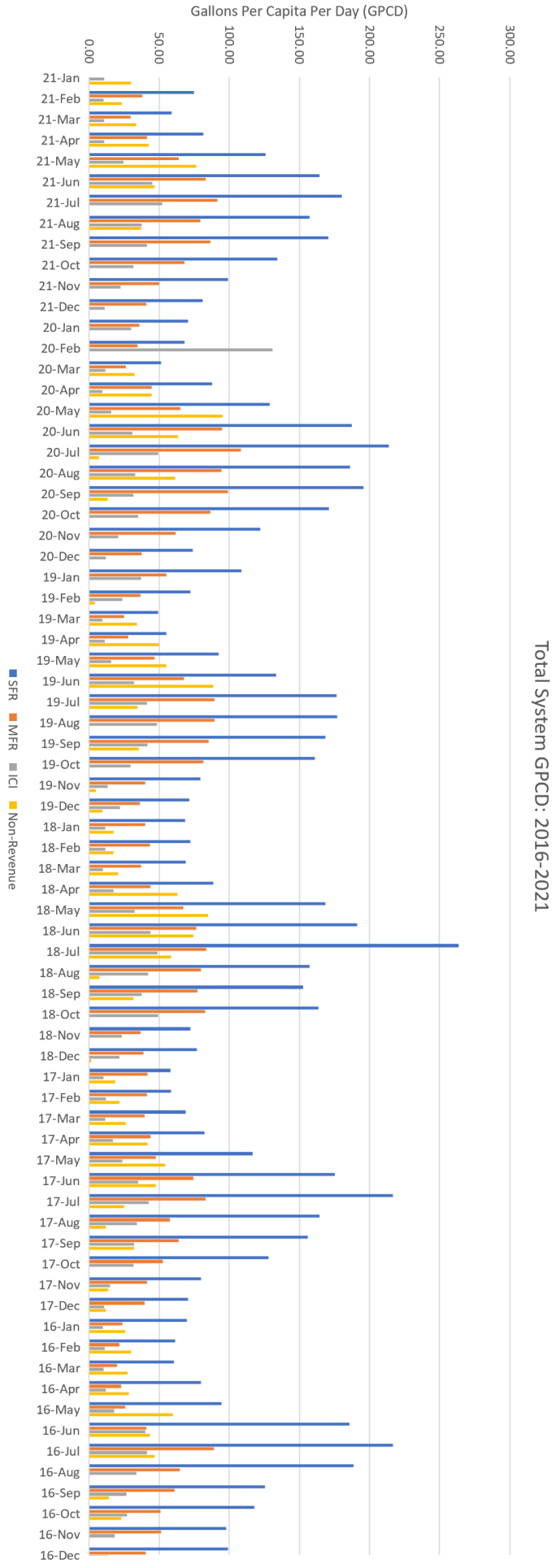
Appendix 2

Additional Graphs and Enlarged Figures

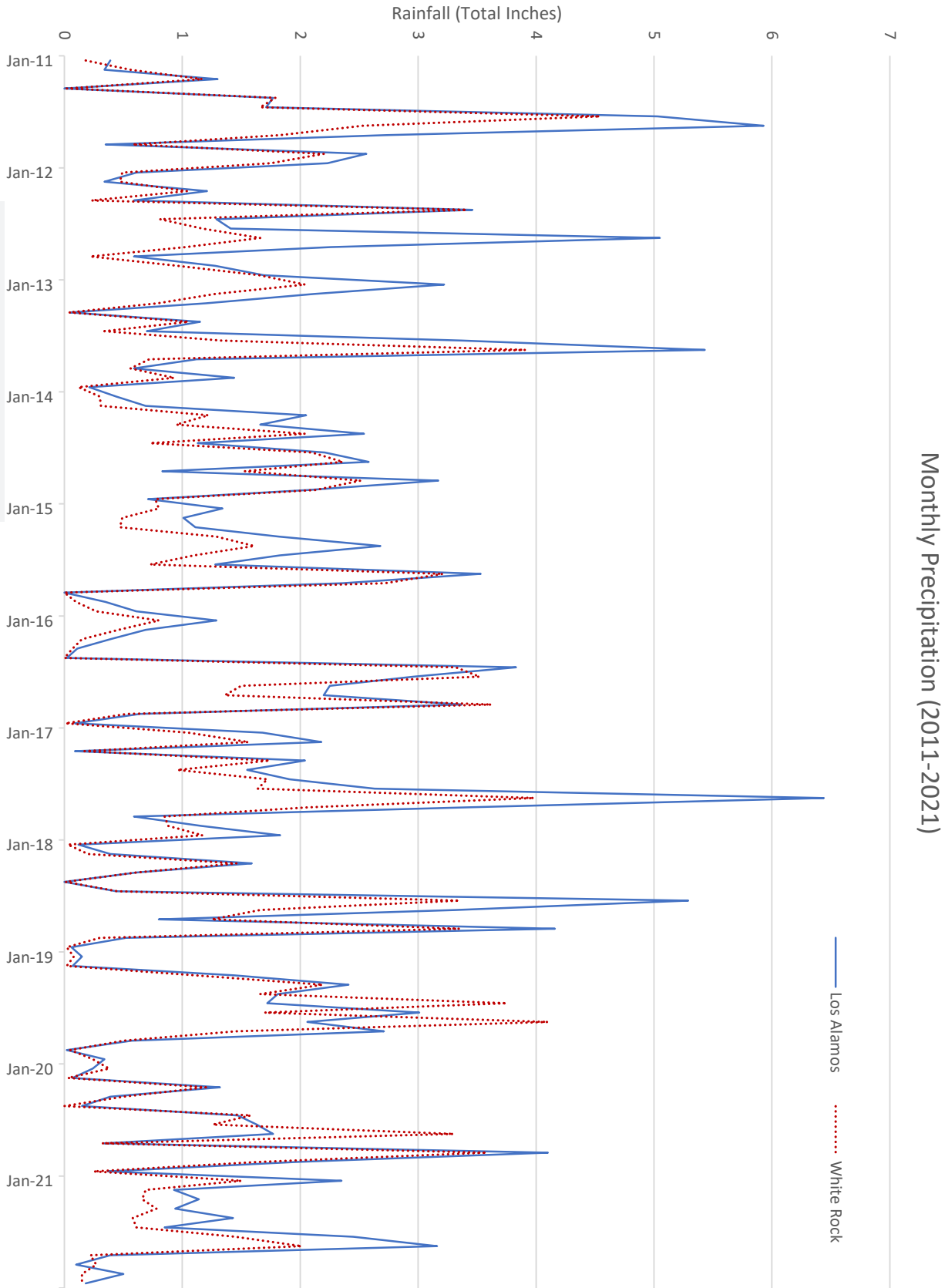
Monthly Gallons Per Capita Per Day

5 years of monthly GPCD data as references in "Assessing Supplier Performance: Water," page 025.

Opposite page: Monthly Precipitation 2011-2021, page 014.



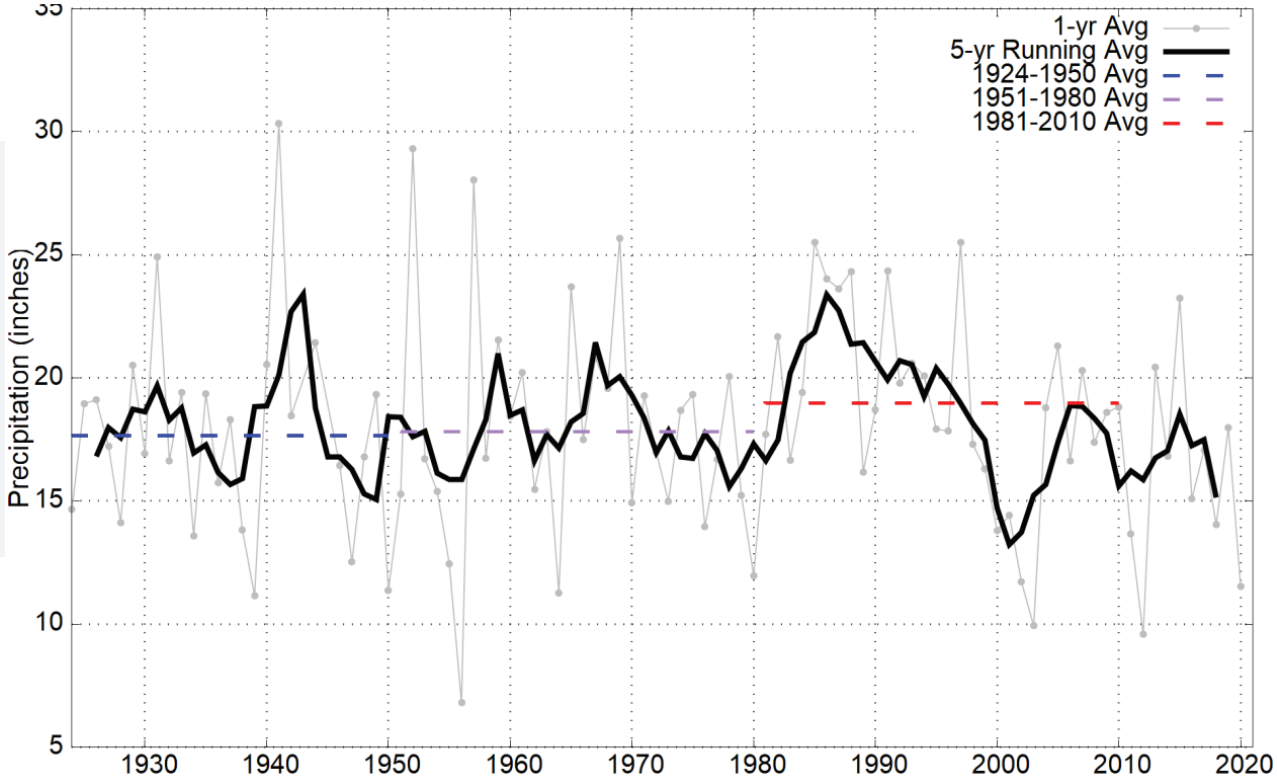
Appendix 2

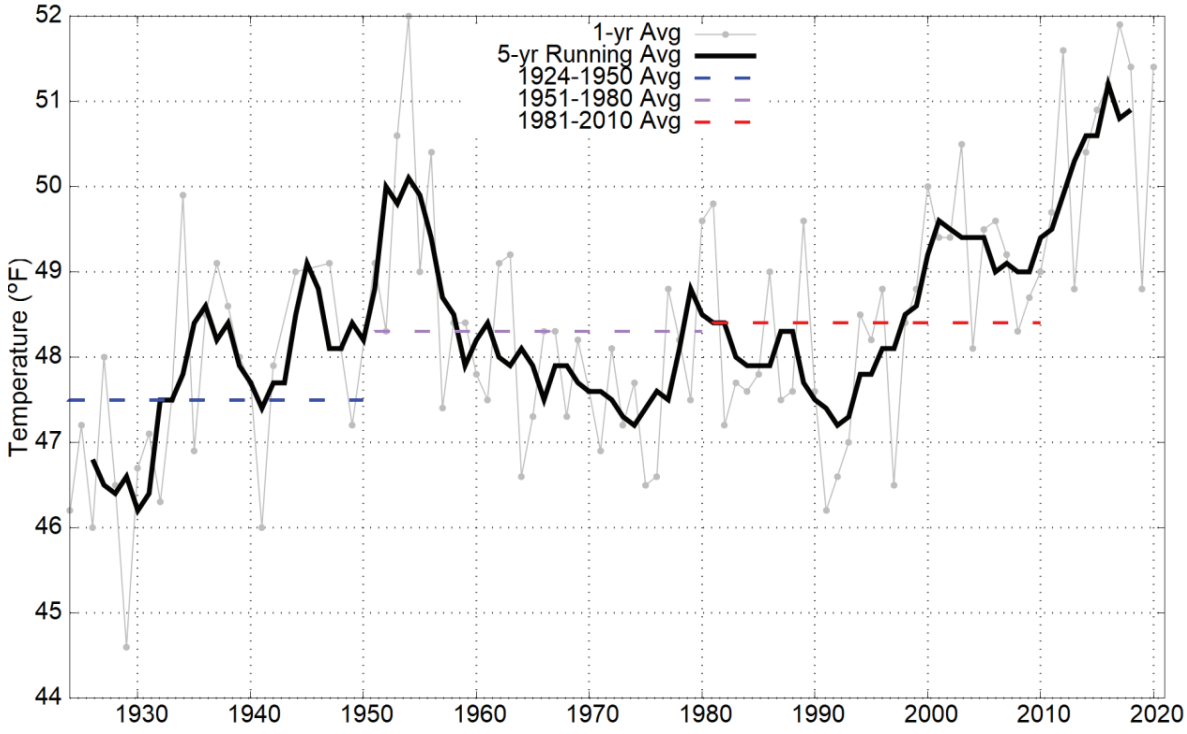

Rainfall (Total Inches)
0
1
2
3
4
5
6
7
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Monthly Precipitation (2011-2021)
Los Alamos
White Rock

Appendix 2

Additional Graphs and Enlarged Figures

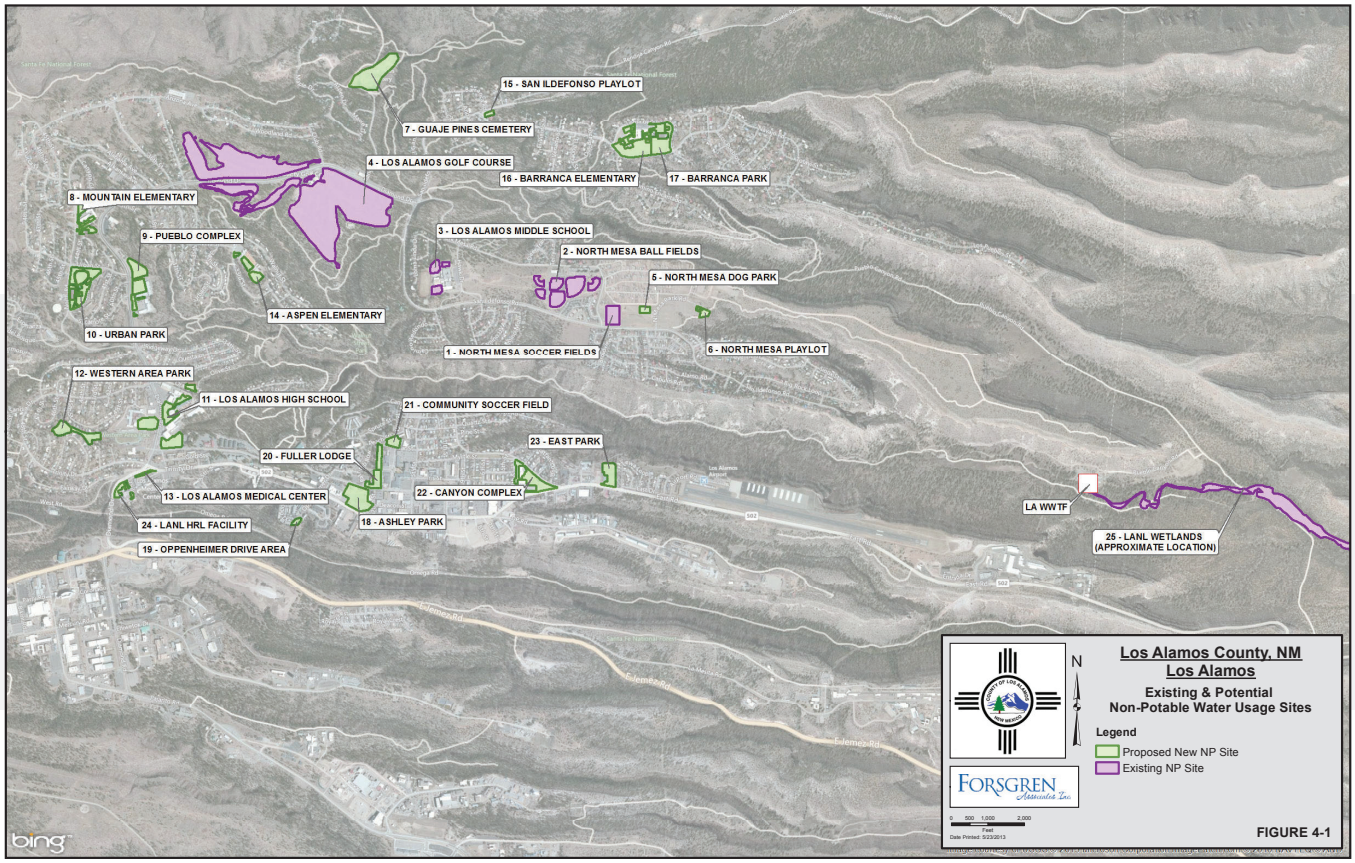
Figures from LANL Climatology 2021 Update. Precipitation (top), page 014, and Temperature (bottom), page 015.

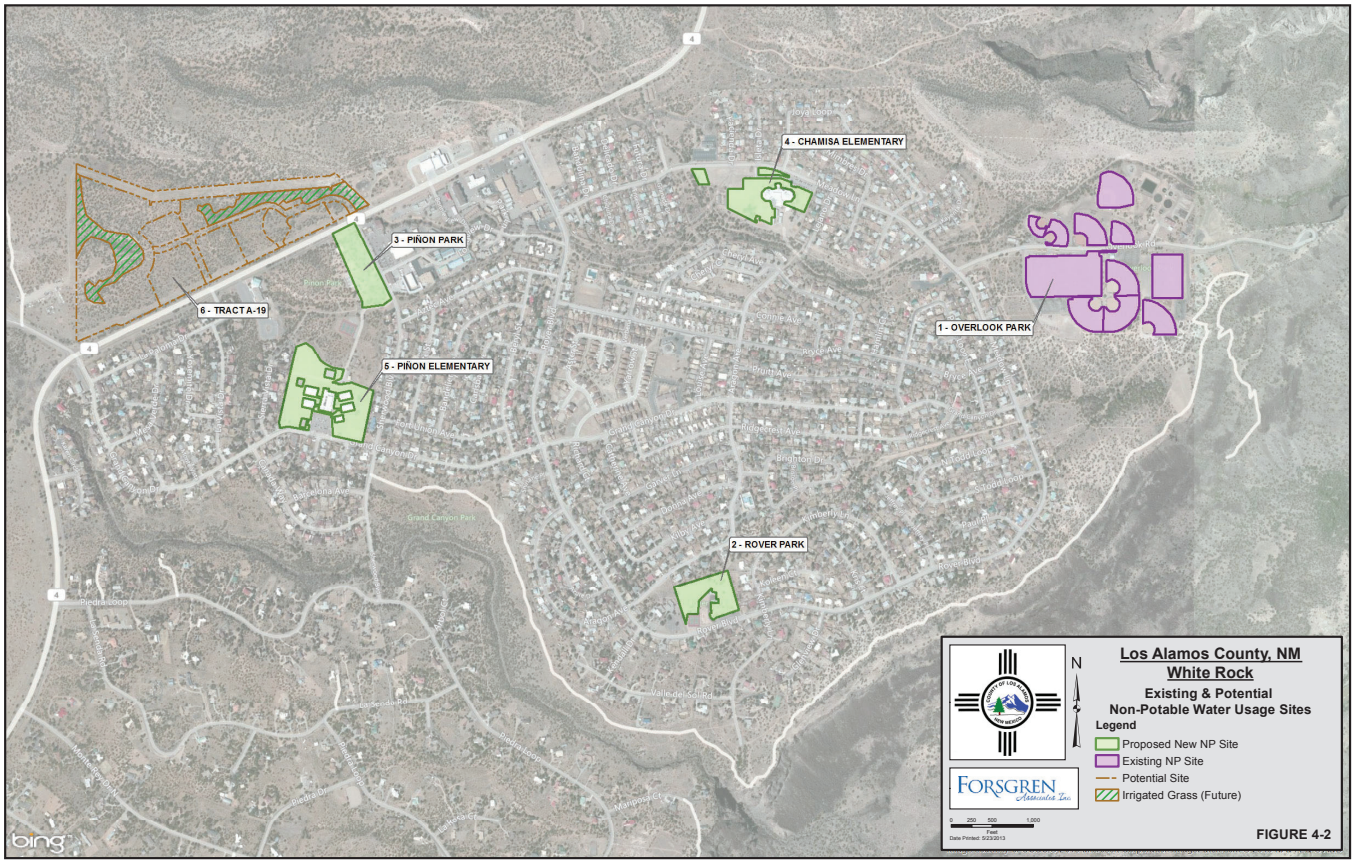




Appendix 2

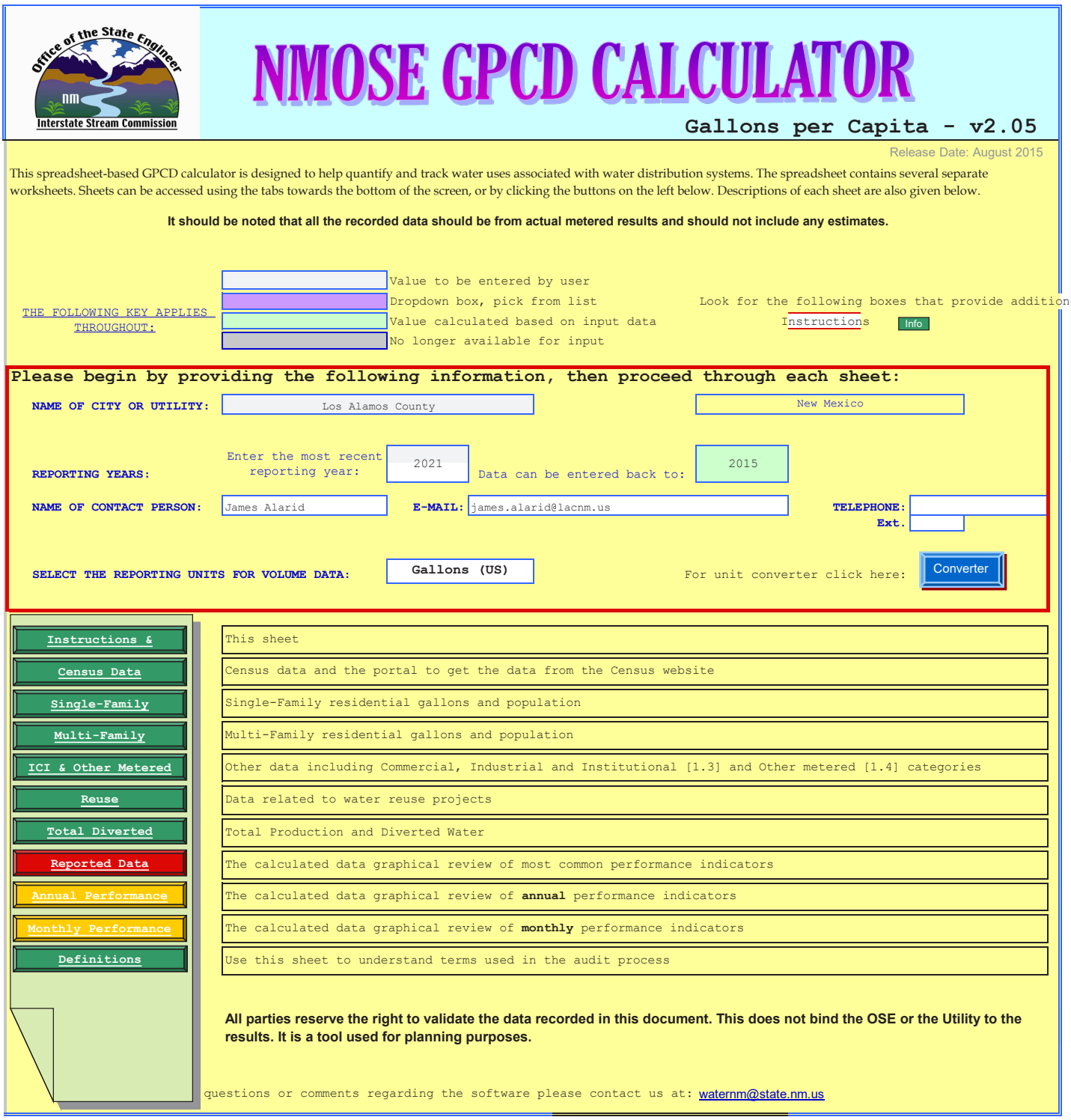
Reclaimed Water Use Maps, page 019.





Appendix 3

NMOSE GPCD Calculator



NMOSE GPCD CALCULATOR

Gallons per Capita - v2.05

Release Date: August 2015

This spreadsheet-based GPCD calculator is designed to help quantify and track water uses associated with water distribution systems. The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons on the left below. Descriptions of each sheet are also given below.

It should be noted that all the recorded data should be from actual metered results and should not include any estimates.

THE FOLLOWING KEY APPLIES THROUGHOUT:

- Value to be entered by user
- Dropdown box, pick from list
- Value calculated based on input data
- No longer available for input

Look for the following boxes that provide addition Instructions Info

Please begin by providing the following information, then proceed through each sheet:

NAME OF CITY OR UTILITY: Los Alamos County — New Mexico

REPORTING YEARS: Enter the most recent reporting year: 2021 — Data can be entered back to: 2015

NAME OF CONTACT PERSON: James Alarid **E-MAIL:** james.alarid@lacnm.us **TELEPHONE:** **Ext.**

SELECT THE REPORTING UNITS FOR VOLUME DATA: Gallons (US) For unit converter click here: Converter

Instructions &	This sheet
Census Data	Census data and the portal to get the data from the Census website
Single-Family	Single-Family residential gallons and population
Multi-Family	Multi-Family residential gallons and population
ICI & Other Metered	Other data including Commercial, Industrial and Institutional [1.3] and Other metered [1.4] categories
Reuse	Data related to water reuse projects
Total Diverted	Total Production and Diverted Water
Reported Data	The calculated data graphical review of most common performance indicators
Annual Performance	The calculated data graphical review of **annual** performance indicators
Monthly Performance	The calculated data graphical review of **monthly** performance indicators
Definitions	Use this sheet to understand terms used in the audit process

All parties reserve the right to validate the data recorded in this document. This does not bind the OSE or the Utility to the results. It is a tool used for planning purposes.

questions or comments regarding the software please contact us at: waternm@state.nm.us

Appendix 3

Census Information Data Table 2.1

Info

Click here to access the Census Web site

OR

Click here for instructions on how to find the data on the Census website

2021 TO 2015

Use the most recent census data

Return to Instructions

DATA

US Census Table	Description		INPUT
DP-1	Profile of General Population and Housing Characteristics	Census Year	2010
Subject			
Relationship	In group quarters	Total	94
Housing Occupancy	Total housing units	Total	8,354
	Occupied housing units		7,663
	Vacant housing units		691
Households by Type	Average household size	Total	2.33

Formula: Household Size = Total Population / Total Number of Housing Units

Vacancy Rate %	8.3%

DATA INPUT SHEET

Los Alamos County

Instructions

3. SINGLE-FAMILY RESIDENTIAL (SFR)

Return to Instructions

MONTHLY DATA

TABLE 3.1 Info — 2021 TO 2015

SFR BILLED WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	23,051,000	22,983,000	21,515,000	29,041,000	44,704,000	54,329,000	66,371,000	53,567,000	61,820,000	49,371,000	29,712,000	29,805,000
2020	25,692,000	20,738,000	19,530,000	30,979,000	46,989,000	59,493,000	78,325,000	63,429,000	60,678,000	62,813,000	38,778,000	27,045,000
2019	33,288,000	26,027,000	17,911,000	19,277,000	33,496,000	41,107,000	57,492,000	64,550,000	49,838,000	55,614,000	22,941,000	23,269,000
2018	24,722,000	22,095,000	24,714,000	30,672,000	59,533,000	62,401,000	6,446,000	57,337,000	46,781,000	49,859,000	37,647,000	26,709,000
2017	21,101,000	19,222,000	24,322,000	25,231,000	41,896,000	61,019,000	68,531,000	58,596,000	53,589,000	43,947,000	25,937,000	25,435,000
2016	21,332,000	20,026,000	21,942,000	28,105,000	34,213,000	64,952,000	67,322,000	68,344,000	43,345,000	41,870,000	30,902,000	34,704,000
2015	18,404,000	14,878,000	16,134,000	22,075,000	30,609,000	55,658,000	51,319,000	40,413,000	48,407,000	50,710,000	23,677,000	27,277,000

TABLE 3.2 Info — Total Connections

You have chosen to enter Total Connections, enter the monthly values below, or enter annual values in table 3.8 Check message above Table 3.3 to see if additional data is required.

NUMBER OF SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	4,888	5,144	5,515	5,532	5,359	5,168	5,531	5,159	5,626	5,523	4,734	5,540
2020	5,472	5,118	5,699	5,485	5,494	4,979	5,509	5,156	4,876	5,523	4,987	5,517
2019	4,657	5,738	5,443	5,444	5,447	5,152	4,939	5,477	4,657	5,472	4,561	4,943
2018	5,407	5,407	5,407	5,390	5,326	5,110	3,852	5,488	4,828	4,657	7,890	5,248
2017	5,461	5,489	5,327	4,824	5,399	5,413	4,811	5,366	5,343	5,185	5,087	5,416
2016	4,658	5,447	5,442	5,470	5,444	5,438	4,738	5,447	5,378	5,358	4,955	5,289
2015	5,017	4,999	5,407	5,354	5,038	5,355	5,063	5,271	5,033	5,350	4,534	5,294

TABLE 3.3 Info

You have entered Total Connections in Table 3.2; enter the number of inactive (zero use) connections below
If values are not entered, an adjustment will be made based on vacancy rates reported in the Census data

INACTIVE (ZERO USE) SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021												
2020												
2019												
2018												
2017												
2016												
2015												

TABLE 3.4

Formula = (No. of Connections - No. of Zero Use Accounts) * Ave. Household Size

SFR POPULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	10,365	10,963	11,827	11,865	11,462	11,019	11,863	10,998	12,084	11,845	10,008	11,885
2020	11,726	10,901	12,254	11,755	11,775	10,575	11,812	10,989	10,336	11,843	10,595	11,831
2019	9,856	12,375	11,688	11,690	11,697	11,010	10,513	11,767	9,856	11,755	9,633	10,523
2018	11,607	10,934	11,574	11,535	11,386	10,882	7,951	11,763	10,225	9,827	17,360	11,204
2017	11,710	11,776	11,398	10,226	11,566	11,599	10,196	11,489	11,435	11,067	10,839	11,606
2016	9,840	11,679	11,667	11,732	11,672	11,658	10,027	11,679	11,518	11,471	10,532	11,311
2015	10,698	10,656	11,607	11,484	10,747	11,486	10,806	11,290	10,736	11,474	9,573	11,344

TABLE 3.5

Formula = Billed Water Consumption (SFR only) / Calculated Population (SFR only)

SFR GPCD CALCULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	71.74	74.87	58.68	81.59	125.81	164.36	180.47	157.11	170.52	134.45	98.96	80.89
2020	70.68	67.94	51.41	87.85	128.72	187.52	213.90	186.19	195.69	171.08	122.00	73.74
2019	108.88	72.23	49.43	54.97	92.38	133.54	176.40	176.96	168.45	160.85	79.39	71.37
2018	68.71	72.17	68.88	88.64	168.67	191.14	26.15	157.23	152.50	163.67	72.29	76.90
2017	58.13	58.30	68.83	82.24	116.85	175.36	216.82	164.52	156.21	128.09	79.76	70.70
2016	69.93	61.24	60.67	79.85	94.56	185.72	216.59	188.78	125.44	117.74	97.80	98.98
2015	55.49	49.86	44.84	64.08	91.87	161.52	153.20	115.47	150.30	142.56	82.44	77.57

COMMENTS:

ANNUAL DATA

TABLE 3.6 ANNUAL CONSUMPTION

TABLE 3.7 ANNUAL CALCULATION

	486,269,000
	534,489,000
	449,769,000
	448,916,000
	468,826,000
	477,057,000
	399,561,000

TABLE 3.8 AVG. ANNUAL CONNECTIONS

TABLE 3.9 AVG CONN. CALCULATION

	5,310
	5,318
	5,161
	5,312
	5,260
	5,255
	5,143

TABLE 3.10 Info CALCULATED GROWTH RATE

TABLE 3.11 No. VACANT SFR CONNECTIONS

-0.15%	439
3.05%	440
-2.85%	427
0.99%	439
0.09%	435
2.19%	435
	425

TABLE 3.12 Info SIZE OF HOUSEHOLD

TABLE 3.13 Info SFR POPULATION

2.33	**11,349**
2.33	**11,366**
2.33	**11,030**
2.33	**11,354**
2.33	**11,242**
2.33	**11,232**
2.33	**10,992**

TABLE 3.14 Info

ANNUAL SFR GPCD
117.39
128.84
111.72
108.32
114.25
116.36
99.59

NMOSE GPCD Calculator v3.03

Appendix 3

NMOSE GPCD Calculator

DATA INPUT SHEET

Los Alamos County

Instructions

4. MULTI-FAMILY RESIDENTIAL (MFR)

Return to Instructions

MONTHLY DATA

2021 TO 2015

TABLE 4.1 Info

MFR BILLED WATER CONSUMPTION (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	6,501,000	6,482,000	6,068,000	8,191,000	12,609,000	15,323,000	18,720,000	15,108,000	17,437,000	13,925,000	8,380,000	8,407,000
2020	7,246,000	5,849,000	5,509,000	8,738,000	13,253,000	16,780,000	22,092,000	17,890,000	17,114,000	17,717,000	10,938,000	7,628,000
2019	9,383,000	7,059,000	5,052,000	5,437,000	9,447,000	12,441,000	16,216,000	18,207,000	14,049,000	16,532,000	6,470,000	6,566,000
2018	7,850,000	7,671,000	6,773,000	8,594,000	12,839,000	15,130,000	1,818,000	16,172,000	13,195,000	14,063,000	10,619,000	7,533,000
2017	7,511,000	6,885,000	7,704,000	8,640,000	9,359,000	14,343,000	16,177,000	10,952,000	11,491,000	10,807,000	7,656,000	8,028,000
2016	7,411,000	7,150,000	7,348,000	8,212,000	9,441,000	14,538,000	16,383,000	11,475,000	11,225,000	8,891,000	8,431,000	8,278,000
2015	8,221,000	6,179,000	7,133,000	7,786,000	8,806,000	10,263,000	11,424,000	9,562,000	11,413,000	10,189,000	6,913,000	8,040,000

TABLE 4.2 If only Current Number of Units is Known, put this number in Table 4.7

NUMBER OF MFR UNITS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2,722	2,865	3,072	3,081	2,985	2,878	3,080	2,874	3,133	3,076	2,637	3,086
2020	3,048	2,851	3,174	3,055	3,060	2,773	3,069	2,872	2,716	3,076	2,778	3,073
2019	2,594	3,196	3,032	3,032	3,034	2,870	2,751	3,051	2,594	3,047	2,541	2,753
2018	2,969	2,951	2,768	3,050	2,883	3,068	2,145	3,057	2,689	2,594	4,394	2,923
2017	2,740	2,788	2,925	3,054	2,963	3,005	2,940	2,883	2,816	3,093	2,888	3,034
2016	4,658	5,447	5,442	5,470	5,444	5,438	2,886	2,797	2,970	2,762	2,696	3,179
2015	2,950	2,615	2,935	2,793	2,798	2,908	2,820	2,749	2,751	2,771	2,464	3,062

TABLE 4.3 Formula = (Number of Units - Vacant MFR Connections) * Ave. Household Size

MFR POPULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	5,773	6,106	6,587	6,608	6,384	6,137	6,607	6,126	6,730	6,597	5,574	6,620
2020	6,531	6,071	6,825	6,547	6,558	5,890	6,579	6,121	5,757	6,596	5,901	6,589
2019	5,490	6,893	6,511	6,511	6,515	6,133	5,856	6,555	5,490	6,546	5,367	5,860
2018	6,348	6,306	5,879	6,536	6,147	6,578	4,428	6,553	5,695	5,474	9,668	6,241
2017	5,820	5,932	6,251	6,552	6,340	6,437	6,286	6,153	5,997	6,643	6,165	6,505
2016	10,063	11,902	11,890	11,955	11,895	11,881	5,934	5,727	6,130	5,645	5,492	6,617
2015	6,334	5,553	6,299	5,968	5,979	6,236	6,031	5,865	5,870	5,917	5,201	6,595

TABLE 4.4 Formula = MFR Billed Water Consumption (Monthly) / MFR Population (Monthly)

MFR GPCD CALCULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	36.33	37.91	29.72	41.32	63.71	83.23	91.39	79.56	86.36	68.09	50.11	40.97
2020	35.79	34.41	26.04	44.49	65.19	94.96	108.32	94.29	99.10	86.64	61.78	37.34
2019	55.13	36.58	25.03	27.84	46.77	67.62	89.33	89.60	85.30	81.47	40.19	36.14
2018	39.89	43.45	37.16	43.83	67.37	76.66	13.24	79.61	77.23	82.87	36.61	38.94
2017	41.63	41.45	39.76	43.96	47.62	74.27	83.02	57.42	63.87	52.48	41.40	39.81
2016	23.76	21.46	19.94	22.90	25.60	40.79	89.05	64.63	61.04	50.80	51.17	40.36
2015	41.87	39.74	36.53	43.49	47.51	54.86	61.11	52.59	64.81	55.55	44.30	39.33

ANNUAL DATA

TABLE 4.5

ANNUAL CONSUMPTION

TABLE 4.6

ANNUAL CALCULATION
137,151,000
150,754,000
126,859,000
122,257,000
119,553,000
118,783,000
105,929,000

TABLE 4.7

No. CURRENT UNITS

TABLE 4.8

ANNUAL UNIT CALCULATION
2,957
2,962
2,875
2,958
2,927
4,099
2,801

TABLE 4.9 Info

MFR POPULATION
6,321
6,330
6,144
6,321
6,257
8,761
5,987

TABLE 4.10

VACANT MFR CONNECTIONS
245
245
238
245
242
339
232

TABLE 4.11 Info

ANNUAL MFR GPCD
59.45
65.24
56.57
52.99
52.35
37.15
48.47

DATA INPUT SHEET

Info Los Alamos County

Instructions

5. INDUSTRIAL, COMMERCIAL & INSTITUTIONAL (ICI) AND OTHER METERED

Return to Instructions

MONTHLY DATA

2021 TO 2015

TABLE 5.1

ICI WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	5,916,000	5,097,000	6,005,000	5,637,000	13,525,000	24,028,000	28,736,000	20,580,000	22,032,000	17,359,000	11,940,000	6,123,000
2020	16,625,000	65,260,000	6,334,000	5,160,000	8,703,000	16,485,000	27,267,000	18,090,000	16,828,000	19,216,000	11,109,000	6,557,000
2019	19,961,000	11,418,000	5,130,000	5,871,000	8,433,000	16,680,000	22,014,000	25,919,000	21,503,000	15,769,000	6,799,000	11,835,000
2018	6,376,000	5,717,000	5,412,000	9,357,000	17,879,000	23,243,000	3,611,000	23,126,000	19,906,000	27,173,000	12,499,000	11,932,000
2017	5,673,000	5,995,000	6,344,000	8,883,000	12,940,000	18,466,000	23,163,000	18,732,000	16,990,000	17,261,000	7,798,000	5,749,000
2016	6,200,000	6,246,000	6,539,000	7,168,000	11,087,000	24,165,000	25,662,000	21,137,000	15,923,000	16,848,000	10,968,000	8,419,000
2015	6,758,000	12,165,000	6,402,000	9,556,000	14,576,000	18,194,000	19,425,000	13,967,000	20,192,000	18,211,000	9,130,000	6,992,000

TABLE 5.2

OTHER METERED (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0

COMMENTS:

ANNUAL DATA

TABLE 5.3

ICI ANNUAL CONSUMPTION

TABLE 5.4

ICI GPCD
25.75
33.52
27.18
25.63
23.05
21.87
24.96

TABLE 5.5

ICI ANNUAL CALCULATED
166,978,000
217,634,000
171,332,000
166,231,000
147,994,000
160,362,000
155,568,000

TABLE 5.6

OTHER ANNUAL CONSUMPTION

TABLE 5.7

OTHER METERED GPCD
N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 5.8

OTHER ANNUAL CALCULATED
N/A
N/A
N/A
N/A
N/A
N/A
N/A

Appendix 3

DATA INPUT SHEET | Info

Los Alamos County

6. REUSE

Return to Instructions

Instructions

MONTHLY DATA

2021 TO 2015

TABLE 6.1

REUSE DIVERSIONS (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	0	659,806	2,685,604	9,572,099	16,864,298	17,154,189	12,589,285	17,753,447	14,306,548	6,979,030	3,745,044	0
2020	0	0	158,030	9,585,767	18,637,523	19,375,844	19,800,444	18,055,444	12,950,770	10,681,570	2,753,536	2,740
2019	0	0	0	7,255,359	13,208,681	18,747,870	15,949,582	15,023,910	16,113,086	6,057,093	497,979	0
2018	2,083,164	985,278	3,155,615	16,677,017	19,927,309	20,682,187	19,665,932	11,649,607	12,530,167	2,965,837	4,127,865	0
2017	104,253	91	4,514,917	7,824,055	11,968,411	18,855,466	15,814,165	7,729,965	14,860,284	3,346,195	3,664,157	0
2016	806	8,354	3,097,391	3,788,420	7,380,421	19,528,481	17,224,228	3,095,964	5,733,467	11,322,306	3,576,394	79
2015	0	0	2,311,815	10,895,334	5,531,325	14,973,057	2,916,420	12,186,453	16,723,354	6,133,506	0	77

COMMENTS:

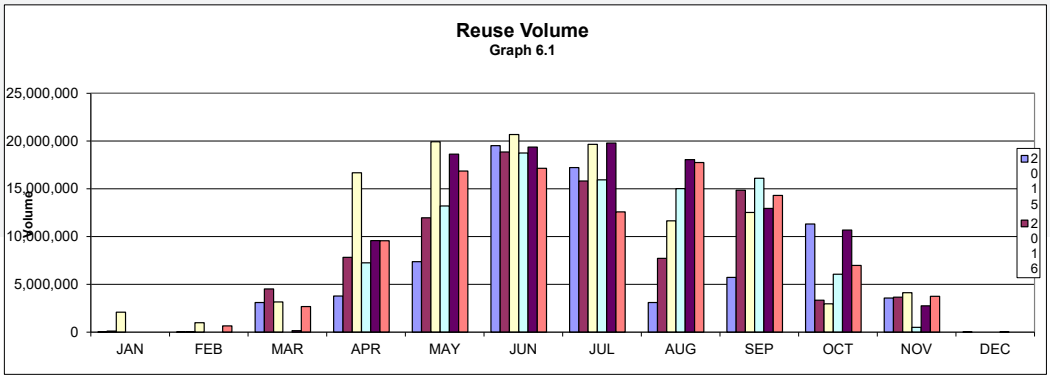
ANNUAL DATA

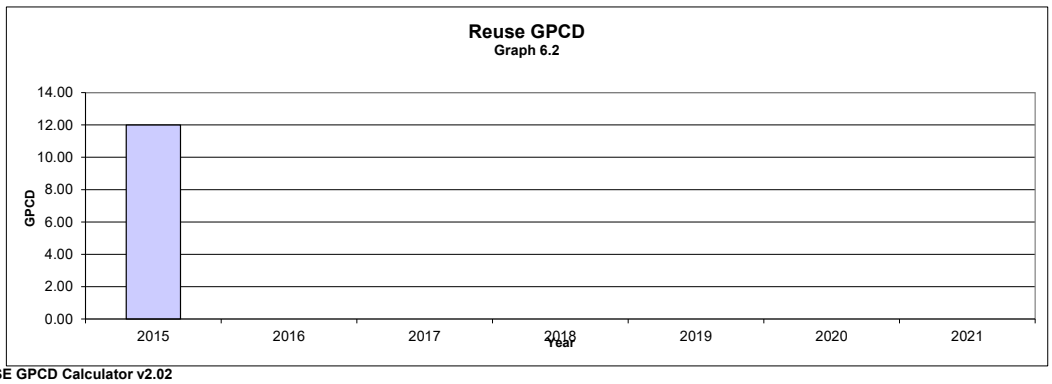
TABLE 6.2

REUSE ANNUAL DIVERSIONS

TABLE 6.3

REUSE GPCD
#REF!
N/A
N/A
N/A
N/A
N/A
12.00





NMOSE GPCD Calculator v2.02

Appendix 3

NMOSE GPCD Calculator

DATA INPUT SHEET

Return to Instructions

7. TOTAL WATER DIVERTED AND SUPPLIED

Los Alamos County

MONTHLY DATA

TABLE 7.1

2021 TO 2015

TOTAL WATER DIVERTED (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	73,126,163	64,467,149	72,039,181	85,991,658	136,692,116	138,643,972	129,966,482	133,134,069	125,684,832	90,377,271	72,110,779	66,698,497
2020	67,401,950	62,914,565	69,410,979	85,475,833	141,942,322	146,229,622	154,420,672	154,372,810	127,979,713	115,992,409	74,356,386	74,325,330
2019	70,473,755	62,897,063	64,818,312	74,593,227	101,156,217	140,633,414	143,625,950	137,673,036	128,481,675	85,749,242	69,837,534	70,241,727
2018	69,036,758	60,505,310	66,999,126	101,119,506	159,786,139	165,186,443	162,518,990	129,189,843	121,269,403	86,986,823	73,342,136	70,664,136
2017	69,336,000	60,153,000	70,690,000	82,063,000	113,586,000	143,975,000	148,734,000	121,019,000	122,771,425	85,161,000	74,000,000	69,876,653
2016	76,266,000	77,689,000	73,348,000	78,145,000	110,585,000	150,103,000	164,760,000	105,829,000	107,358,000	106,728,000	78,084,000	72,039,000
2015	68,453,500	57,912,300	69,273,500	83,021,700	94,454,200	124,076,300	105,430,500	115,114,400	123,296,600	98,968,300	76,643,800	76,019,000

TABLE 7.2

IMPORTED WATER (Monthly)(Gallons (US)) Info.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 7.3

EXPORTED WATER (Monthly) (Gallons (US)) Info.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	21,112,700	18,411,100	19,950,700	20,344,529	23,727,100	20,144,000	23,172,900	23,370,500	24,712,200	18,391,900	23,965,700	22,221,900
2020	20,406,100	22,229,600	20,068,800	16,865,200	20,368,900	19,521,100	22,977,900	21,203,500	26,372,800	27,992,200	21,102,400	35,208,600
2019	21,646,200	17,362,400	18,404,100	18,172,800	20,256,000	21,564,900	29,475,500	30,079,600	24,763,500	19,371,800	31,045,600	23,388,700
2018	20,572,860	16,372,840	18,588,020	18,810,720	22,828,000	24,832,730	27,057,100	28,402,800	24,508,400	22,007,000	27,628,200	23,595,000
2017	24,867,700	17,430,940	17,984,950	17,208,200	19,855,950	25,054,470	27,270,000	26,115,100	23,745,100	26,430,000	25,385,700	24,122,880
2016	25,133,820	27,368,200	20,431,210	17,601,790	18,697,580	20,181,160	26,313,280	28,034,800	28,499,990	24,974,070	29,726,740	19,692,900
2015	26,171,490	17,246,620	18,442,090	17,205,510	17,378,210	17,004,930	31,891,120	14,443,150	26,247,120	28,905,780	25,658,300	24,953,020

TABLE 7.4

Formula = Total Water Diverted + Imported water - Exported Water

TOTAL WATER SUPPLY (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	52,013,463	46,056,049	52,088,481	65,647,129	112,965,016	118,499,972	106,793,582	109,763,569	100,972,632	71,985,371	48,145,079	44,476,597
2020	46,995,850	40,684,965	49,342,179	68,610,633	121,573,422	126,708,522	131,442,772	133,169,310	101,606,913	88,000,209	53,253,986	39,116,730
2019	48,827,555	45,534,663	46,414,212	56,420,427	80,900,217	119,068,514	114,150,450	107,593,436	103,718,175	66,377,442	38,791,934	46,853,027
2018	48,463,898	44,132,470	48,411,106	82,308,786	136,958,139	140,353,713	135,461,890	100,787,043	96,761,003	64,979,823	45,713,936	47,069,136
2017	44,468,300	42,722,060	52,705,050	64,854,800	93,730,050	118,920,530	121,464,000	94,903,900	99,026,325	58,731,000	48,614,300	45,753,773
2016	51,132,180	50,320,800	52,916,790	60,543,210	91,887,420	129,921,840	138,446,720	77,794,200	78,858,010	81,753,930	48,357,260	52,346,100
2015	42,282,010	40,665,680	50,831,410	65,816,190	77,075,990	107,071,370	73,539,380	100,671,250	97,049,480	70,062,520	50,985,500	51,065,980

ANNUAL DATA

TABLE 7.6

ANNUAL TOTAL DIVERTED

TABLE 7.7

ANNUAL TOTAL DIVERTED CALC
1,188,932,169
1,274,822,591
1,150,181,152
1,266,604,613
1,161,365,078
1,200,934,000
1,092,664,100

TABLE 7.8

ANNUAL TOTAL IMPORTED

TABLE 7.9

ANNUAL TOTAL IMPORT CALC
N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 7.10

ANNUAL TOTAL EXPORTED

TABLE 7.11

ANNUAL TOTAL EXPORT CALC
259,525,229
274,317,100
275,531,100
275,203,670
275,470,990
286,655,540
265,547,340

TABLE 7.12

ANNUAL TOTAL WATER SUPPLY
929,406,940
1,000,505,491
874,650,052
991,400,943
885,894,088
914,278,460
827,116,760

TABLE 7.13

TOTAL POP. EST.
17,764
17,791
17,268
17,769
17,593
20,087
17,073

Table 7.5

SYSTEM TOTAL GPCD (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	94	93	95	123	205	222	194	199	189	131	90	81
2020	85	82	89	129	220	237	238	241	190	160	100	71
2019	91	94	87	109	151	230	213	201	200	124	75	88
2018	88	89	88	154	249	263	246	183	182	118	86	85
2017	82	87	97	123	172	225	223	174	188	108	92	84
2016	82	89	85	100	148	216	222	125	131	131	80	84
2015	80	85	96	128	146	209	139	190	189	132	100	96

TABLE 7.14

Year	SYSTEM TOTAL GPCD
2021	**143.35**
2020	**154.08**
2019	**138.77**
2018	**152.86**
2017	**137.96**
2016	**124.70**
2015	**132.73**

COMMENTS:

NMOSE GPCD Calculator v2.02

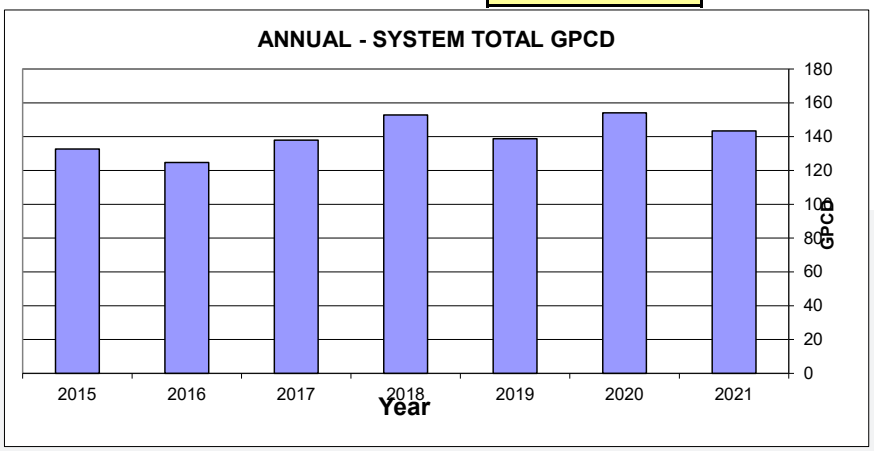
Appendix 3

8. SUMMARY GPCD REPORTED DATA

Los Alamos County		
2021	To:	2015

ANNUAL

Year	SYSTEM GPCD
2021	143.35
2020	154.08
2019	138.77
2018	152.86
2017	137.96
2016	124.70
2015	132.73

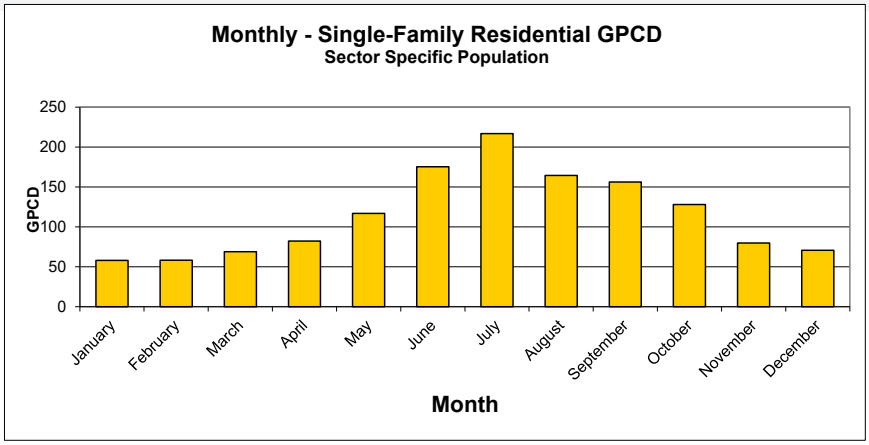


MONTHLY

Month	SFR GPCD
January	58.13
February	58.30
March	68.83
April	82.24
May	116.85
June	175.36
July	216.82
August	164.52
September	156.21
October	128.09
November	79.76
December	70.70

Year	2017

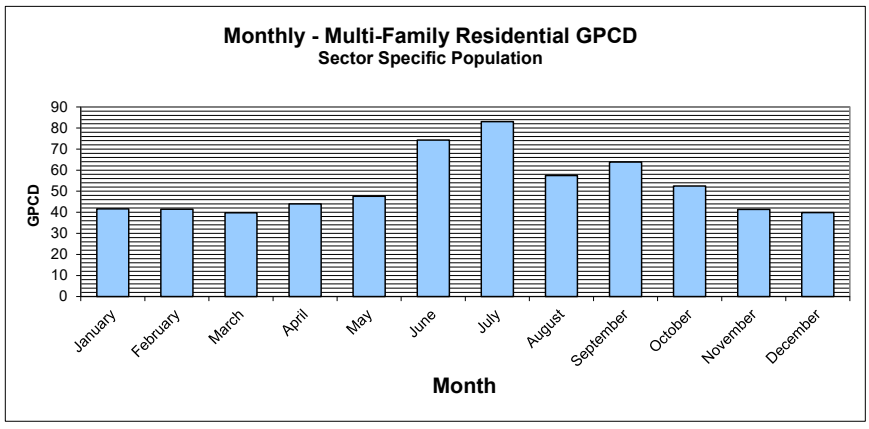
Peak/Ave	1.89



YEAR 2017

Month	MFR GPCD
January	41.63
February	41.45
March	39.76
April	43.96
May	47.62
June	74.27
July	83.02
August	57.42
September	63.87
October	52.48
November	41.40
December	39.81

Peak/Ave	1.59



YEAR 2017

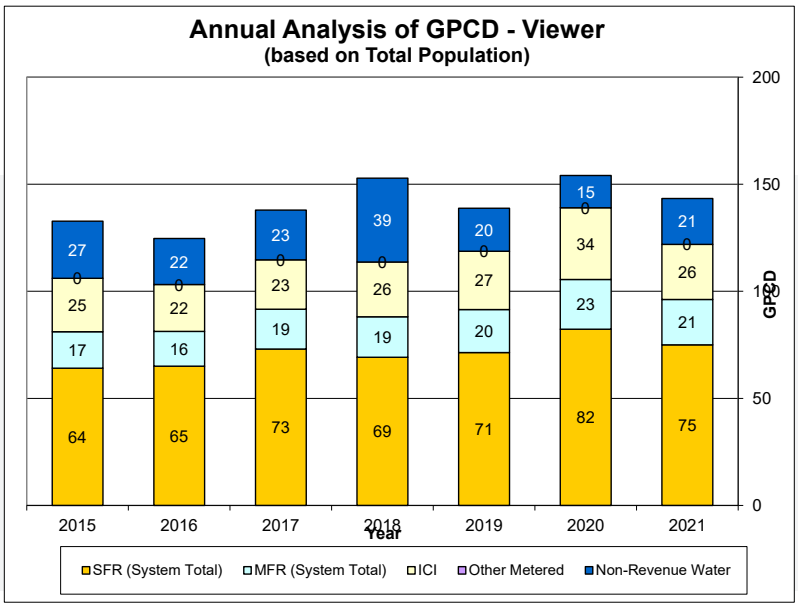
Appendix 3
NMOSE GPCD Calculator

9. System Total Annual Reporting Performance

Overall Annual GPCD (based on Total Population)

Year	SFR (System Total)	MFR (System Total)	ICI	Other Metered	Non-Revenue Water (Info)	Total Supplied	Non-Revenue Volume Million Gallons (US)
On Graph?	Yes	Yes	Yes	Yes	Yes		
2021	75.00	21.15	25.75	N/A	21.44	#REF!	#REF!
2020	82.31	23.22	33.52	N/A	15.03	154.08	97.63
2019	71.36	20.13	27.18	N/A	20.10	138.77	126.69
2018	69.22	18.85	25.63	N/A	39.16	152.86	254.00
2017	73.01	18.62	23.05	N/A	23.28	137.96	149.52
2016	65.07	16.20	21.87	N/A	21.56	124.70	158.08
2015	64.12	17.00	24.96	N/A	26.65	144.72	166.06

Los Alamos County		
2021	to	2015



10. Monthly Reporting Performance

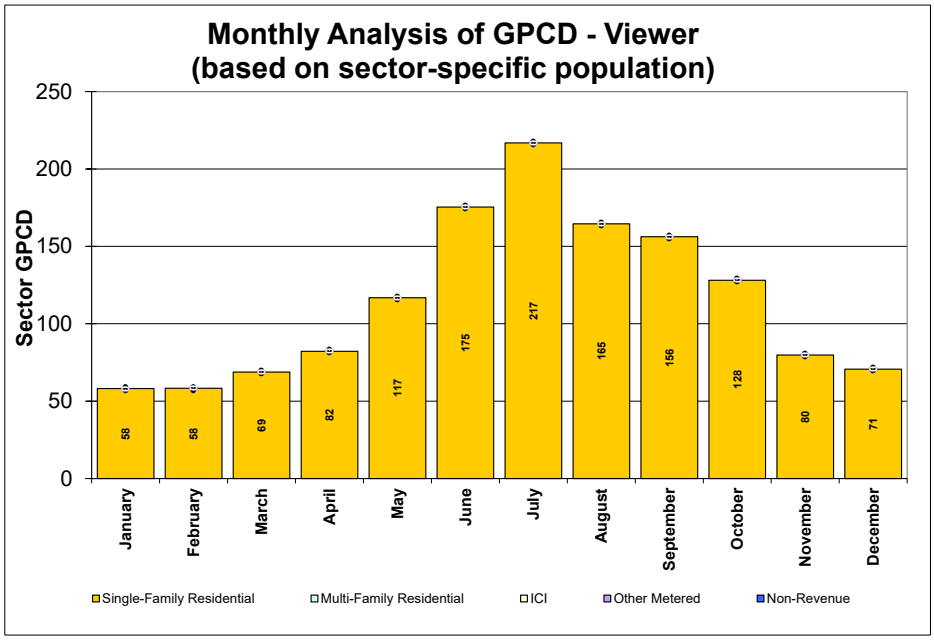
Choose Year for Monthly Analysis **2017**

Choose Sector **Single-Family Residential**

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	58.13	41.63	10.40	0.00	18.67
FEB	58.30	41.45	12.17	0.00	21.56
MAR	68.83	39.76	11.63	0.00	26.28
APR	82.24	43.96	16.83	0.00	41.87
MAY	116.85	47.62	23.73	0.00	54.15
JUN	175.36	74.27	34.99	0.00	47.54
JUL	216.82	83.02	42.47	0.00	24.92
AUG	164.52	57.42	34.35	0.00	12.15
SEP	156.21	63.87	32.19	0.00	32.13
OCT	128.09	52.48	31.65	0.00	-24.36
NOV	79.76	41.40	14.77	0.00	13.69
DEC	70.70	39.81	10.54	0.00	11.99

Los Alamos County		
2021	to	2015



Appendix 4

AWWA Audit

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person:	Jennifer Baca
Email Address:	jennifer.baca@lacnm.us
Telephone (incl Ext.):	505-662-8133
Name of City / Utility:	Los Alamos County
City/Town/Municipality:	Los Alamos
State / Province:	New Mexico (NM)
Country:	United States
Year:	2021
Start Date:	01/2020 Enter MM/YYYY numeric format
End Date:	12/2020 Enter MM/YYYY numeric format
Audit Preparation Date:	2/17/2022
Volume Reporting Units:	Million gallons (US)
PWSID / Other ID:	NM3500115

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

Appendix 4

AWWA Audit

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association.

? Click to access definition

+ Click to add a comment

Water Audit Report for: Los Alamos County (NM3500115)

Reporting Year: 2021 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ----------> Pcnt: Value:

Volume from own sources:	7	1,189.000	MG/Yr	2				MG/Yr
Water imported:	n/a	0.000	MG/Yr					MG/Yr
Water exported:	8	260.000	MG/Yr					MG/Yr

Enter negative % or value for under-registration

Enter positive % or value for over-registration

WATER SUPPLIED: 929.000 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

Pcnt: Value:

Billed metered:	8	790.395	MG/Yr		
Billed unmetered:	n/a	0.000	MG/Yr		
Unbilled metered:	n/a	0.000	MG/Yr		
Unbilled unmetered:		11.613	MG/Yr	1.25%	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: 802.008 MG/Yr

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption) 126.993 MG/Yr

Apparent Losses

Pcnt: Value:

Unauthorized consumption:		2.323	MG/Yr	0.25%	MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	7	16.131	MG/Yr	2.00%	MG/Yr
Systematic data handling errors:		1.976	MG/Yr	0.25%	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 20.429 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 106.564 MG/Yr

WATER LOSSES: 126.993 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 138.605 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	167.0	miles
Number of active AND inactive service connections:	7	7,111	
Service connection density:		43	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 6 65.0 psi

COST DATA

Total annual cost of operating water system:	10	$21,424,928	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$6.02	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$461.38	$/Million gallons

☑ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 72 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Variable production cost (applied to Real Losses)

3: Unauthorized consumption

Appendix 4

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0
American Water Works Association.

Water Audit Report for: Los Alamos County (NM3500115)
Reporting Year: 2021 1/2020 - 12/2020

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 72 out of 100 ***

System Attributes:

	Apparent Losses:	20.429	MG/Yr
+	Real Losses:	106.564	MG/Yr
=	**Water Losses:**	**126.993**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	46.74	MG/Yr
	Annual cost of Apparent Losses:	$122,983	
	Annual cost of Real Losses:	$641,512	Valued at **Customer Retail Unit Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	14.9%	
	Non-revenue water as percent by cost of operating system:	3.9%	Real Losses valued at Customer Retail Unit Cost
Operational Efficiency:	Apparent Losses per service connection per day:	7.87	gallons/connection/day
	Real Losses per service connection per day:	41.06	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.63	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	106.56	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	2.28	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

Appendix 4

AWWA Audit

AWWA Free Water Audit Software:
User Comments

WAS v5.0

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

Audit Item	Comment
Volume from own sources:	Total Water Produced for all for 2021 divided by 1,000,000
Vol. from own sources: Master meter error adjustment:	Additional meter accuracy data for production wells is needed to improve this value. Calculation only includes 2 of 12 production wells. Source: PureOps - Los Alamos County - Meter Testing Report 17.04 - C.PDF PureOps tested 21 meters in 2016, three of which were production wells (Otowi 1 and 4 and Pajarito 2). The Otowi Well 1 was highly inaccurate (only registering 29.8% of the flow) and therefore replaced. In order to not include an extreme outlier value, the remaining two values were averaged. (Value of all three = 76.9% vs. valueofjusttwo = 100 4%)
Water imported:	None (Los Alamos County has a contract with the United States Bureau of Reclamation for 1,200 acre-feet of water per year from the San Juan-Chama Project, but this water has not been brought online).
Water imported: master meter error adjustment:	Not applicable
Water exported:	Put the LANL water sale as exported water.
Water exported: master meter error adjustment:	Not applicable
Billed metered:	Total water sales, Kgal: total number added 12 months up and divided by 1,000
Billed unmetered:	None
Unbilled metered:	None
Unbilled unmetered:	Calculated

Appendix 4

Audit Item	Comment
Unauthorized consumption:	
Customer metering inaccuracies:	No data (no customer meter testing was conducted in 2021).
Systematic data handling errors:	
Length of mains:	122 miles of water main pipeline + 45 miles of transmission main = 167
Number of active AND inactive service connections:	Average of 12 months of billed locations: total units / locations
Average length of customer service line:	Answer yes to question regarding whether customer meters are located at the curb. From email from James Alarid to Amy Ewing on October 9, 2017: "the vast majority are at the curb."
Average operating pressure:	From email from James Alarid to Amy Ewing: "Average system operating pressure is 65 psi."
Total annual cost of operating water system:	Total cost for Water Production + total cost for Water Distribution - Less: Interdept Water
Customer retail unit cost (applied to Apparent Losses):	Los Alamos County Water Rate
Variable production cost (applied to Real Losses):	Total Water Production Electric Bill divided by Volume from own sources.

Appendix 4

AWWA Audit

AWWA Free Water Audit Software: Water Balance (WAS v5.0)

American Water Works Association.

Water Audit Report for:	Los Alamos County (NM3500115)	
Reporting Year:	2021	1/2020 - 12/2020
Data Validity Score:	72	

Own Sources (Adjusted for known errors) *1,189.000*	Water Exported *260.000*	Billed Water Exported			
	Water Supplied *929.000*	Authorized Consumption *802.008*	Billed Authorized Consumption *790.395*	Billed Metered Consumption (water exported is removed) *790.395*	Revenue Water 790.395
				Billed Unmetered Consumption *0.000*	
			Unbilled Authorized Consumption *11.613*	Unbilled Metered Consumption *0.000*	Non-Revenue Water (NRW) 138.605
				Unbilled Unmetered Consumption *11.613*	
		Water Losses *126.993*	Apparent Losses *20.429*	Unauthorized Consumption *2.323*	
				Customer Metering Inaccuracies *16.131*	
				Systematic Data Handling Errors *1.976*	
Water Imported *0.000*			Real Losses *106.564*	Leakage on Transmission and/or Distribution Mains *Not broken down*	
				Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
				Leakage on Service Connections *Not broken down*	

Appendix 4

AWWA Free Water Audit Software:
Determining Water Loss Standing

Water Audit Report for: Los Alamos County (NM3500115)
Reporting Year: 2021 1/2020 - 12/2020
Data Validity Score: 72

Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Appendix 4
AWWA Audit

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning.
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

Appendix 5

Sources Referenced

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