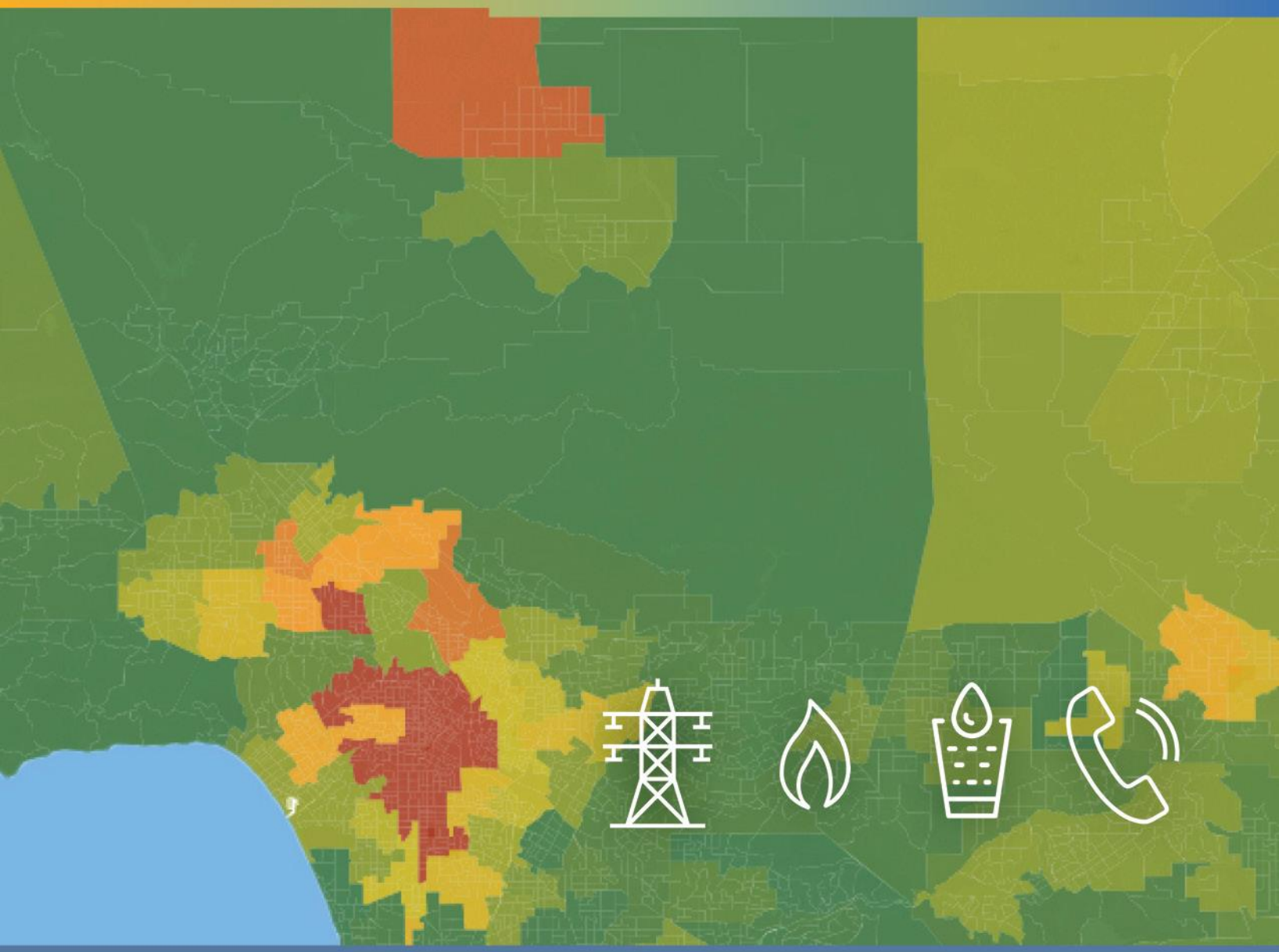

2019 ANNUAL AFFORDABILITY REPORT

APRIL 2021

California Public
Utilities Commission

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Executive Summary

The California Public Utilities Commission (CPUC or Commission) is deeply concerned with understanding and measuring the affordability of essential utility services. Historically, affordability has been measured by comparing increases in utility rates to inflation rates. This is rooted in the assumption that household income levels generally increase at the same rate as inflation, and therefore utility services become less affordable if utility rates increase faster than inflation. However, for many low-income households, wages have remained stagnant compared to inflation in recent years, while utility costs have continued to increase. Exacerbating this problem is the economic impact of the COVID-19 pandemic, which has disproportionately hurt lower-income communities.

At the same time, it is difficult to understand the extent of the problem based on consumer behavior. While customers may forego other products or services depending on the price, people need essential utility services – electricity, gas, water, and communications – regardless of their cost. Rather than observing actual consumption behavior, affordability metrics need to consider the costs of essential services in relation to the socioeconomic conditions of the households that are paying for those services. To that end, this report makes use of three metrics that were developed by Commission staff and adopted in Decision (D.) 20-07-032 (Decision) to measure the affordability of essential services[1]:

- Hours at Minimum Wage (HM) – describes essential service bills in terms of worked hours at minimum wage required to pay for them. It provides a clear illustration of the impact of utility costs on daily lives of low-wage ratepayers compared to the dollar amount alone.
- Socioeconomic Vulnerability Index (SEVI) – describes the relative socioeconomic characteristics of communities—in terms of poverty, unemployment, educational attainment, linguistic isolation, and percent of income spent on housing—to quantify how the same utility cost may affect one community's ability to pay more than another's.
- Affordability Ratio (AR) – describes the impact an essential service bill has on a representative household's budget; that is, the percent of income that is spent on each type of essential utility service after housing and the remaining essential utility services are considered. This metric can be calculated for households at any point on the income distribution for a given area.

This report uses these metrics to quantify the affordability of utility services at a geographically granular level so that it is possible to identify where utility affordability concerns are most serious in California. The results of this report establish a baseline measure of affordability as of 2019 (the most recent year for which socioeconomic and utility rate data was available) so that future changes can be measured and tracked over time.

[1] For the electric, natural gas, and water utilities under its jurisdiction, the Commission sets rates based on a cost-of-service model. The Commission does not set rates for communications providers or municipally-owned providers of electricity, gas, or water service.

Following are the key results of this report:

California households face significant disparities in their ability to afford essential utility services, even among households at similar points of the income distribution for a given area. The results of the analysis show stark geographical and income-based disparities. Figure 1 shows the affordability ratio (utility costs as percentage of the income left over after housing and other utility costs) for all four services—electricity, natural gas, water, and communications. This is denoted as bundled AR. The figure demonstrates how the AR for households in the 20th percentile of the income distribution varies greatly throughout the state.[2] The color scale shows this affordability metric on a spectrum from most affordable (green color areas) to least affordable (red color areas).[3] The majority of households are located in areas where utility costs make up a modest proportion of household budgets while a substantial number of households are located in areas where utility costs comprise an alarmingly high percentage of low-income household budgets. Approximately 11 percent of households are in the least affordable areas.

[2] AR for a household in the 20th percentile of the income distribution is abbreviated AR_{20}. Likewise, AR for a median-income household is abbreviated AR_{50}. Households in the 20th percentile of the income distribution earn more income than only 20 percent of households in the surrounding area. The 20th percentile was selected for analysis in this report because it represents households that are low-income, but do not necessarily qualify for an assistance program such as California Alternate Rates for Energy (CARE).

[3] 35 percent was selected as the maximum value for the color scale legend (red color areas) because it is roughly the 90th percentile bundled AR_{20} value observed at the PUMA scale. Many of the red colored areas on this map have AR_{20} values significantly higher than 35 percent. However, it is not based on any cutoff point for affordability. It was chosen to highlight the disparities in AR values across the state and is kept constant across all the maps showing AR values in this report for the sake of consistency.

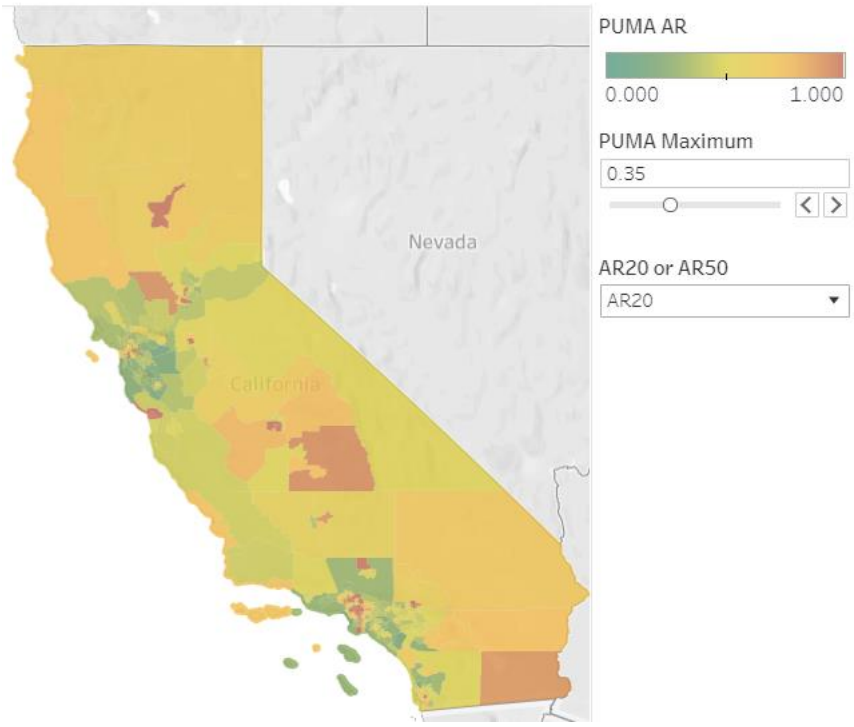

Figure 1: Bundled AR_{20} Values Statewide (2019)[4]

Income, more than housing costs, drives whether essential utility services are affordable for families and individuals. The primary driver of low utility affordability is low household income. Although high housing costs play a role, their effect on affordability is significantly lower than income. In the cases of communications and water, disproportionately high service costs also play a role. As with incomes, expensive utility service tends to be geographically distinct: areas with the highest service costs also tend to have low incomes, resulting in a double burden of expensive services and lower ability to pay for it.

Certain areas of California face greater burdens to affording essential utility services. The analysis reveals specific geographic areas where utility services are currently least affordable for low-income households (as measured by AR_{20}), *and* where residents are most vulnerable to future increases in essential service charges (as measured by SEVI). These areas include Oakland, Stockton, Fresno, Modesto, Tulare County, Bakersfield, San Bernardino, and many parts of Los Angeles.

Industry-specific differences present opportunities for targeted policymaking:

- **Electricity** – 13 percent of households in the state are located in areas where low income households pay more than 15 percent of their disposable income on electricity service as

[4] "PUMA" as it appears on this map, stands for Public Use Microdata Area, a geographic unit defined by the US Census Bureau containing at least 100,000 people. More information about PUMAs can be found on page 20 of this report.

measured by this report's electric AR_{20} metric.[5] AR_{20} indicates the affordability ratio for the lowest 20 percent of households in an area by income. Some of these areas have AR_{20} values for electric service that are significantly higher than 15 percent, indicating that low-income households in these areas spend a very large percentage of their non-disposable income on electricity. These areas include parts of Los Angeles, Chico, parts of the San Joaquin Valley, and parts of the San Francisco Bay Area where household incomes are extremely low.

- Natural Gas – Affordability concerns for electric and natural gas service tend to coincide in the same geographic areas, because low household income levels are a major contributing factor to high values of both electric and gas AR_{20} metrics.
- Water – The Class A utilities tend to be more affordable than other providers, but can have serious affordability problems in areas with very low incomes, where any utility cost has a large impact. The small Commission-regulated systems tend to be less affordable, as small, rural systems are burdened by the highest water prices as well as low 20th percentile incomes.
- Communications – The least affordable areas overall are spread out across the entire state, including areas in Butte, Sacramento, Fresno, Kern, Riverside, and Imperial counties. For households at the 20th percentile of income, the most acute affordability challenges are in areas within Los Angeles and San Francisco counties. Affordability challenges are greatest in low-income areas with high cost of service and high housing costs.

It is important to note that while this report's analysis depicts affordability for a representative household, individual households will have a wide variety of experiences that cannot be perfectly captured by depicting a single household. Given California's diversity in demographic profiles and climate types, individual households will have large variations in the basic quantity of each utility service required to enable health, safety, and participation in society. The affordability measurement will also be heavily dependent on a given household's social and economic standing, which is influenced by factors that vary widely across different parts of the state.

Because variations in socioeconomic conditions are such an important factor, it is less useful to measure affordability for the state as a whole or even for regions that encompass communities of varying levels of affluence. Instead, it is important to understand the diversity of affordability outcomes across the state at a geographically granular level. Disparities in affordability measurements highlight where assistance should be focused to help low-income households that are in most dire need.

These metrics allow the Commission to have a geographically-focused approach to understanding and addressing utility affordability, which enable more cost-effective and targeted delivery of relief. In addition to the results and conclusions presented in this report, detailed outputs from the analysis are provided in the form of interactive maps and spreadsheets, which the Commission and stakeholders should use to further examine these geographic areas.

[5] Electric AR_{20} is a variation of bundled AR_{20} where electric essential service charges are expressed as a percentage of household income after housing costs *and* other utility expenses.

This report can be used to examine whether existing assistance programs are delivering sufficient relief to low-income households in their respective geographies. Additionally, the Commission's Environmental and Social Justice Action Plan, which includes the goal of tracking and monitoring progress on equity and access issues,[6] highlights the metrics developed in this proceeding specifically as one mechanism by which affordability can be assessed across Commission proceedings and services.

Resources for addressing utility affordability can be most effective if targeted to the specific communities identified by these affordability metrics. These targeted efforts may include marketing, education, and outreach (ME&O) for existing programs and consideration of additional programs to address community affordability concerns. For example, the Commission has already identified disadvantaged communities (DAC)[7] for targeted assistance. More recently, the Commission has undertaken a series of actions[8] to assist customers who are most at risk of mounting bill arrearages and utility service disconnection. Using these affordability metrics, the Commission can further refine its efforts by identifying additional geographic areas of interest and taking a more granular approach to mitigating affordability concerns.

[6] See the CPUC Environmental and Social Justice Action Plan home page https://www.cpuc.ca.gov/esjactionplan/.

[7] See Order Instituting Rulemaking (R.)15-03-010, "Order Instituting Rulemaking to Identify Disadvantaged Communities in the San Joaquin Valley and Provide Economically Feasible Options for Affordable Energy." The Phase I decision adopted the methodology for identification of communities meeting the statutory definition of a San Joaquin Valley Disadvantaged Community. Phase II of the rulemaking adopted D.18-12-015 which approved $56 million in funding for 11 pilots with PG&E and SCE as the Pilot Administrators for electrification pilots and SoCalGas administering a natural gas pilot project in California City with limited gas pilots in Allensworth and Seville.

[8] Actions the Commission has taken to address customer disconnections include: disconnection moratorium through June 2021 (Resolution M-4849); electric and natural gas disconnection caps post-moratorium (Decision 20-06-003); enforcement of water disconnection protections under SB 998; and arrearage management programs for low-income electric and water customers with high arrearage balances (Resolution E-5114).

Background

In July 2020, the CPUC issued Decision (D.)20-07-032 (Decision) adopting metrics and methodologies for assessing the relative affordability of public utility service under the Commission's jurisdiction.[9] The Decision ordered the newly adopted affordability metrics be used in an annual affordability report. In developing this first annual affordability report, staff seeks to examine the affordability of public utility services in California and provide a baseline upon which changes in affordability may be measured over time.

The Decision establishes a few important definitions related to the measurement of affordability. The Decision defined affordability as the degree to which a representative household is able to pay for an essential utility service charge, given its socioeconomic status. In its use of a "representative household" rather than households in general, the Commission recognizes that households will have a wide variety of experiences that cannot be perfectly captured by depicting a single household. "Essential utility service charge" refers to the costs borne by a representative household for the quantity of utility service required to enable a ratepayer's health, safety, and full participation in society. "Socioeconomic status" refers to the social and economic standing of a given household.

In presenting the results of the affordability metrics, staff highlights those public utilities under the Commission's jurisdiction for each industry: electric, natural gas, water, and communications. Although the CPUC does not have ratesetting authority over all service providers in California, staff has included all available service charges where and when possible to provide a comprehensive evaluation of affordability.[10]

This report provides the results of the affordability metrics for 2019.[11] Workpapers used to prepare the 2019 Annual Affordability Report may be accessed on the CPUC's website.[12] Additionally, all maps displaying the affordability metric results presented in this report may be accessed in an interactive format through the CPUC's affordability proceeding webpage.[13]

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[9] See D.20-07-032, "Decision Adopting Metrics and Methodologies for Assessing the Relative Affordability of Utility Service," in Rulemaking (R.) 18-07-006, "Order Instituting Rulemaking to Establish A Framework and Processes for Assessing the Affordability of Utility Service."

[10] As noted above, the Commission does not set rates for communications providers or municipally-owned providers of electricity, gas, or water service.

[11] Affordability metrics results for 2018 are incorporated in selected comparison analyses. 2018 data is based on data used in preparation of the Affordability Metrics Framework Staff Proposal R.18-07-006 issued January 24, 2020 (Revised Staff Proposal) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K620/325620620.PDF

[12] ftp://ftp.cpuc.ca.gov/Affordability_Framework/

[13] https://www.cpuc.ca.gov/affordability/

Overview of Metrics

D.20-07-032 adopted three metrics and supporting methodologies to be used by the Commission to assess the affordability of essential electricity, natural gas, water, and communications utility services in California. The Decision states three independent, but related, metrics allow for the creation of a more complete picture of affordability than any one metric could provide on its own. The three metrics are: 1) the affordability ratio, 2) the hours at minimum wage, and 3) the socioeconomic vulnerability index.

Affordability Ratio

Figure 2: Affordability Ratio

The Affordability Ratio (AR) metric quantifies the percentage of a representative household's income that would be used to pay for an essential utility service after non-discretionary expenses such as housing and other essential utility service charges are deducted from the household's income. The higher an AR, the less affordable the utility service. The AR may be calculated for a single essential utility service, a combination of services, or all essential utility services combined.

AR may be calculated for any given income level in a given area. For example, the AR for a household in the 20th percentile income level would be an AR_{20} figure. The AR for a household in the 50th percentile of income would be an AR_{50} figure. The AR metric is also sensitive to geographic variations in cost-of-living, which can impact the amount of income available to pay for essential utility service. Areas for which AR may be calculated with existing data range from a census block group to an entire utility service territory to statewide.

Hours Minimum Wage

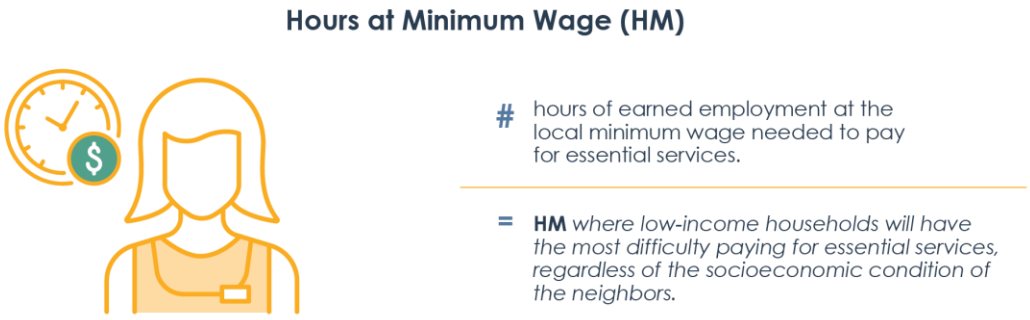

Figure 3: Hours at Minimum Wage

The Hours at Minimum Wage (HM) metric quantifies the hours of earned employment at the local area minimum wage necessary for a household to pay for essential utility service charges. Thus, the metric allows the CPUC and stakeholders to conceive of essential utility service charges in terms of something most people can relate to – hours of labor. The minimum wage-based metric also implicitly considers the impact of essential utility service charges on lower-income customers regardless of the socioeconomic conditions of the community as a whole. HM may be calculated for a single essential utility service, a combination of services, or all essential utilities combined. Some jurisdictions have different minimum wages for small businesses than larger businesses. The HM metric is calculated using this small business wage, as it is equal to or less than the large business wage.

Socioeconomic Vulnerability Index

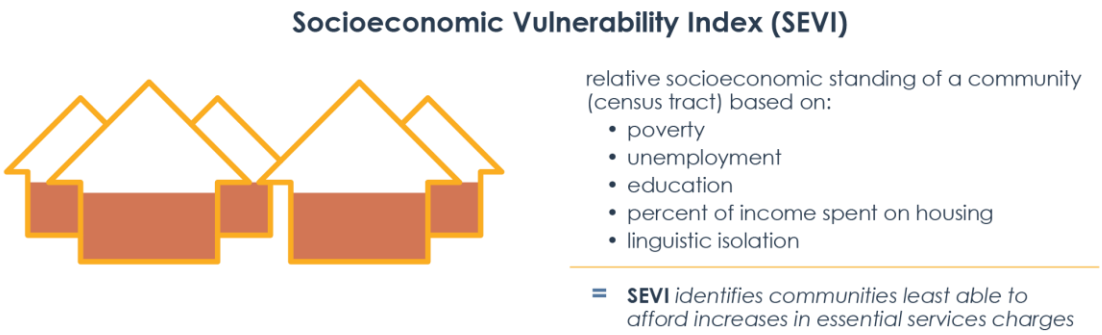

Figure 4: Socioeconomic Vulnerability Index

The Socioeconomic Vulnerability Index (SEVI) metric represents the relative socioeconomic standing of census tracts, referred to as communities, in terms of poverty, unemployment, educational attainment, linguistic isolation, and percentage of income spent on housing. This metric therefore considers how a rate change may affect one community's ability to pay more than another. The goal of the SEVI metric in this context is to highlight those communities where uniform changes in rates may have a disproportionate impact. Thus, the SEVI metric allows for an affordability assessment that is independent of the absolute value of essential utility service charges.

Essential Service Charges

Essential service charges are a function of pricing and essential service quantity:

*Essential Service Charge = Pricing * Essential Service Quantity*

The Decision set essential service quantities for each industry. Staff collected pricing data corresponding to essential service quantity so that an essential utility service charge could be calculated. This section details the essential service level adopted for each industry and the source for pricing so that essential utility service charges could be calculated for each industry to measure affordability.

Figure 5: Essential Service Quantities by Industry

Electricity

D.20-07-032 adopted the use of electric baseline pricing and baseline quantity for determining essential electric utility service charges.[14] Pricing is the baseline rate ($/kilowatt-hour, or $/kWh) and is generally referred to as the Tier 1 rate. Baseline quantity (kilowatt-hour, or kWh) is defined by statute and set by the CPUC and is generally referred to as the Tier 1 quantity.[15] In order to calculate essential service charges for electricity, data requests were sent to all Commission-regulated electric Investor Owned Utilities (IOU).[16] The IOUs were requested to provide calendar year 2019 residential monthly baseline rates in effect, monthly baseline quantities, the percent of residential customers in each climate zone on an all-electric tariff, and an annualized essential service charge by baseline territory calculated from the rate and baseline quantity data, for both basic and all-electric customers.

Natural Gas

Similarly, D.20-07-032 adopted the use of natural gas baseline pricing for essential gas utility service.[17] Data requests were sent to all Commission-regulated natural gas IOUs to determine 2019 essential service charges.[18] The IOUs were requested to provide calendar year 2019 natural gas

[14] The Decision noted that the essential usage study referenced in the then-pending PG&E General Rate Case (GRC) Phase 2 proceeding (A.19-11-019) may be used to refine the value used for essential electricity service in a later phase of the Affordability OIR proceeding.

[15] Electric baseline quantities are required by statute to be set between 50 percent to 60 percent of average household usage in a given climate zone for dual-fuel customers and between 60 percent to 70 percent of average household usage for all-electric customers during the winter heating season.

[16] See Appendix for IOU list.

[17] Natural gas baseline quantities are required by statute to be set between 60 percent to 70 percent of average household usage during the winter heating season.

[18] See Appendix for IOU list.

residential monthly baseline rates in effect, monthly baseline quantities, and an annualized essential service charge by baseline territory calculated from the rate and baseline quantity data.[19]

Water

D.20-07-032 adopted 600 cubic feet (CCF) per month per household as the essential service level for water. 2019 pricing data was collected from data requests submitted to Class A utilities to provide residential rates on a monthly basis for each of their ratemaking areas. Monthly rates were annualized by averaging the rates over the year. Non-Class A utility pricing data was obtained from the State Water Resource Control Board's (SWRCB) Division of Drinking Water's (DDW) Electronic Annual Report (EAR). The EAR is a voluntary survey completed by water utilities that provides pricing data on a yearly basis.[20]

Communications

D.20-07-032 adopted an essential service level for communications that includes fixed broadband service of 25 megabits per second (Mbps) downstream / 3 Mbps upstream (25/3) and basic residential telephone service.

For the broadband component, staff collected pricing data from over 90 service providers based on the level recommended in the Revised Staff Proposal,[21] which is a minimum connection speed of 20 Mbps downstream / 3 Mbps upstream (20/3).[22] Staff gathered the non-promotional, non-bundled rates from the CPUC-issued annual data request to California broadband service providers for services as of December 31, 2019. Starting with the next annual affordability report, staff expects to have pricing data available for the 25/3 service level.

In geographic areas served by one or more service providers, the affordability analysis captures the broadband services offered at the lowest price. In geographic areas where broadband service was not available at neither the essential service level of 25/3 nor data collection level of 20/3, staff used

[19] Staff estimated propane costs for customers who are not on all-electric service or whom it appears natural gas service is unavailable.

[20] Adjustments were made to 2018 data used in the Revised Staff Proposal to reflect differences noted after the Revised Staff Proposal was published.

[21] Affordability Metrics Framework Staff Proposal R.18-07-006 (January 24, 2020) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K620/325620620.PDF

[22] The affordability analysis in this report is based on the essential service level for broadband services originally proposed in the Revised Staff Proposal. D.20-07-032 subsequently adopted a different essential service level for broadband services.

the fastest available service, which in some areas was as low as 10 Mbps downstream / 1 Mbps upstream (10/1), to impute values for the metrics.[23]

For the voice component, basic residential voice service rates were derived from incumbent local exchange carriers' (ILEC) annual tariff filings.

Geographic Information System Tools

ArcMap was used as the Geographic Information System (GIS) tool in the analysis of affordability for CPUC-regulated utilities and uses geographic location shapefiles as data sources. Shapefiles used in preparation of the 2019 Annual Affordability Report may be accessed on the CPUC's website.[24]

For 2019 data, CPUC-jurisdictional energy utility and Class A water utility service territory shapefiles were obtained from the utilities.[25] For voice service, ILEC service area shapefiles were not requested and are unchanged from previous mapping efforts.[26] Broadband service area shapefiles were obtained from the broadband service providers.[27]

In addition to service provider shapefiles, 2010 census block shapefiles from the United States Census Bureau were used and included income and housing unit information.[28] Staff utilized income and housing cost data from the United States Census Bureau Public Use Microdata Samples (PUMS).[29] The census block data was combined through GIS's intersect tool and aggregated to

[23] Staff included services as low as 10/1 to reduce the number of instances where $0 is being imputed for the broadband component of essential communications service. In two extreme cases, staff included services from Áan Chúuphan ISP at 3.2 Mbps downstream / 1 Mbps upstream and SylverNet at 8 Mbps downstream / 3 Mbps upstream to capture select remote communities.

[24] ftp://ftp.cpuc.ca.gov/Affordability_Framework/

[25] For non-CPUC jurisdictional energy utilities e.g. publicly-owned utilities and for non-Class A water utilities, publicly-available online resources were used to obtain shapefiles.

[26] Voice service shapefiles from previous mapping efforts are from 2014. Since the shapefiles are not as current, some service areas may be underrepresented. As a result, the rates for the voice component may be understated by the rates of basic service in service areas not represented by the existing ILEC shapefiles. For future annual reports, staff will procure updated shapefiles for voice services to better match broadband services areas.

[27] Shapefiles for fixed broadband services at or close to the minimum connection speed of 20/3 were requested. As a result, the collected data may not reflect 25/3 adopted in the Decision.

[28] Due to Census data renewing every ten years, a growth key and growth factor were used on the 2010 housing unit data to estimate the number of housing units in 2019.

[29] California PUMS include approximately 776,000 households statewide. Unlike most other data sources related to income and housing costs, PUMS provides household-level data. See "American Community Survey: About PUMS." United States Census Bureau. June 17, 2018. Accessed August 12, 2019 from https://www.census.gov/programs-surveys/acs/technical-documentation/pums/about.html/

utility or Public Use Microdata Areas (PUMA) territories using the aggregation method discussed in the Revised Staff Proposal.[30]

Each Public Use Microdata Area (PUMA), from which PUMS data is derived, is comprised of a collection of census tracts, which are in turn comprised of a collection of census blocks. Census blocks are the most granular geographic unit defined by the Census Bureau and are the building blocks of the Census geography.[31] There are 710,145 census blocks in California. Census block data allows us to more accurately identify and assign the unique combination of utility providers to households in each area.

As some municipalities have minimum wages higher than the state minimum, staff created shapefiles using geographic attributes for minimum wage with a combination of city and county boundaries, obtained from the California State Geoportal.[32] Staff obtained the minimum wages effective July 1, 2019, from each municipality where there is a differentiation from the statewide minimum wage.

[30] Affordability Metrics Framework Staff Proposal R.18-07-006 (January 24, 2020), p. 40. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K620/325620620.PDF

[31] US Census Bureau: Geographic Areas Reference Manual.

https://www.census.gov/programs-surveys/geography/guidance/geographic-areas-reference-manual.html

[32] California State Geoportal: https://gis.data.ca.gov/datasets/CDTFA::city-and-county-boundaries/

Overall Affordability of Bundled Services

This section covers the affordability of all four utility services when taken together. While the remaining sections of this report focus exclusively on CPUC-jurisdictional provider territories, this section will consider affordability for all parts of the state. This is because some areas are served by a mix of CPUC jurisdictional and non-jurisdictional utilities (for instance, a non-jurisdictional water provider serving an area that is part of an electric IOU's service territory). Rather than try to parse out which utility services fall within the purview of the CPUC's regulatory jurisdiction for a given area, affordability for the bundle of services is considered across the whole state.

Affordability Ratio

The bundled AR metric shows the affordability of all utility services combined. The 2019 results are shown at the PUMA-level for representative households in the 20th percentile of the income distribution (denoted as AR_{20}) in Figure 6. This map shows the results across the entire state and has been displayed with a color scale ranging from 0 percent (green) to 35 percent (red) in order to show disparities in results at the PUMA level across the state.[33] AR_{20} values greater than 35 percent also appear red on the map.[34]

[33] 35 percent was selected as the maximum value for the color scale legend because it is roughly the 90th percentile bundled AR_{20} value observed on the PUMA scale. However, it is an arbitrary selection rather than based on any cutoff point for affordability. It was chosen to highlight the disparities in AR values across the state and is kept constant across all the maps showing AR values in this report for the sake of consistency.

[34] This map can be found in interactive form at https://www.cpuc.ca.gov/ar-2019/.

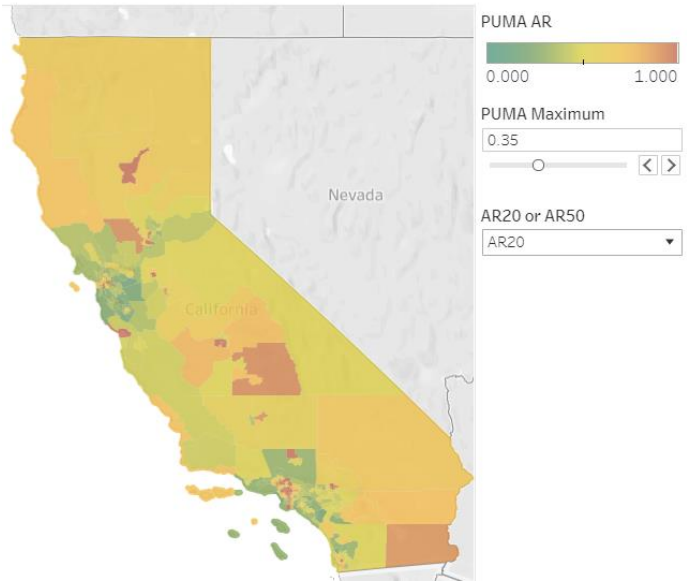

Figure 6: Bundled AR_{20} Values Statewide (2019)

The map shows a number of areas within the state where affordability concerns are quite severe. A look at the distribution of AR results, as illustrated in Figure 7, shows that a minority of households in the state are in areas where AR_{20} values are significantly higher than they are in the rest of the state.

Figure 7 shows the bundled AR_{20} values ranked in order from highest to lowest, with the x-axis showing what percentage of households in the state are in areas where bundled AR_{20} values are at least that high. There is an inflection point in the graph at around an AR_{20} value of 35 percent. Approximately 11.2 percent of households are in areas with AR_{20} values at least that high, while the remaining 88.8 percent are in areas with lower values, many of them significantly lower.

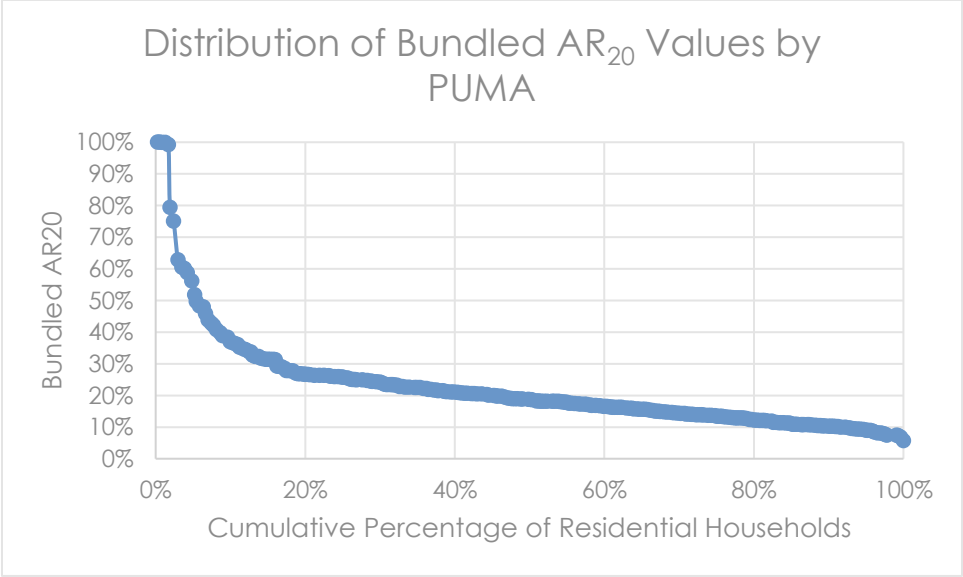

Figure 7: Distribution of Bundled AR_{20} Values by Percent of Residential Households (2019)

Table 1 provides some details on the PUMAs with AR_{20} values above 35 percent. Many of the PUMAs are in Los Angeles County, San Francisco, Fresno, San Diego, Stockton, Oakland, San Bernardino, Santa Cruz, and Sacramento. Perhaps the most striking thing about these PUMAs is how low the 20th percentile income values are compared to the statewide average of $32,029/year. For the most part, the predicted average housing costs for households in the 20th percentile of the income distribution are also significantly lower than the statewide average of $14,796/year, though this is not enough to offset the low incomes.

PUMA	County/City	Bundled AR_{20}	20th Percentile Income ($/yr)	20th Income Percentile Housing Cost ($/yr)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park)	100.0%	$ 11,746	$ 13,533
03751	Los Angeles County (South Central)--LA City (South Central/Watts)	100.0%	$ 14,245	$ 11,850
03750	Los Angeles County (South Central)--LA City (South Central/Westmont)	100.0%	$ 14,223	$ 11,728
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills)	100.0%	$ 15,270	$ 12,257
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights)	99.2%	$ 12,517	$ 10,179
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon)	79.4%	$ 16,164	$ 11,493
07503	San Francisco County (Central)--South of Market & Potrero	75.1%	$ 17,986	$ 13,081
03732	Los Angeles County (Central)--LA City (East Central/Hollywood)	62.9%	$ 18,848	$ 12,991
03734	Los Angeles County--LA City (East Central/Silver Lake, Echo Park & Westlake)	60.5%	$ 17,524	$ 11,415
03733	Los Angeles County (Central)--LA City (Central/Koreatown)	60.1%	$ 19,192	$ 13,035
03721	Los Angeles County (North)--LA City (Northeast/North Hollywood & Valley Village)	58.7%	$ 20,360	$ 14,091
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	56.1%	$ 26,655	$ 20,306
03703	Los Angeles County (North Central)--Lancaster City	51.8%	$ 16,207	$ 11,263
01903	Fresno County (Central)--Fresno City (East Central)	49.6%	$ 14,714	$ 8,246
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	48.3%	$ 19,506	$ 12,599
03719	Los Angeles County (Central)--Glendale City	47.9%	$ 21,174	$ 15,594
03723	Los Angeles County (North)--LA City (North Central/Mission Hills & Panorama City)	45.8%	$ 21,443	$ 13,463
07702	San Joaquin County (Central)--Stockton City (South)	43.9%	$ 15,647	$ 8,642
03722	Los Angeles County (Northwest)--LA City (North Central/Van Nuys & North Sherman Oaks)	42.8%	$ 22,391	$ 13,804
03708	Los Angeles County (North)--LA City (Northeast/Sunland, Sun Valley & Tujunga)	42.1%	$ 22,510	$ 13,849
01904	Fresno County (Central)--Fresno City (Southwest)	40.8%	$ 15,779	$ 7,868
03730	Los Angeles County (West Central)--LA City (Central/Hancock Park & Mid-Wilshire)	39.8%	$ 26,939	$ 17,667
00104	Alameda County (North Central)--Oakland City (South Central)	38.9%	$ 19,192	$ 12,440
03729	Los Angeles County (West Central)--LA City (West Central/Westwood & West Los Angeles)	38.4%	$ 29,929	$ 20,501
07108	San Bernardino County (Southwest)--San Bernardino City (West)	37.0%	$ 17,272	$ 9,193
08702	Santa Cruz County (South & Coastal)--Santa Cruz City	36.7%	$ 25,848	$ 16,708
06704	Sacramento County (North Central)--North Highlands, Foothill Farms & McClellan Park	36.3%	$ 17,241	$ 9,776
00701	Butte County (Northwest)--Chico City	36.1%	$ 18,373	$ 10,014
01905	Fresno County (Central)--Fresno City (Southeast)	35.3%	$ 16,740	$ 7,665

Table 1: PUMAs with Bundled AR_{20} Values Greater than 35 Percent (2019)

The only PUMAs in which housing costs are above the statewide average for 20th income percentile households are in Central Los Angeles County (West Hollywood & Beverly Hills, as well as Glendale), West Central Los Angeles County (Central/Hancock Park & Mid-Wilshire, as well as West Central/Westwood & West Los Angeles), and South and Coastal Santa Cruz. With these exceptions, the high affordability ratio values are primarily driven by very low annual incomes. In the case of these four PUMAs, annual incomes for representative households are insufficient to cover the cost of housing and utilities, causing the AR_{20} values to max out at 100 percent (AR values

were top-coded at 100 percent if housing costs exceeded household income or if utility expenses were greater than the income minus housing costs).[35]

An alternative way to consider the affordability outcomes for households in the 20th percentile of the income distribution is to consider how disposable household income (defined as gross income minus housing costs and essential utility service charges) would change in response to a decrease in essential utility service charges. This is useful context for understanding how essential utility service charge reductions would improve the affordability outcomes for low-income households in these areas. Table 2 shows how much disposable income would change in response to a 1 percent decrease in all essential utility service charges for representative 20th income percentile households in the same PUMAs detailed in Table 1, both on a percentage and an absolute dollar basis. Note that the percent increase in disposable income cannot be calculated for the top five PUMAs because some or all of the constituent areas within these PUMAs have top-coded AR_{20} values, meaning that they do not have any disposable income once housing costs and utility expenses are subtracted from gross income in the base scenario.

[35] In top-coding, outliers are replaced with some upper or lower value that retains the contextual meaning of the metric. With this approach, both negative AR and AR greater than one are top-coded with an AR of one. That is, the essential service charge comprises 100 percent of income after other nondiscretionary household expenses, whether due to negative income after nondiscretionary expenses, or due to the household's essential service charges being greater than available income.

PUMA	County/City	Disposable Income Change Resulting from 1% Reduction in All Essential Service Charges (%)	Disposable Income Change Resulting from 1% Reduction in All Essential Service Charges ($/yr)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park)	N/A	$ 37.01
03751	Los Angeles County (South Central)--LA City (South Central/Watts)	N/A	$ 37.04
03750	Los Angeles County (South Central)--LA City (South Central/Westmont)	N/A	$ 37.02
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills)	N/A	$ 36.95
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights)	N/A	$ 35.83
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon)	3.9%	$ 37.09
07503	San Francisco County (Central)--South of Market & Potrero	3.0%	$ 36.82
03732	Los Angeles County (Central)--LA City (East Central/Hollywood)	1.7%	$ 36.82
03734	Los Angeles County--LA City (East Central/Silver Lake, Echo Park & Westlake)	1.5%	$ 36.97
03733	Los Angeles County (Central)--LA City (Central/Koreatown)	1.5%	$ 36.98
03721	Los Angeles County (North)--LA City (Northeast/North Hollywood & Valley Village)	1.4%	$ 36.83
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	1.5%	$ 35.64
03703	Los Angeles County (North Central)--Lancaster City	1.1%	$ 25.61
01903	Fresno County (Central)--Fresno City (East Central)	17.5%	$ 32.11
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	0.9%	$ 33.37
03719	Los Angeles County (Central)--Glendale City	0.9%	$ 26.74
03723	Los Angeles County (North)--LA City (North Central/Mission Hills & Panorama City)	0.8%	$ 36.58
07702	San Joaquin County (Central)--Stockton City (South)	0.8%	$ 30.72
03722	Los Angeles County (Northwest)--LA City (North Central/Van Nuys & North Sherman Oaks)	0.7%	$ 36.75
03708	Los Angeles County (North)--LA City (Northeast/Sunland, Sun Valley & Tujunga)	0.7%	$ 36.42
01904	Fresno County (Central)--Fresno City (Southwest)	0.7%	$ 32.26
03730	Los Angeles County (West Central)--LA City (Central/Hancock Park & Mid-Wilshire)	0.7%	$ 36.90
00104	Alameda County (North Central)--Oakland City (South Central)	0.6%	$ 26.27
03729	Los Angeles County (West Central)--LA City (West Central/Westwood & West Los Angeles)	0.6%	$ 36.19
07108	San Bernardino County (Southwest)--San Bernardino City (West)	0.6%	$ 29.88
08702	Santa Cruz County (South & Coastal)--Santa Cruz City	0.6%	$ 33.53
06704	Sacramento County (North Central)--North Highlands, Foothill Farms & McClellan Park	0.6%	$ 27.13
00701	Butte County (Northwest)--Chico City	0.6%	$ 30.15
01905	Fresno County (Central)--Fresno City (Southeast)	0.6%	$ 32.01

Table 2: Impact of 1 Percent Essential Service Charge Reductions on Disposable Income (2019)

The values in this table show that each percent decrease in bundled essential service charges can have a substantial impact on a representative household's budget in these areas. For example, in Fresno a 1 percent reduction in all essential service charges would result in a 17.5 percent increase in disposable income for representative low-income households due to a combination of exceptionally high communications essential service charges in some parts of this PUMA and extremely low household income. On average, this only amounts to about $32/year, but is a substantial amount for an area where the 20th percentile income level is less than $15,000/year. This demonstrates how important even a small essential service charge reduction can be for some Californians.

AR values remained fairly static between 2018 and 2019. Figure 8 shows the change in AR_{20} value on a scale from -100 percent to 100 percent,[36] defined here as the 2019 value minus the 2018 value (a positive value indicates an increase in affordability ratio while a negative value indicates a decrease).[37] Most of the PUMAs showed changes in AR_{20} values of only a few percentage points, as

[36] Note that AR is a percentage value, so this is the change in the AR_{20} value itself not the percent change in AR_{20} value.

[37] This map can be found in interactive form at https://www.cpuc.ca.gov/delta-2019/.

can be seen in the histogram in Figure 9. The majority of PUMAs have a change in AR_{20} that is between -2 percent and 2 percent. The relatively stable AR_{20} values reflect the overall nominal changes in household incomes, housing costs, and essential service charges in 2019 compared to 2018.

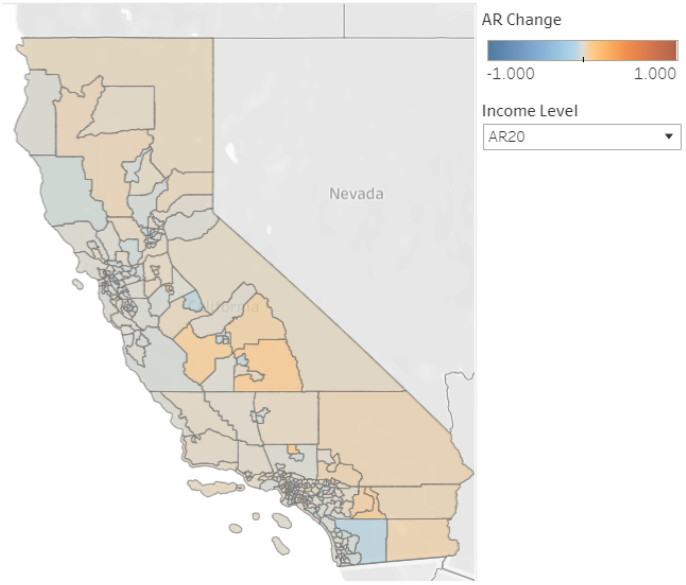

Figure 8: Change in Bundled AR_{20} Value between 2018 and 2019 (2019 Value minus 2018 Value)

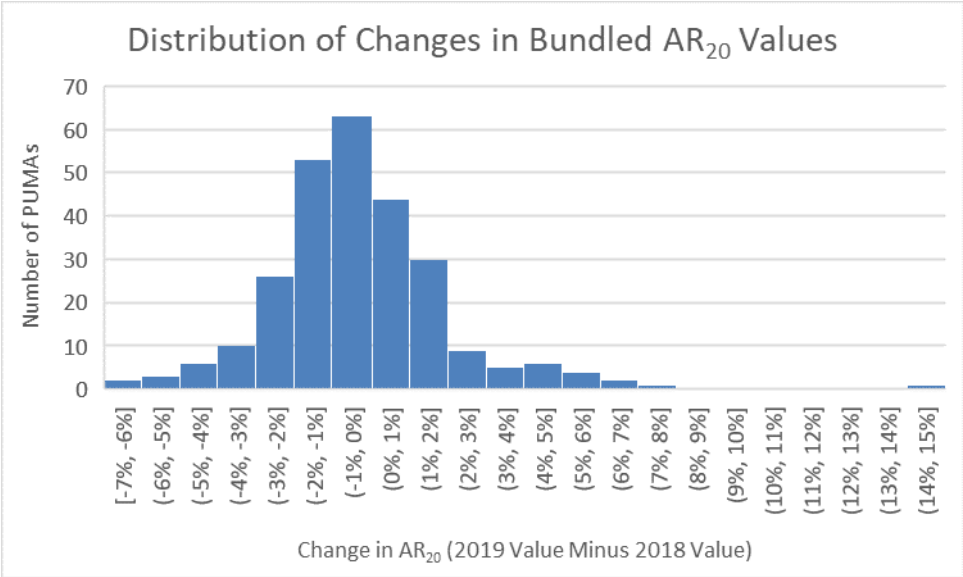

Figure 9: Distribution of Changes in Bundled AR_{20} Values

In addition to characterizing affordability for 20th percentile income households, the affordability ratio was also calculated for median income households in each PUMA (denoted here as AR_{50}). Figure 10 shows the AR_{50} values across the state for 2019. The color scale for this map has been

made consistent with the previous AR_{20} map (0 percent = green, 35 percent and higher = red) to show how affordability for median income households compare to households in the 20th percentile of the income distribution. As this map demonstrates, even in the most economically distressed parts of the state, the affordability outcomes for median income households are significantly better than they are for 20th percentile income households anywhere in the state. This reinforces the notion that affordability concerns are primarily being driven by income levels rather than housing costs or essential service charge levels.

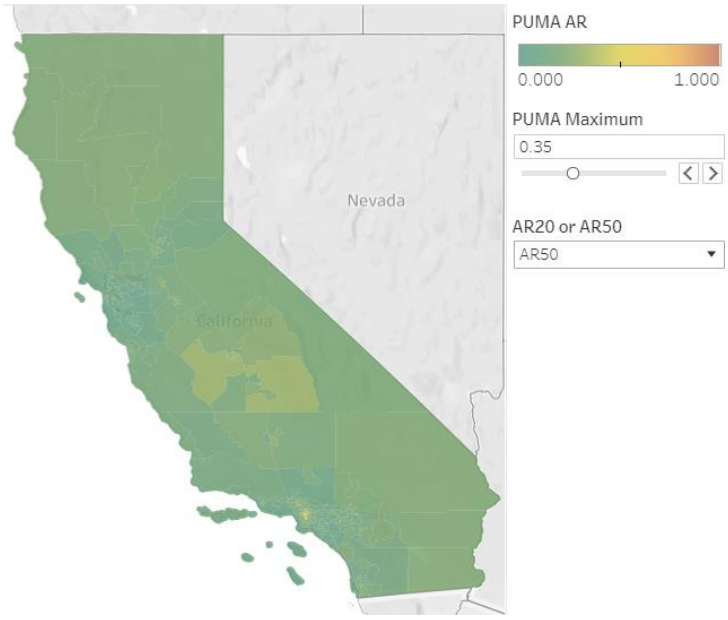

Figure 10: Bundled AR_{50} Values Statewide (2019)

A more detailed presentation of the range of bundled AR values for households in the 20th and 50th income percentiles is provided in Figure 11. This histogram shows the range of AR_{20} and AR_{50} values overlaid on one another, in order to also show how affordability outcomes compare for households at different points in the income distribution. Unsurprisingly, households with median income levels generally have lower bundled AR values compared to households in the 20th percentile of the income distribution, with maximum AR_{50} value below 20 percent, whereas AR_{20} values show a much greater range with values as high as 100 percent. The key takeaway is that utility expenses consistently comprise a much smaller portion of household budgets for median income households compared to lower income households, and that there are considerable disparities in ability to pay for utility services among lower income households.

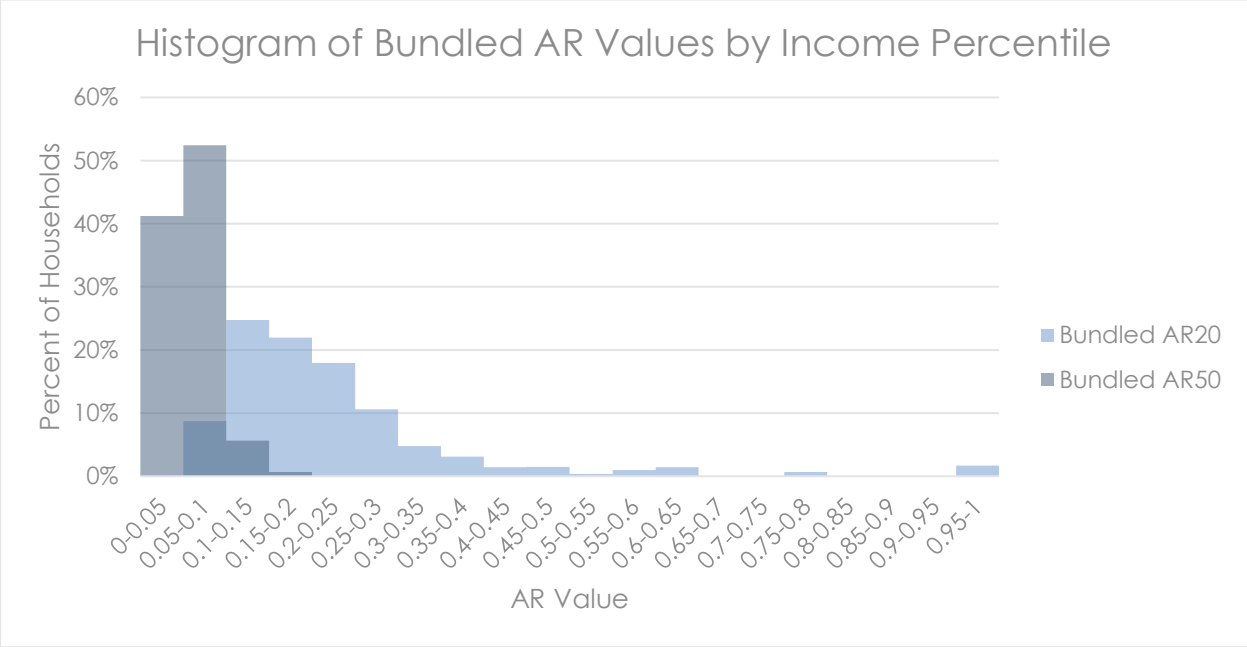

Figure 11: Histogram of Bundled AR Values by Income Percentile

SEVI

The Socioeconomic Vulnerability Index (SEVI) describes the relative socioeconomic characteristics of census tracts, referred to as communities, in terms of poverty, unemployment, educational attainment, linguistic isolation, and percent of income spent on housing.[38] The SEVI affordability metric accurately identifies the socioeconomically vulnerable communities that will be most affected by affordability concerns. Figure 12 is a SEVI map that depicts census tracts by color, with red indicating more vulnerable areas and green less vulnerable areas.[39]

[38] The socioeconomic indicators are those used by the California Office of Environmental Health Hazard Assessment in developing its CalEnviroScreen score.

[39] The map can also be found in interactive form at https://www.cpuc.ca.gov/sevi-2019/.

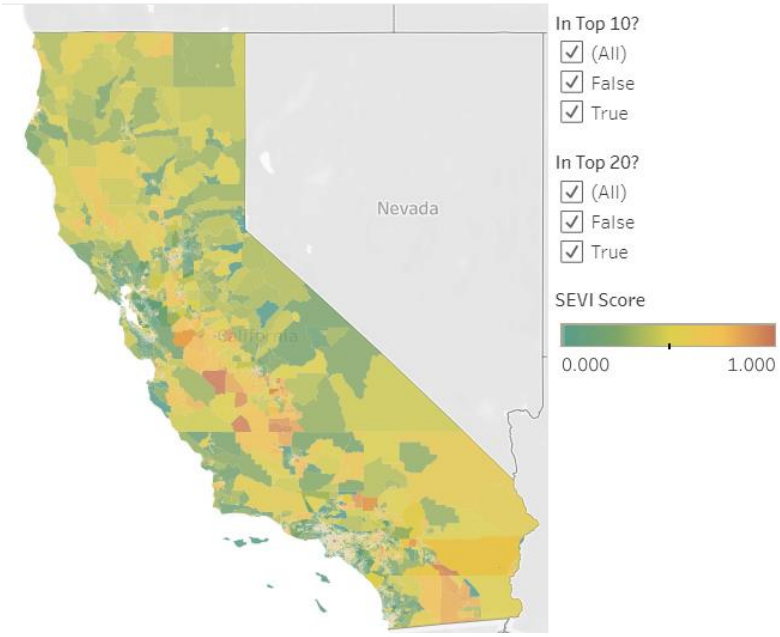

Figure 12: SEVI Map

The 10 highest SEVI value census tracts are listed in Table 3, along with the PUMAs they belong to and the AR_{20} values for those PUMAs based on the 2019 analysis. Many of the areas highlighted in this table are the same areas with the highest AR_{20} values that were identified in Table 1. However, the SEVI and AR_{20} values are perfectly correlated with one another; some of the highest value AR_{20} PUMAs have lower SEVI value census tracts than the PUMAs with lower AR_{20} values. This is because some PUMAs that are particularly vulnerable based on the criteria measured by SEVI do not currently have the same level of affordability issues that other PUMAs have as measured by the AR_{20} metric. The two metrics measure fundamentally different things.

PUMA	County/City	Census Tract	Bundled AR20	Raw SEVI Score	SEVI Percentile
03766	Los Angeles County (South)--Long Beach City (Southwest & Port)	572800	27.8%	99.8	100.0%
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park)	222700	100.0%	99.6	99.7%
01903	Fresno County (Central)--Fresno City (East Central)	002502	49.6%	97.2	97.3%
07316	San Diego County (South Central)--San Diego City (Central/Centre City & Balboa Park)	003901	26.4%	97.1	97.3%
03722	Los Angeles County (Northwest)--LA City (North Central/Van Nuys & North Sherman Oaks)	128303	42.8%	96.9	97.1%
01901	Fresno County (West)--Selma, Kerman & Coalinga Cities	008302	27.7%	96.1	96.3%
07316	San Diego County (South Central)--San Diego City (Central/Centre City & Balboa Park)	003902	26.4%	96.0	96.1%
07110	San Bernardino County (Southwest)--Fontana City (East)	002804	25.7%	95.9	96.1%
03751	Los Angeles County (South Central)--LA City (South Central/Watts)	239601	100.0%	95.8	95.9%
06501	Riverside County (East)--Indio, Coachella, Blythe & La Quinta (East) Cities	045303	26.4%	95.8	95.9%

Table 3: Top 10 SEVI Value Census Tracts

AR/SEVI Analysis

In addition to looking at each of the affordability metrics in isolation, it is possible to look at the AR and SEVI metrics in tandem to identify parts of the state that are both currently experiencing

significant affordability concerns (as measured by AR) and are also particularly vulnerable to any future bill shocks (as measured by SEVI). In this analysis, census tracts that have both the highest bundled AR_{20} values *and* SEVI values have been identified. The map in Figure 13 shows the census tracts that have both a bundled AR_{20} value and a SEVI value in the top 20 percent of the results.[40] Labels have been added to identify the regions and cities where these census tracts are located.

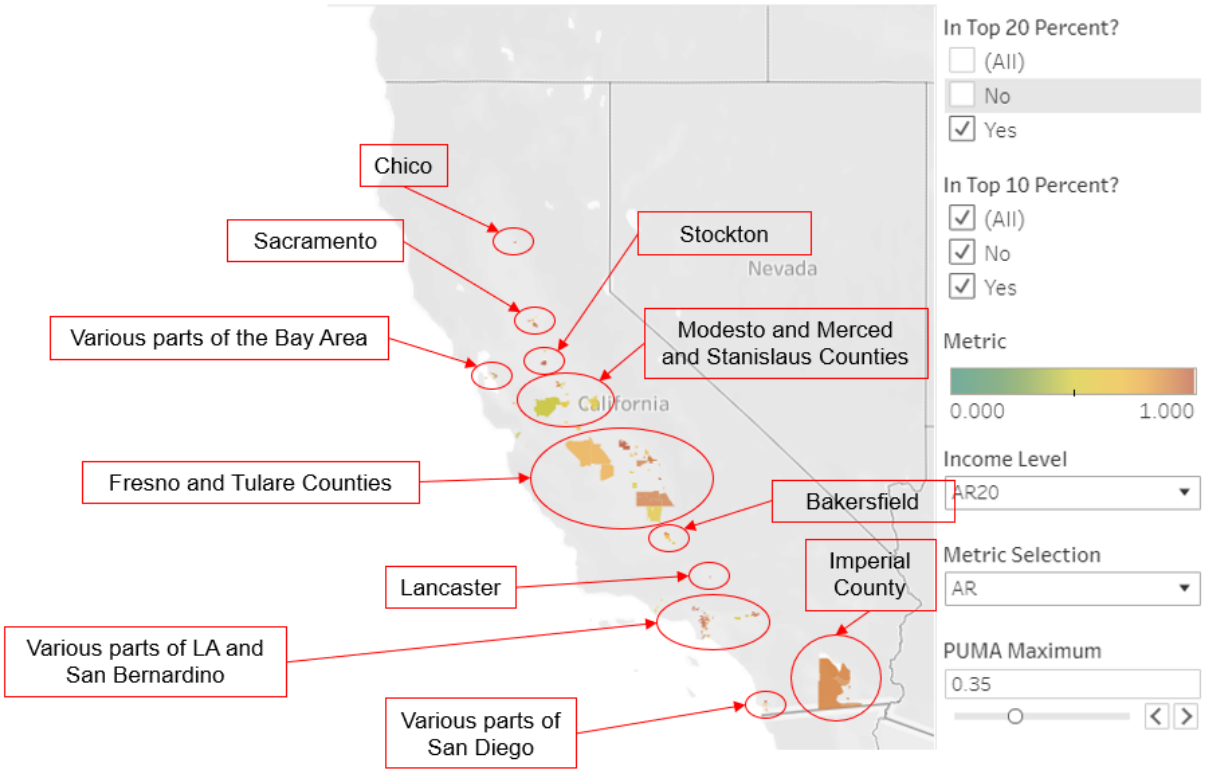

Figure 13: Census Tracts with Top 20 Percent of Bundled AR_{20} and SEVI Values

The most serious affordability concerns based on this measure are in many of the same areas that were highlighted by looking at the top AR_{20} values alone. Oakland, Stockton, Fresno, Modesto, Tulare County, Bakersfield, San Bernardino, and many parts of Los Angeles County are of particular concern, as demonstrated by Figure 14, which highlights census tracts with the top 10 percent of AR_{20} and SEVI values. A table with the full list of census tracts with the top 10 percent of bundled AR_{20} and SEVI values is provided in Appendix B. The additional census tracts in which AR_{20} and SEVI values fall in the top 20 percent can be found in an online supplemental appendix.[41]

[40] These maps can be found in interactive form at https://www.cpuc.ca.gov/AR-SEVI-2019/.

[41] The list of census tracts is too long to include in this report. Instead, a spreadsheet with the list of census tracts is available on the Affordability Report website located here: https://www.cpuc.ca.gov/2019-Annual-Affordability-Report/

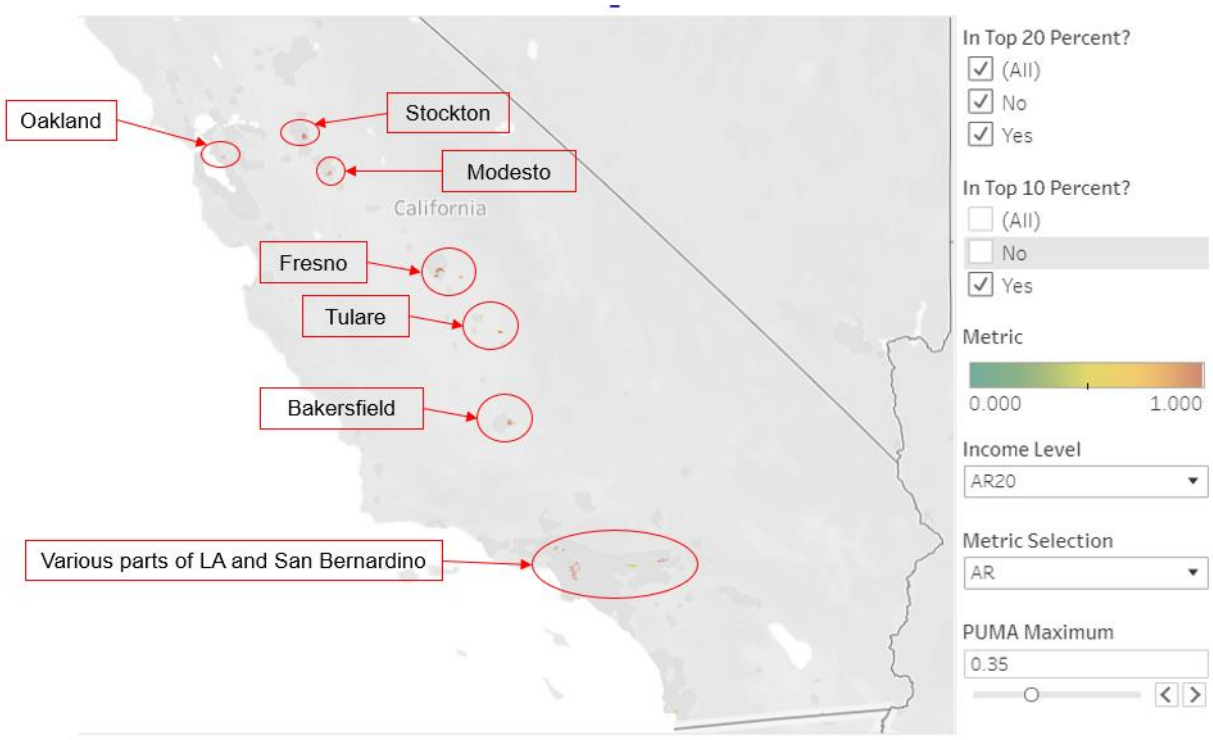

Figure 14: Census Tracts with Top 10 Percent of Bundled AR_{20} and SEVI Values

Bundled Affordability Conclusions

This report's analysis has generated a number of insights into the current state of bundled utility affordability. Specifically, these metrics have highlighted how there is a stark disparity in affordability concerns among low-income households across the state, with a substantial number of households located in areas where AR_{20} values are much higher than the rest of the state. Approximately 11.2 percent of households are in areas with AR_{20} values of at least 35 percent, while the remaining 88.8 percent are in areas with lower values. While housing costs in general are quite high in California, the high AR_{20} values are primarily being driven by particularly low household incomes rather than high housing costs. The analysis has also demonstrated that median-income households can much more easily afford utility services than lower income households, and AR_{50} values are fairly uniform across the state.

In an effort to track changes in affordability over time, bundled AR values for 2019 were compared to 2018 values. AR_{20} values were found to be similar year-on-year, indicating that changes in household incomes, housing costs, and essential service charges remained stable between 2018 and 2019. It will be of great interest to staff to track how these values change over the course of the next few years as economic data that reflects the effects of the COVID-19 pandemic become available. If these metrics reflect a growing difference between low- and median-income households, it will serve as a warning sign that the economic recovery from this recent recession has

been uneven and that lower income households in California will need more assistance to weather the storm.

This analysis has also identified the specific geographic areas where utility services are currently least affordable for low-income households (as measured by AR_{20}) and are most vulnerable to future increases in essential service charges (as measured by SEVI). Specific details on the PUMAs with the highest AR_{20} values and the census tracts with the highest SEVI values have been made publicly available along with this report. There is significant overlap between these two groups, and the areas with the highest values of both metrics have been identified as areas of particular concern. This includes Oakland, Stockton, Fresno, Modesto, Tulare County, Bakersfield, San Bernardino, and many parts of Los Angeles County. Assistance programs that target low-income households should focus on these specific communities.

Electricity Affordability

This section covers the affordability of electric utility service at the essential usage level defined by each climate zone's baseline allowance. Results in this section are presented at the scale of utility climate zones (which is the level of geographic granularity that determines baseline allowances, and thus essential usage levels of electricity) broken down by PUMA, meaning that each area can be defined by a unique combination of climate zone and PUMA.

Affordability Ratio

The electric affordability ratio metric represents the percent of a household's income that is spent on an essential level of electric utility service once housing costs and other utility services (natural gas, water, and telecommunications) are subtracted. The 2019 results for households in the 20th percentile of the income distribution are presented in Figure 15.[42] The color scale on this map has been made consistent with the bundled AR results maps presented in the previous section to allow for easy comparison of the results (0 percent = green, 35 percent and higher = red).[43]

While the overall electric AR_{20} values are smaller than the bundled AR_{20} results (owing to the fact that only the affordability of electric service is measured by electric AR_{20} while the other utility expenses are treated as expenses to be deducted from gross income), the geographic pattern of where affordability ratio is highest is consistent with the bundled AR results.

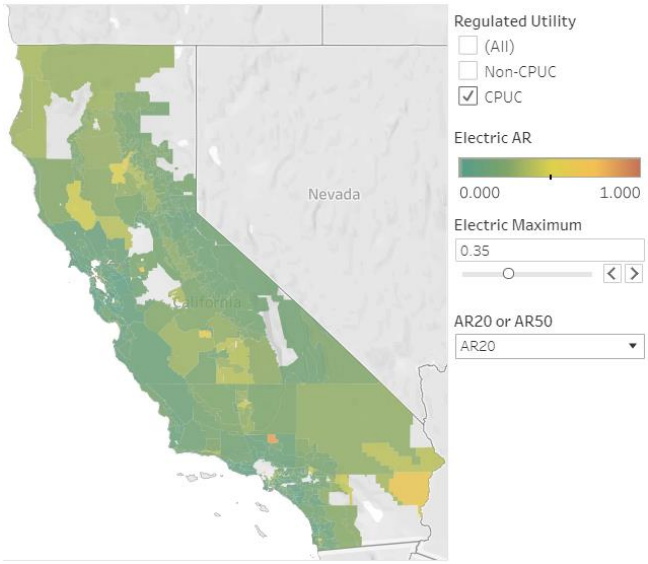

Figure 15: Statewide Electric AR_{20} Results for CPUC Jurisdictional Areas (2019)

[42] The map in Figure 15 displays AR results for CPUC-jurisdictional areas only.
[43] This map can be found in interactive form at https://www.cpuc.ca.gov/ar-2019/.

Disparities in electric AR_{20} results are even more pronounced than what is observed in the bundled AR_{20} results. Figure 16 shows the electric AR_{20} values ranked in order from highest to lowest, with the x-axis showing what percentage of households in the state are in areas where electric AR_{20} values are at least that high.[44] Only 13.3 percent of households in the state are in areas where electric AR_{20} is above 15 percent.

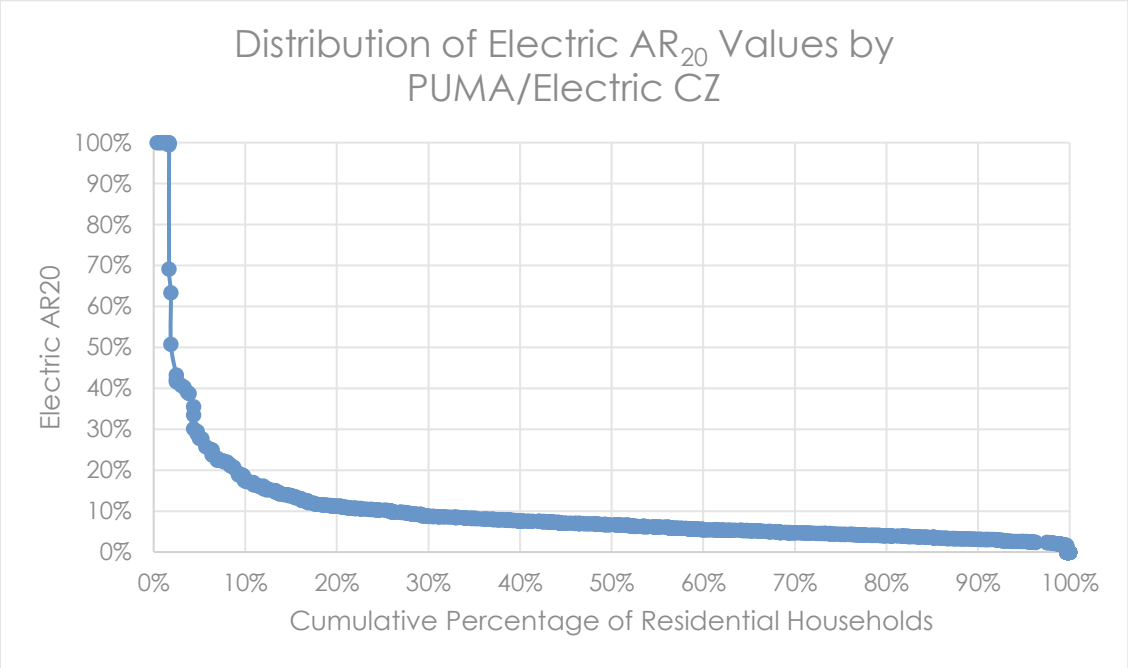

Figure 16: Distribution of Electric AR_{20} Values by Percent of Residential Households (2019)

The stark differences in electric AR_{20} values across PUMA/climate zone areas demonstrates that affordability concerns can be easy to miss when looking at affordability metrics that are aggregated and averaged at larger geographic scales. If AR_{20} metrics were reported as an average across entire utility climate zones, many of the PUMA/climate zone areas with high AR_{20} values would have a small impact on the average values once lumped in with surrounding areas where AR_{20} is significantly lower. By drilling down to this more granular geographic area, it is possible to identify specific communities where affordability concerns are greatest.

Table 4 provides details of the CPUC-regulated PUMA/climate zone areas with electric AR_{20} values greater than 15 percent.[45] As with the PUMAs highlighted in Table 1 with particularly high bundled AR_{20} values, many of the areas in this table have significantly lower 20th percentile income levels than the statewide average of $32,029/year. Housing costs in these areas are generally lower than the statewide average for 20th income percentile households ($14,796/year), though that is not always

[44] The scatterplot in Figure 16 includes service territories that are regulated by the CPUC as well as areas that are not in the CPUC's jurisdiction. This was done to give a comprehensive picture of affordability across the entire state, rather than just focusing on CPUC-regulated providers.

[45] This is the observed inflection point in the distribution of electric AR_{20} values in Figure 16.

the case and there is considerable variability. This indicates that electric affordability concerns are mostly being driven by low incomes rather than high housing costs. It is also worth noting that many of the areas highlighted here are the same areas identified as having high bundled AR values. Difficulty paying for an essential service such as electricity necessarily means that affordability of other utility services is a concern.

PUMA	County/City	Electric Climate Zone	Electric AR_{20}	20th Percentile Income ($/yr)	20th Income Percentile Housing Cost ($/yr)
07503	San Francisco County (Central)--South of Market & Potrero	PG&E T	35.5%	$ 17,986	$ 13,081
03703	Los Angeles County (North Central)--Lancaster City	SCE 14	29.5%	$ 16,207	$ 11,263
01903	Fresno County (Central)--Fresno City (East Central)	PG&E R	27.8%	$ 14,714	$ 8,246
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	SCE 9	25.7%	$ 26,655	$ 20,306
00701	Butte County (Northwest)--Chico City	PG&E P	22.5%	$ 18,373	$ 10,014
06501	Riverside County (East)--Indio, Coachella, Blythe & La Quinta (East) Cities	SCE 15	22.1%	$ 17,241	$ 8,921
07702	San Joaquin County (Central)--Stockton City (South)	PG&E S	22.0%	$ 15,647	$ 8,642
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	SDG&E INLAND	21.4%	$ 19,506	$ 12,599
01904	Fresno County (Central)--Fresno City (Southwest)	PG&E R	20.8%	$ 15,779	$ 7,868
02500	Imperial County--El Centro City	SCE 15	18.9%	$ 16,390	$ 7,162
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	SDG&E COASTAL	18.6%	$ 19,506	$ 12,599
00104	Alameda County (North Central)--Oakland City (South Central)	PG&E X	18.2%	$ 19,192	$ 12,440
02903	Kern County (Central)--Bakersfield City (Northeast)	PG&E R	17.5%	$ 17,060	$ 8,005
01905	Fresno County (Central)--Fresno City (Southeast)	PG&E R	17.2%	$ 16,740	$ 7,665
00701	Butte County (Northwest)--Chico City	PG&E S	17.2%	$ 18,373	$ 10,014
07108	San Bernardino County (Southwest)--San Bernardino City (West)	SCE 10	16.3%	$ 17,272	$ 9,193
03300	Lake & Mendocino Counties	PG&E P	16.2%	$ 18,848	$ 8,040
06515	Riverside County--Palm Desert, La Quinta (West) & Desert Hot Springs Cities	SCE 15	16.1%	$ 20,898	$ 10,277
00701	Butte County (Northwest)--Chico City	PG&E Y	15.8%	$ 18,373	$ 10,014
07108	San Bernardino County (Southwest)--San Bernardino City (West)	SCE 16	15.7%	$ 17,272	$ 9,193
02903	Kern County (Central)--Bakersfield City (Northeast)	PG&E W	15.5%	$ 17,060	$ 8,005
06502	Riverside County (Central)--Cathedral City, Palm Springs & Rancho Mirage Cities	SCE 15	15.0%	$ 21,324	$ 9,957

Table 4: PUMA/Climate Zone Areas with Electric AR_{20} Values Greater than 15 Percent (2019)

In the context of electric affordability, it is useful to think of what small reductions in electric essential service charges would have on customers' household budgets and ability to pay. Table 5 shows the impact of a 1 percent reduction in electric essential service charge on a 20th income percentile household's disposable income (defined here as income minus housing and utility costs) for the same areas identified in Table 4. This could reflect the impact of an energy efficiency program or an energy conservation messaging campaign. The disposable income changes in the table reflect the impact of each percentage decrease in electric essential service charge.

PUMA	County/City	Electric Climate Zone	Disposable Income Change Associated with 1% Reduction in Electric Bill (%)	Disposable Income Change Associated with 1% Reduction in Electric Bill ($/yr)
07503	San Francisco County (Central)--South of Market & Potrero	PG&E T	0.6%	$ 6.72
03703	Los Angeles County (North Central)--Lancaster City	SCE 14	0.4%	$ 9.90
01903	Fresno County (Central)--Fresno City (East Central)	PG&E R	3.4%	$ 12.07
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	SCE 9	0.4%	$ 9.14
00701	Butte County (Northwest)--Chico City	PG&E P	0.3%	$ 14.74
06501	Riverside County (East)--Indio, Coachella, Blythe & La Quinta (East) Cities	SCE 15	0.3%	$ 14.73
07702	San Joaquin County (Central)--Stockton City (South)	PG&E S	0.3%	$ 11.00
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	SDG&E INLAND	0.3%	$ 9.65
01904	Fresno County (Central)--Fresno City (Southwest)	PG&E R	0.3%	$ 12.07
02500	Imperial County--El Centro City	SCE 15	0.2%	$ 14.73
07317	San Diego County (South Central)--San Diego City (Central/Mid-City)	SDG&E COASTAL	0.2%	$ 8.38
00104	Alameda County (North Central)--Oakland City (South Central)	PG&E X	0.2%	$ 8.67
02903	Kern County (Central)--Bakersfield City (Northeast)	PG&E R	0.2%	$ 12.07
01905	Fresno County (Central)--Fresno City (Southeast)	PG&E R	0.2%	$ 12.07
00701	Butte County (Northwest)--Chico City	PG&E S	0.2%	$ 11.00
07108	San Bernardino County (Southwest)--San Bernardino City (West)	SCE 10	0.2%	$ 9.91
03300	Lake & Mendocino Counties	PG&E P	0.2%	$ 14.74
06515	Riverside County--Palm Desert, La Quinta (West) & Desert Hot Springs Cities	SCE 15	0.2%	$ 14.73
00701	Butte County (Northwest)--Chico City	PG&E Y	0.2%	$ 10.50
07108	San Bernardino County (Southwest)--San Bernardino City (West)	SCE 16	0.2%	$ 9.64
02903	Kern County (Central)--Bakersfield City (Northeast)	PG&E W	0.2%	$ 11.34
06502	Riverside County (Central)--Cathedral City, Palm Springs & Rancho Mirage Cities	SCE 15	0.2%	$ 14.73

Table 5: Impact of 1 Percent Electric Essential Service Charge Reduction on Disposable Income (2019)

For most of the state, electric affordability results showed only small changes between 2018 and 2019. Figure 17 and Figure 18 show the change in electric AR_{20} value (defined as the 2019 value minus the 2018 value) in map and histogram formats respectively.[46] The vast majority of PUMA/climate zone areas show a minimal AR_{20} change of only a few percentage points, with the maximum change being an AR_{20} increase of about 11 percent in a portion of Los Angeles that falls in Southern California Edison's (SCE) territory (PUMA 3731, SCE climate zone 9). This area saw electric AR_{20} values increase from 14.8 percent to 25.7 percent, even though 20th percentile incomes fell only a small amount ($26,655/year in 2019 compared to $26,789/year in 2018) and predicted housing costs did not increase substantially ($20,304/year in 2019 compared to $19,596/year in 2018). This demonstrates that even small movements in income and housing costs can have an outsized impact on a household's ability to pay for electric service when disposable income levels are so low.

[46] This map can be found in interactive form at https://www.cpuc.ca.gov/delta-2019/.

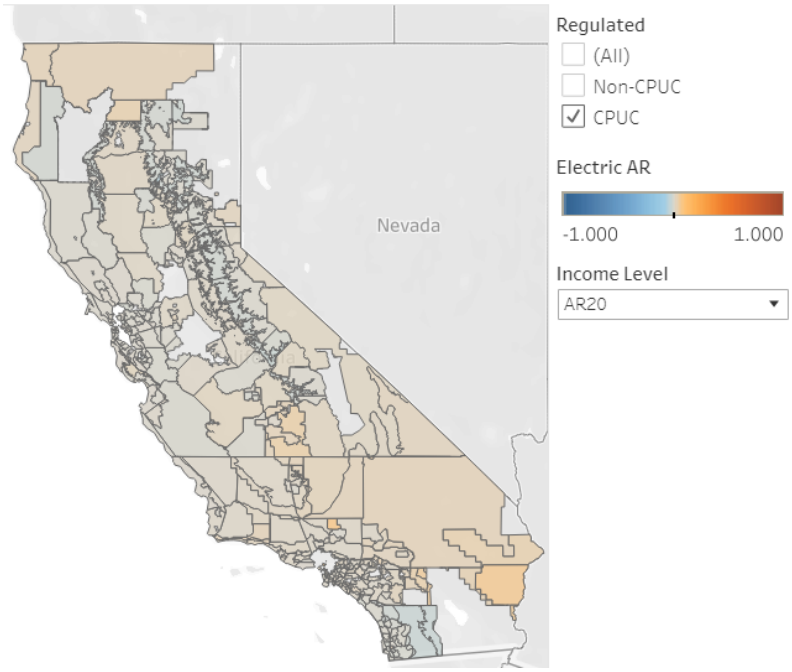

Figure 17: Change in Electric AR_{20} Value Between 2018 and 2019 (2019 Value Minus 2018 Value)

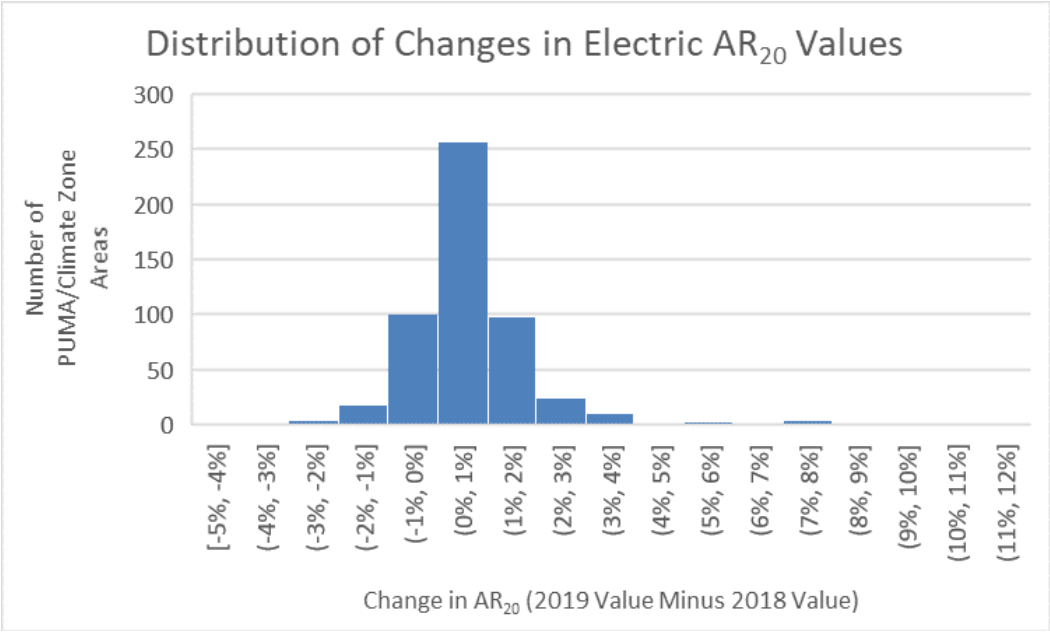

Figure 18: Distribution of Changes in Electric AR_{20} Values

Affordability ratio results were also calculated for median income households in each PUMA/climate zone area. Figure 19 shows the electric AR_{50} results for CPUC jurisdictional areas based on the 2019 analysis. As with the bundled AR results, the AR_{50} values are considerably lower than the AR_{20} values overall and show a much smaller range of outcomes. Median income households spend a relatively small percentage of discretionary income on electric utility service.

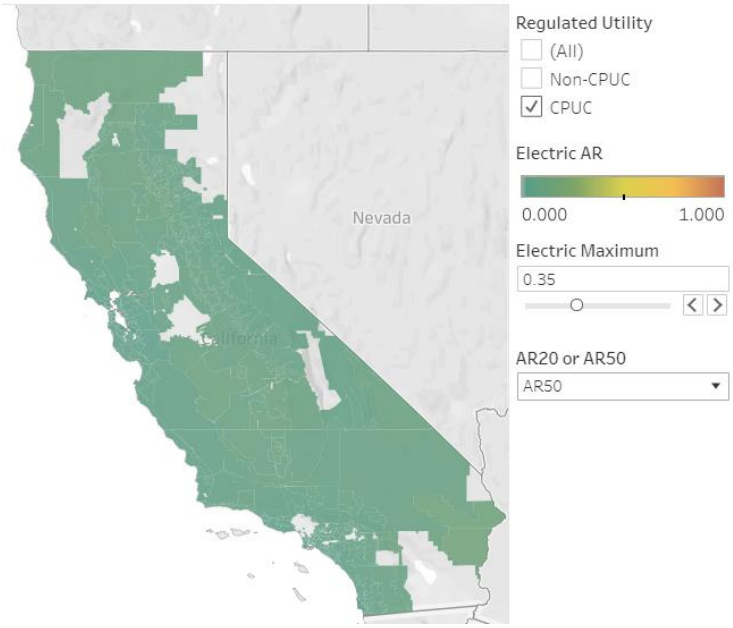

Figure 19: Electric AR_{50} Values Statewide (2019)

This point is further demonstrated by Figure 20 which shows the distribution of electric AR_{20} and electric AR_{50} areas as a percentage of the state's population that lives in areas with those values. AR_{50} values are lower than the AR_{20} results in general, with the high end of the AR_{50} distribution at less than 10 percent. The electric AR_{20} values show a much wider spread, indicating that lower income households experience a wider range of affordability outcomes with some households experiencing AR values that are quite high.

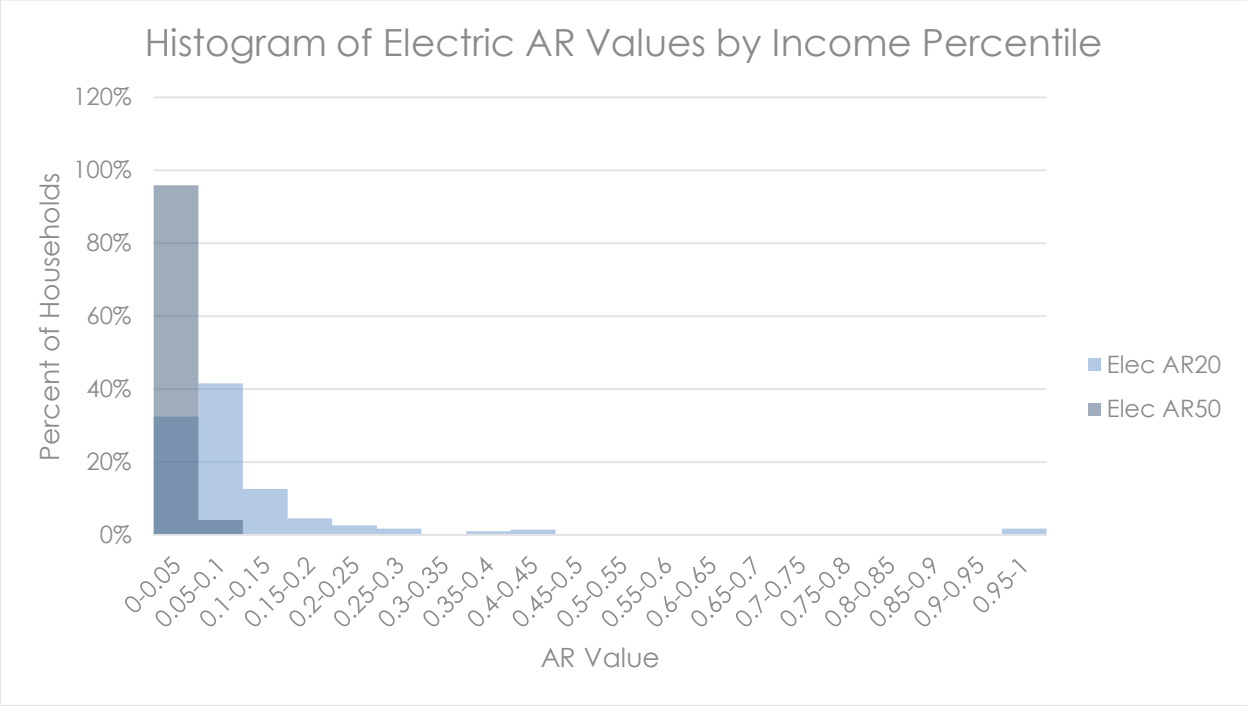

Figure 20: Histogram of Electric AR Values by Income Percentile

Hours at Minimum Wage

The electric HM metric shows the number of hours that members of a household would need to work at the local area minimum wage in a month to pay for their electric essential service charge. Unlike the AR and SEVI metrics, which take the socioeconomic conditions of a community into account when assessing a household's ability to pay, the HM metric measures the affordability of an essential service charge for a low-income household regardless of what income levels are for the community in general. It gives an unbiased view into the affordability of a utility service for low-income households.

Figure 21 shows the electric HM results for the 2019 analysis across the state.[47] The highest electric HM value areas are in places where there is no local minimum wage that supersedes the state minimum wage, essential usage levels are quite high (owing to the large air conditioning loads that are required in inland areas in particular), and annual average electric essential service charges are higher than the rest of the state.

[47] This map can be found in interactive form at https://www.cpuc.ca.gov/hm-2019/.

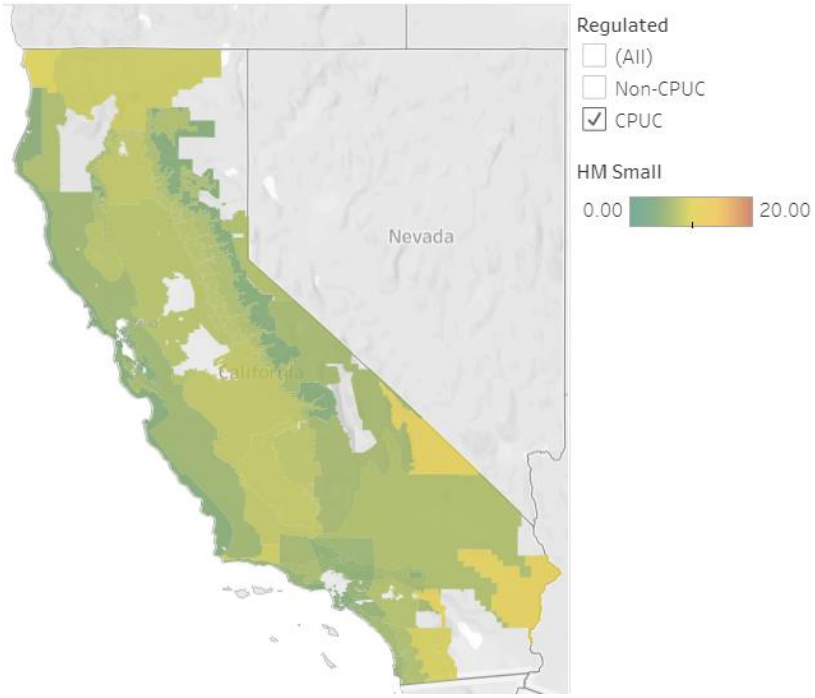

Figure 21: Electric HM Results (2019)

AR/SEVI - Top 10 Percent and 20 Percent Areas

By combining the electric AR and SEVI metrics, it is possible to identify the areas where communities are particularly vulnerable to high rates and where electricity affordability is already concerning based on current conditions. These areas should be prioritized for low-income energy efficiency and assistance programs. Figure 22 and Figure 23 show the census tracts where SEVI values and electric AR_{20} values are in the top 20 percent and top 10 percent respectively.[48] Details on the specific census tracts can be found in an online supplemental appendix.[49]

[48] These maps can be found in interactive form at https://www.cpuc.ca.gov/AR-SEVI-2019/.

[49] The list of census tracts is too long to include in this report. Instead, a spreadsheet with the list of census tracts is available on the Affordability Report website located here: https://www.cpuc.ca.gov/2019-Annual-Affordability-Report/

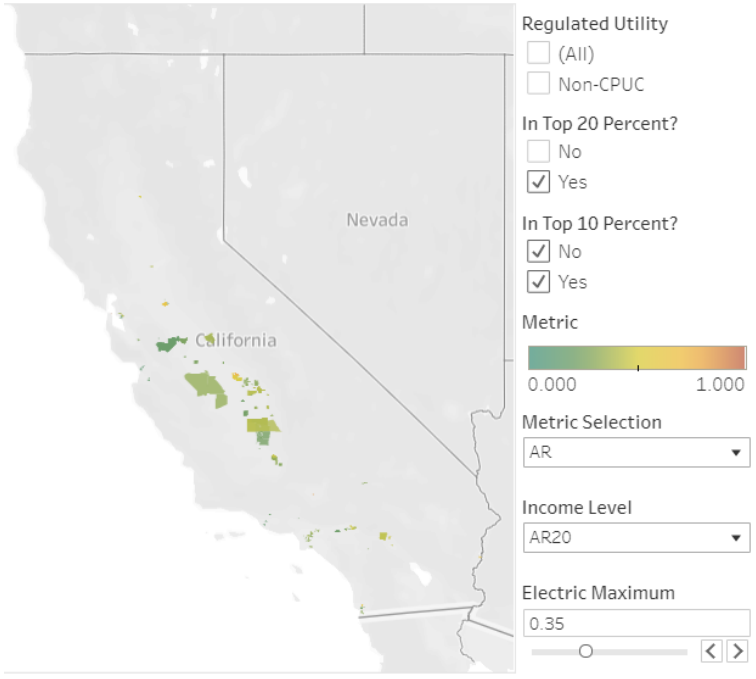

Figure 22: Census Tracts with Top 20 Percent of Electric AR_{20} and SEVI Values

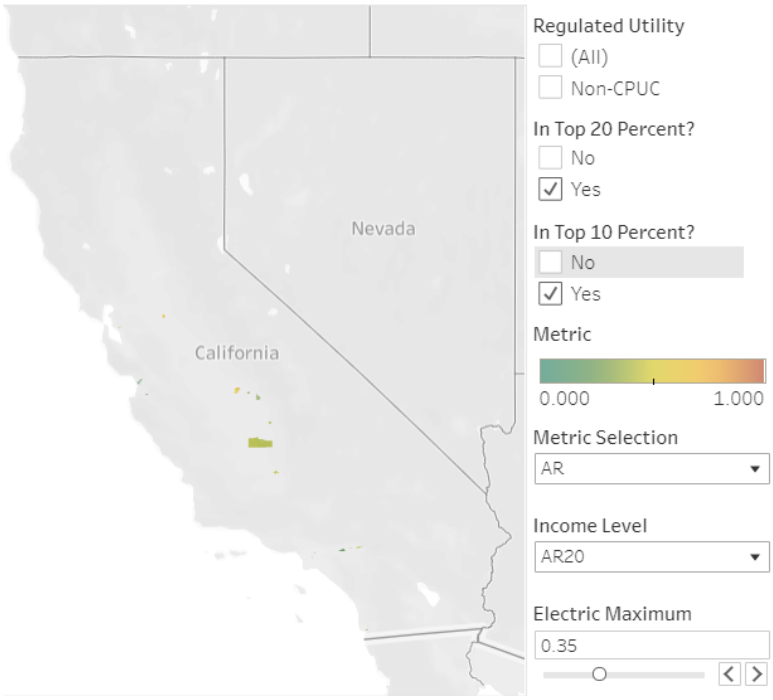

Figure 23: Census Tracts with Top 10 Percent of Electric AR_{20} and SEVI Values

Electric Affordability Conclusions

Similar to the bundled affordability analysis, the electric affordability metrics have demonstrated that there are significant disparities for low-income households across various parts of the state. Only 13.3 percent of households in the state are located in areas where AR_{20} is above 15 percent. Many of the same areas that were identified as economically distressed by the bundled affordability metrics also have the highest electric AR values. As with the bundled utility analysis, electric affordability concerns are primarily driven by low household income levels rather than high housing costs.

Identifying these areas with electric affordability concerns is only possible by evaluating affordability at a more geographically granular level than utility service territory or climate zone. Within a given utility climate zone, there are significant variations in AR_{20} values. If the affordability ratio metric were calculated for an entire climate zone or service territory, the resulting metric would not adequately reflect this variation in these specific communities. These communities should be prioritized for low-income energy efficiency and energy assistance programs.

In addition to the disadvantaged communities (DAC) that the Commission has already identified for targeted assistance, these affordability metrics (and in particular the census tracts with the highest AR_{20} and SEVI values) can be used to classify additional geographic areas of concern. Furthermore, in future iterations of the Annual Affordability Report, staff will investigate the extent to which assistance programs such as California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance (FERA) are being effectively utilized in the areas where AR_{20} values are highest to alleviate affordability concerns.

Natural Gas Affordability

This section covers the affordability of natural gas utility service at the essential usage level defined by each climate zone's baseline allowance. Results in this section are presented at the scale of utility climate zones broken down by PUMA, meaning that each area can be defined by a unique combination of climate zone and PUMA.

Affordability Ratio

The gas affordability ratio metric represents the percent of a household's income that is spent on an essential level of gas utility service once housing costs and other utility services (electricity, water, and telecommunications) are subtracted. The 2019 results for households in the 20th percentile of the income distribution are presented in Figure 24.[50,51] Once again, the color scale is set to be consistent with the bundled and electric AR maps (0 percent = green, 35 percent and higher = red) to allow for easy comparison of AR results across industries. Compared to the electricity AR_{20} results, gas AR_{20} values are generally much lower. This is a byproduct of the fact that annual average gas essential service charges are generally lower than electricity, owing to the highly seasonal nature of natural gas usage.

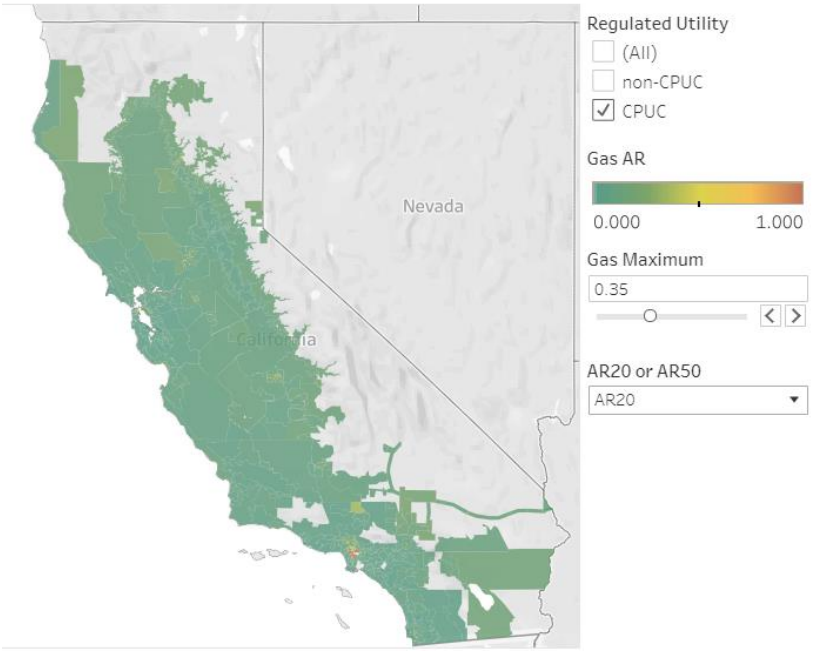

Figure 24: Statewide Gas AR_{20} Results (2019)

[50] The map in Figure 24 displays AR results for CPUC-jurisdictional areas only.

[51] This map can be found in interactive form at https://www.cpuc.ca.gov/ar-2019/.

And yet, there are still a handful of PUMA/climate zone areas where gas AR_{20} is considerably higher than the rest of the state. Figure 25 shows the distribution of gas AR_{20} values ranked in order from highest to lowest, with the x-axis showing what percentage of households in the state are in areas where gas AR_{20} values are at least that high.[52] The vast majority of households in the state are in areas with gas AR_{20} values below 10 percent. Approximately 6 percent of households are in areas with gas AR_{20} values greater than 10 percent.

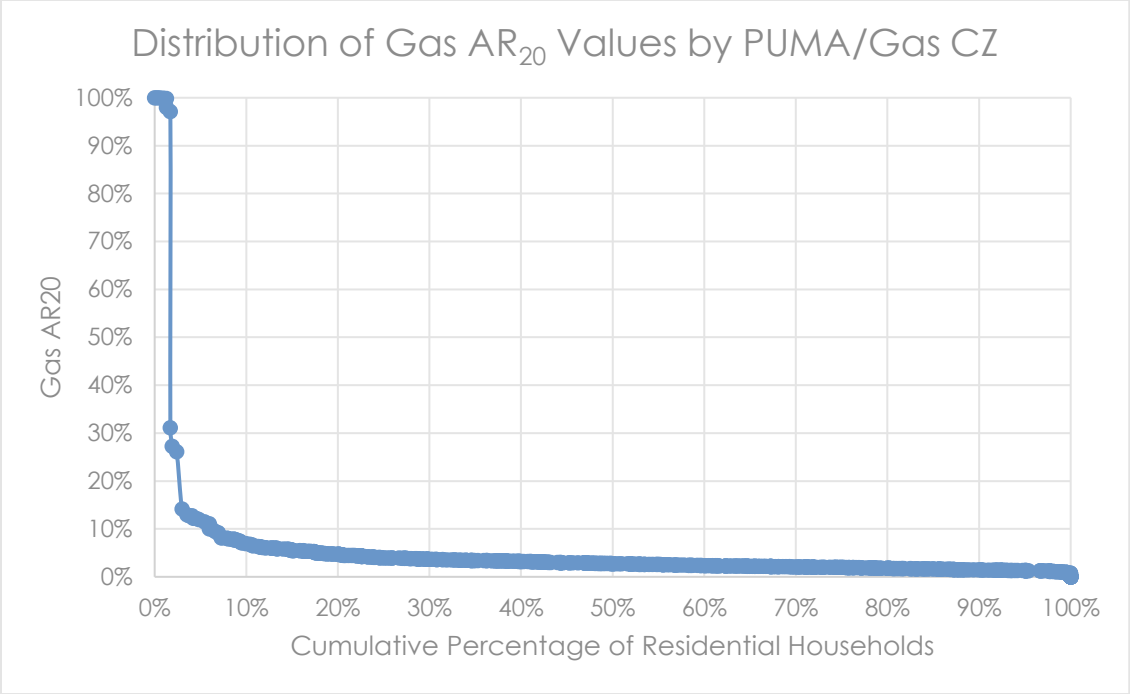

Figure 25: Distribution of Gas AR_{20} Values by Percent of Residential Households (2019)

Details of the CPUC-regulated PUMA/climate zone areas where gas AR_{20} is above 10 percent[53] can be seen in Table 6. As with the high electric AR_{20} values in Table 4, many of these areas coincide with the same areas identified as having high bundled AR_{20} values: parts of Los Angeles, Chico, parts of the San Joaquin Valley, and parts of the San Francisco Bay Area. Similarly, the areas identified as having significant gas affordability concerns all have 20th percentile incomes well below the state average 20th percentile income value ($32,029/year). Housing costs for 20th income percentile households are also lower than the statewide average ($14,796/year) for most of the identified PUMA/climate zone areas, though not low enough to offset the low household income values.

[52] The scatterplot in Figure 25 includes service territories that are regulated by the CPUC as well as areas that are not in the CPUC's jurisdiction. This was done to give a comprehensive picture of affordability across the entire state, rather than just focusing on CPUC-regulated providers.

[53] This is the observed inflection point in the distribution of natural gas AR_{20} values as seen in Figure 25.

PUMA	County/City	Gas Climate Zone	Gas AR_{20}	20th Percentile Income ($/yr)	20th Income Percentile Housing Cost ($/yr)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park)	SCG 1	100.0%	$ 11,746	$ 13,533
03751	Los Angeles County (South Central)--LA City (South Central/Watts)	SCG 1	100.0%	$ 14,245	$ 11,850
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills)	SCG 1	99.9%	$ 15,270	$ 12,257
03750	Los Angeles County (South Central)--LA City (South Central/Westmont)	SCG 1	99.9%	$ 14,223	$ 11,728
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights)	SCG 1	97.1%	$ 12,517	$ 10,179
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon)	SCG 1	27.2%	$ 16,164	$ 11,493
07503	San Francisco County (Central)--South of Market & Potrero	PG&E T	26.1%	$ 17,986	$ 13,081
03732	Los Angeles County (Central)--LA City (East Central/Hollywood)	SCG 1	14.2%	$ 18,848	$ 12,991
03734	Los Angeles County--LA City (East Central/Silver Lake, Echo Park & Westlake)	SCG 1	12.9%	$ 17,524	$ 11,415
03703	Los Angeles County (North Central)--Lancaster City	SCG 2	12.8%	$ 16,207	$ 11,263
03733	Los Angeles County (Central)--LA City (Central/Koreatown)	SCG 1	12.7%	$ 19,192	$ 13,035
03703	Los Angeles County (North Central)--Lancaster City	SCG 1	12.2%	$ 16,207	$ 11,263
03721	Los Angeles County (North)--LA City (Northeast/North Hollywood & Valley Village)	SCG 1	12.2%	$ 20,360	$ 14,091
01903	Fresno County (Central)--Fresno City (East Central)	PG&E R	11.9%	$ 14,714	$ 8,246
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	SCG 1	11.5%	$ 26,655	$ 20,306
03719	Los Angeles County (Central)--Glendale City	SCG 1	11.1%	$ 21,174	$ 15,594
00104	Alameda County (North Central)--Oakland City (South Central)	PG&E X	10.6%	$ 19,192	$ 12,440
00701	Butte County (Northwest)--Chico City	PG&E Y	10.0%	$ 18,373	$ 10,014

Table 6: PUMA/Climate Zone Areas with Gas AR_{20} Values Greater than 15 Percent (2019)

For each of these PUMA/climate zone areas, Table 7 shows the impact of every 1 percent reduction in gas essential service charge on the disposable budget of a household in the 20th percentile of the income distribution. Note that the top few entries in this table contain areas with top-coded AR_{20} values, meaning incomes are insufficient to cover housing and utility expenses, so it is not possible to calculate the percentage change in disposable income as a result of the gas essential service charge reduction.

PUMA	County/City	Gas Climate Zone	Disposable Income Change Associated with 1% Reduction in Gas Bill (%)	Disposable Income Change Associated with 1% Reduction in Gas Bill ($/yr)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park)	SCG 1	N/A	$ 3.59
03751	Los Angeles County (South Central)--LA City (South Central/Watts)	SCG 1	N/A	$ 3.59
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills)	SCG 1	N/A	$ 3.59
03750	Los Angeles County (South Central)--LA City (South Central/Westmont)	SCG 1	N/A	$ 3.59
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights)	SCG 1	N/A	$ 3.59
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon)	SCG 1	0.4%	$ 3.59
07503	San Francisco County (Central)--South of Market & Potrero	PG&E T	0.4%	$ 4.32
03732	Los Angeles County (Central)--LA City (East Central/Hollywood)	SCG 1	0.2%	$ 3.59
03734	Los Angeles County--LA City (East Central/Silver Lake, Echo Park & Westlake)	SCG 1	0.1%	$ 3.59
03703	Los Angeles County (North Central)--Lancaster City	SCG 2	0.1%	$ 3.44
03733	Los Angeles County (Central)--LA City (Central/Koreatown)	SCG 1	0.1%	$ 3.59
03703	Los Angeles County (North Central)--Lancaster City	SCG 1	0.1%	$ 3.27
03721	Los Angeles County (North)--LA City (Northeast/North Hollywood & Valley Village)	SCG 1	0.1%	$ 3.59
01903	Fresno County (Central)--Fresno City (East Central)	PG&E R	1.1%	$ 3.94
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities	SCG 1	0.1%	$ 3.37
03719	Los Angeles County (Central)--Glendale City	SCG 1	0.1%	$ 3.59
00104	Alameda County (North Central)--Oakland City (South Central)	PG&E X	0.1%	$ 4.63
00701	Butte County (Northwest)--Chico City	PG&E Y	0.1%	$ 6.22

Table 7: Impact of 1 Percent Gas Essential Service Charge Reduction on Disposable Income (2019)

Similar to the electric AR_{20} results, little change in gas AR_{20} was observed between 2018 and 2019. Figure 26 and Figure 27 show the changes in gas AR_{20} values (defined as the 2019 value minus the 2018 value) in map and histogram formats respectively.[54] The vast majority of PUMA/climate zone areas saw a change in gas AR_{20} of less than 1 percent in either direction.

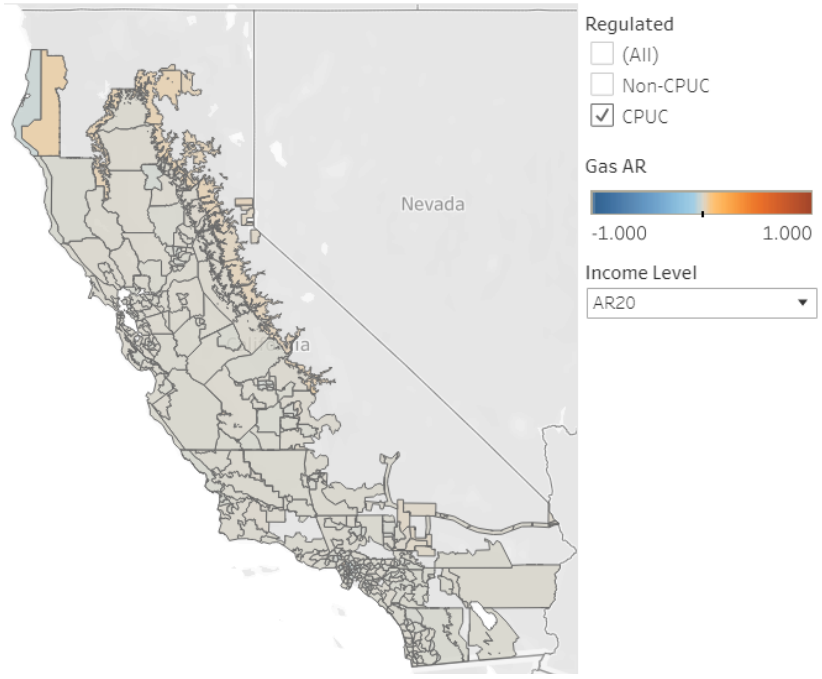

Figure 26: Change in Gas AR_{20} Value Between 2018 and 2019 (2019 Value Minus 2018 Value)

[54] This map can be found in interactive form at https://www.cpuc.ca.gov/delta-2019/.

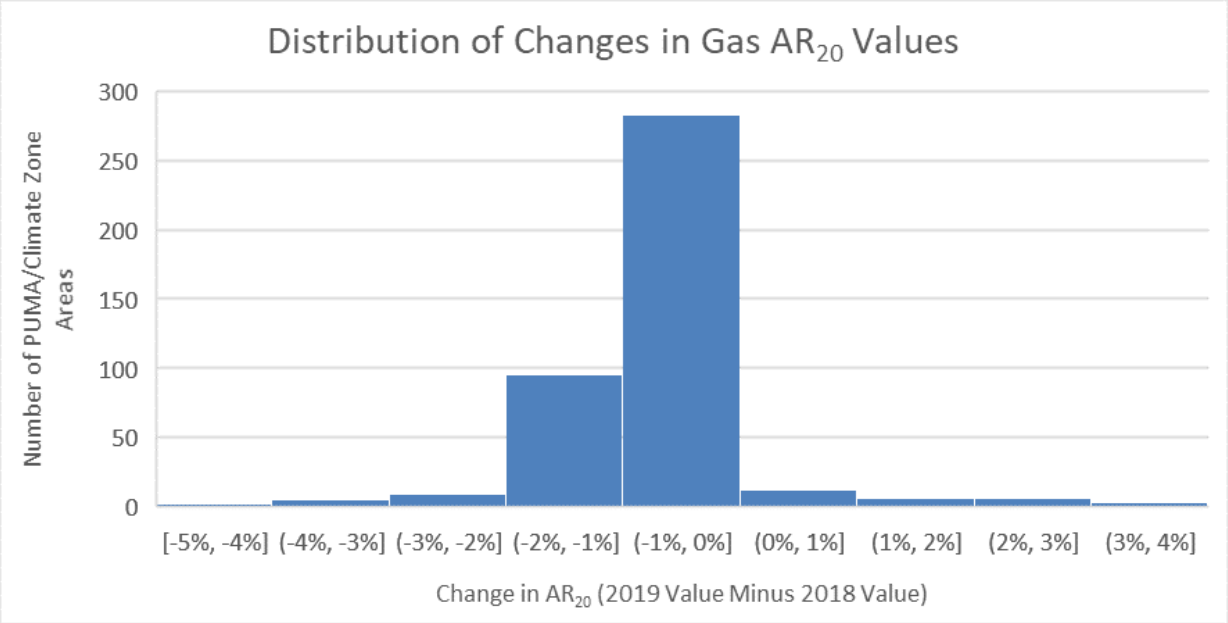

Figure 27: Distribution of Changes in Gas AR_{20} Values

Gas affordability ratio values were also calculated for median income customers in each area and are presented in Figure 28 for the 2019 analysis. As with the electric AR results, the gas AR_{50} values are lower than the gas AR_{20} values across the state. This is further illustrated by Figure 29, which shows the distribution of gas AR_{20} and gas AR_{50} values. While most PUMA/climate zone areas have low (<5 percent) AR_{20} and AR_{50} values, there is more variability in AR values for 20th income percentile households, whereas there are no areas with AR_{50} values greater than 5 percent.

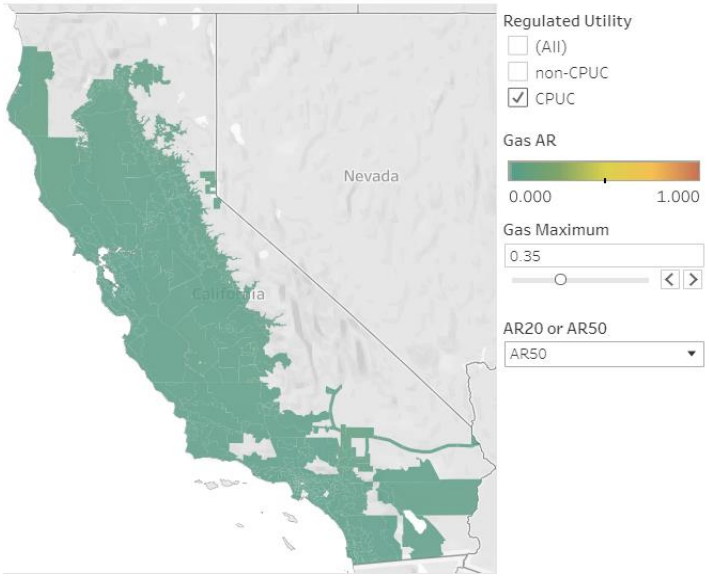

Figure 28: Gas AR_{50} Values Statewide (2019)

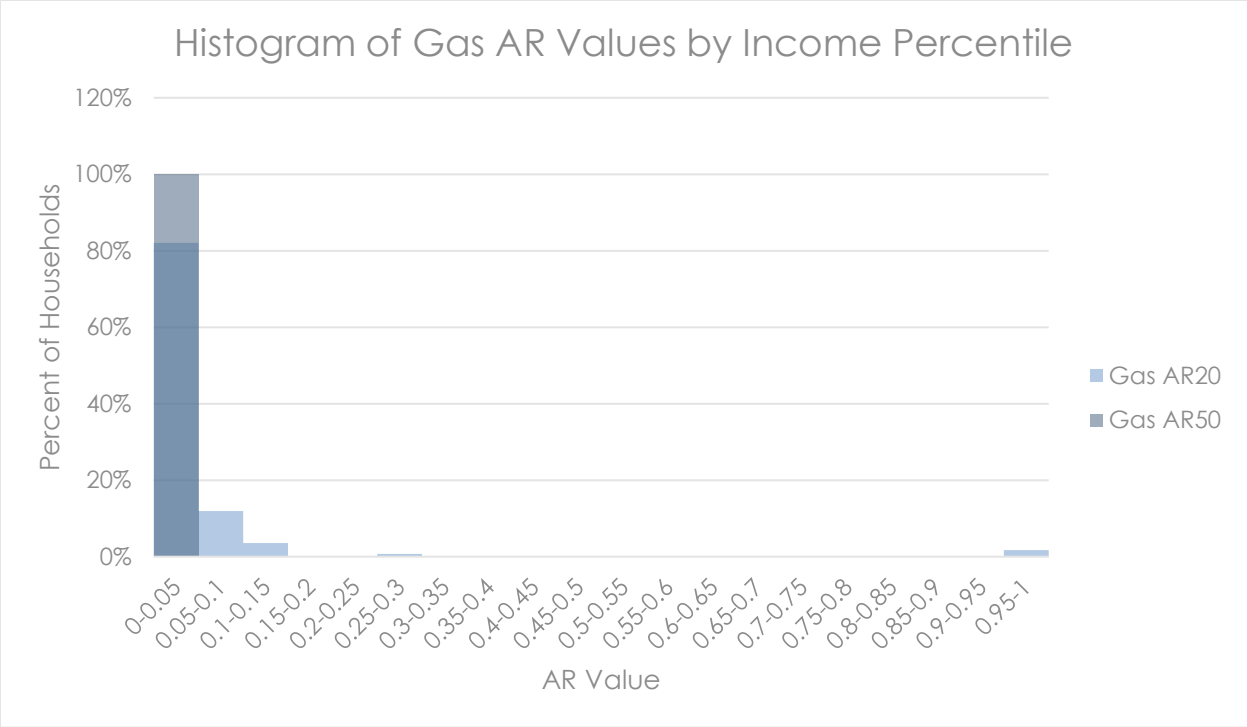

Figure 29: Histogram of Gas AR Values by Income Percentile

Hours at Minimum Wage

As with electric HM, the gas HM metric provides a measurement of utility service affordability for low-income households, regardless of the socioeconomic conditions of the community as a whole. Figure 30 shows statewide gas HM results,[55] which are skewed in a pattern demonstrating higher gas HM values in the northern parts of the state, owing to the greater need for gas usage in the winter months in colder climate zones. However, despite these regional variations in usage, HM variance is fairly subtle overall, owing to the fact that natural gas essential usage charges are relatively small compared to other essential services.

[55] This map can be found in interactive form at https://www.cpuc.ca.gov/hm-2019/.

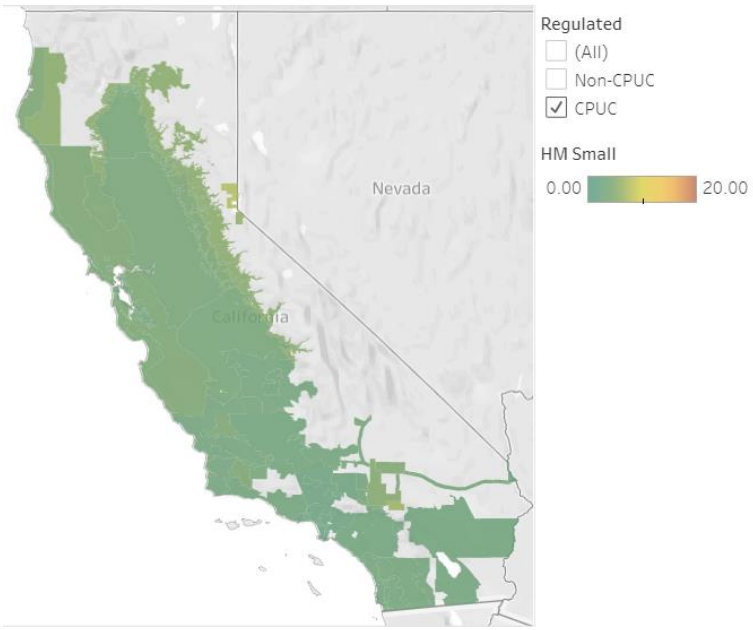

Figure 30: Gas HM Results (2019)

AR/SEVI - Top 10 Percent and 20 Percent Areas

The census tracts with the highest SEVI and gas AR_{20} values are presented in Figure 31 and Figure 32, which shows the census tracts with the top 20 percent and top 10 percent of both values respectively.[56] More details on these census tracts are provided in a supplemental appendix.[57]

[56] These maps can be found in interactive form at https://www.cpuc.ca.gov/AR-SEVI-2019/.

[57] The list of census tracts is too long to include in this report. Instead, a spreadsheet with the list of census tracts is available on the Affordability Report website located here: https://www.cpuc.ca.gov/2019-Annual-Affordability-Report/

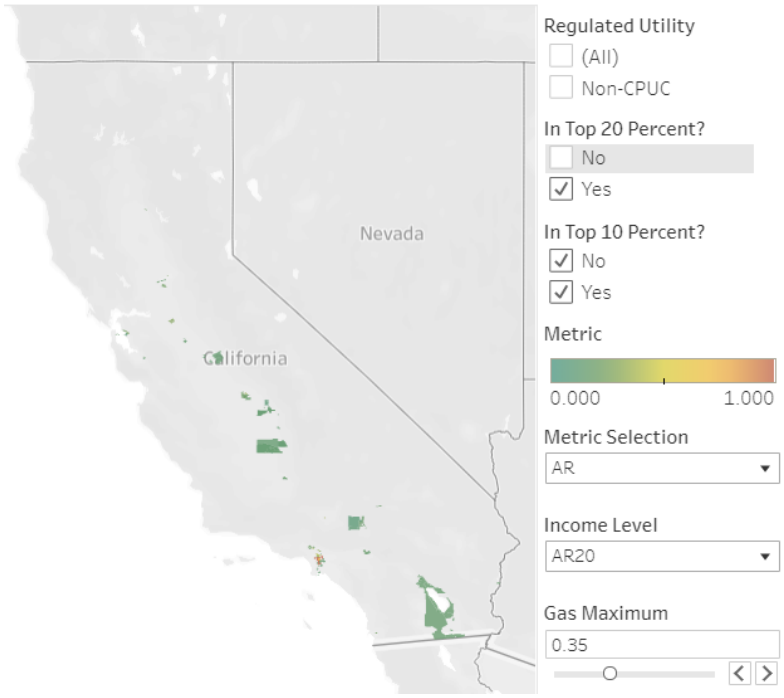

Figure 31: Census Tracts with Top 20 Percent of Gas AR_{20} and SEVI Values

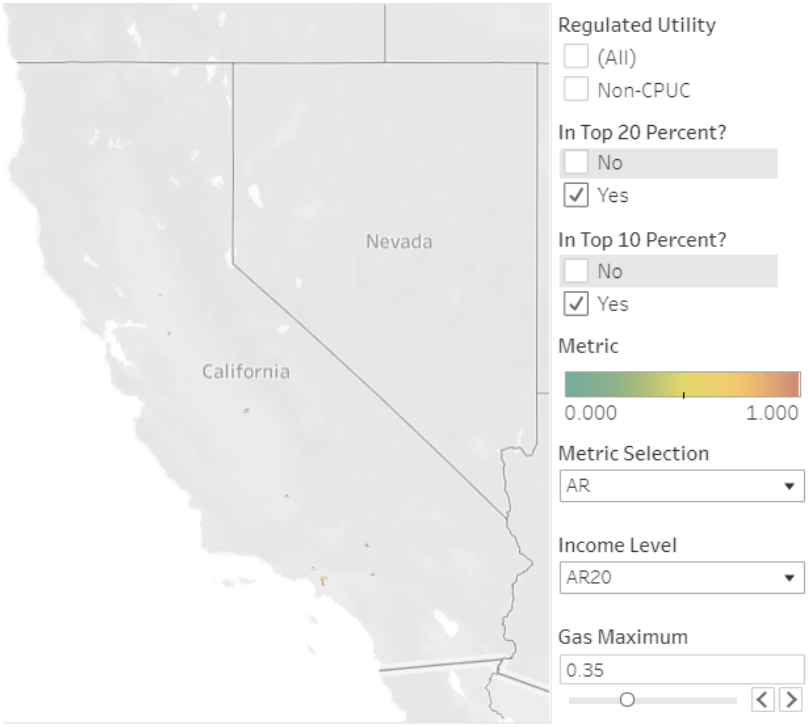

Figure 32: Census Tracts with Top 10 Percent of Gas AR_{20} and SEVI Values

Natural Gas Affordability Conclusions

Many of the conclusions that can be drawn from this analysis concerning natural gas affordability echo those presented in the electric affordability section. The vast majority of households in the state are located in areas with relatively low gas AR_{20} values, with only 6 percent of households in areas where gas AR_{20} is above 10 percent. The areas identified as having significant affordability concerns all have 20th percentile incomes below the state average value, suggesting that low household incomes rather than high housing costs account for this trend. Many of the high gas AR_{20} areas are also high electric AR_{20} areas: parts of Los Angeles, Chico, parts of the San Joaquin Valley, and parts of the San Francisco Bay Area. Furthermore, the difference in affordability results between median and 20th income percentile households observed for electricity also is true for gas: there is more variability in AR values for 20th income percentile households, whereas all median income households have very low gas AR values (less than 5 percent across the state).

Gas AR_{20} values are lower than electric AR_{20} values overall, as annual average gas essential service charges are generally lower than electric essential service charges. This is largely due to the highly seasonal nature of natural gas usage and the fact that natural gas is cheaper than electricity on an energy equivalent basis.

As with the electric affordability conclusions, the gas affordability results provide an opportunity to identify communities struggling to pay for a vital utility service beyond the DACs that the Commission has already recognized. Additionally, staff can use future iterations of the Annual Affordability Report to evaluate the extent to which assistance programs such as CARE and FERA are effectively deployed to customers in these communities to address affordability concerns.

Water Affordability

This section covers the affordability of water utility service at the essential usage level of 600 cubic feet (ccf) per household per month.

Affordability Ratio

The water calculations are displayed differently than the electric and gas industries. Many water systems are much smaller than an individual PUMA. As a result, AR is calculated based on service territories. For the Commission-regulated Class A water utilities, staff analyzed each ratemaking or tariff area. For the Class Bs, Cs, and Ds, staff used water system, as defined by the Department of Drinking Water, as the unit of analysis.

Water tends to make up a small percentage of the household budget, with a median AR_{20} of 5.5 percent for all utilities for which staff obtained data.[58] The Class A utilities tend to be more affordable than providers as a whole, with a median AR_{20} of 3.9 percent. By definition, the Class As have a large number of connections which facilitates economies of scale and can contribute to lower essential service charges. Many Class A service territories are also located within relatively high-income areas: the areas with lowest AR scores also tend to have some of the highest incomes, regardless of essential service charge.

However, the small Commission-regulated systems tend to have greater affordability concerns, with a median AR_{20} of 5.8 percent. The regulated systems with the highest ARs also tend to be small, though some Class A districts serving very low-income areas also have high ARs.[59] In direct contrast to the Class As, smaller systems tend to serve lower-income areas on average, and have fewer customer connections over which to spread costs. As many small systems are in rural areas, the costs to provide service are often higher to begin with.

Figure 33 through Figure 36 depict the water AR_{20} and AR_{50} for Commission-regulated utilities in 2019. Once again, the color scale has been set to be consistent with the bundled AR maps (0 percent = green, 35 percent and higher = red) to allow for easy comparison of AR results across industries. Commission-regulated utilities cover a small portion of the state's area, so for the sake of clarity, the following maps focus on a few key areas of interest. For a more complete picture of water affordability, interactive versions of these maps have been made available at: https://www.cpuc.ca.gov/ar-2019/.

[58] Staff obtained data from all Commission-regulated utilities through either data requests or filed tariffs. For non-Commission providers, data was obtained through the State Water Resources Control Board's Electronic Annual Report (EAR). Consequently, non-Commission providers whose charge for 6 ccf was zero or not reported in the 2019 EAR are not included in this analysis.

[59] It should be noted that the effects of Customer Assistance Programs (CAP) have not been taken into account here, so individual Class A customers may experience different levels of affordability than this report indicates.

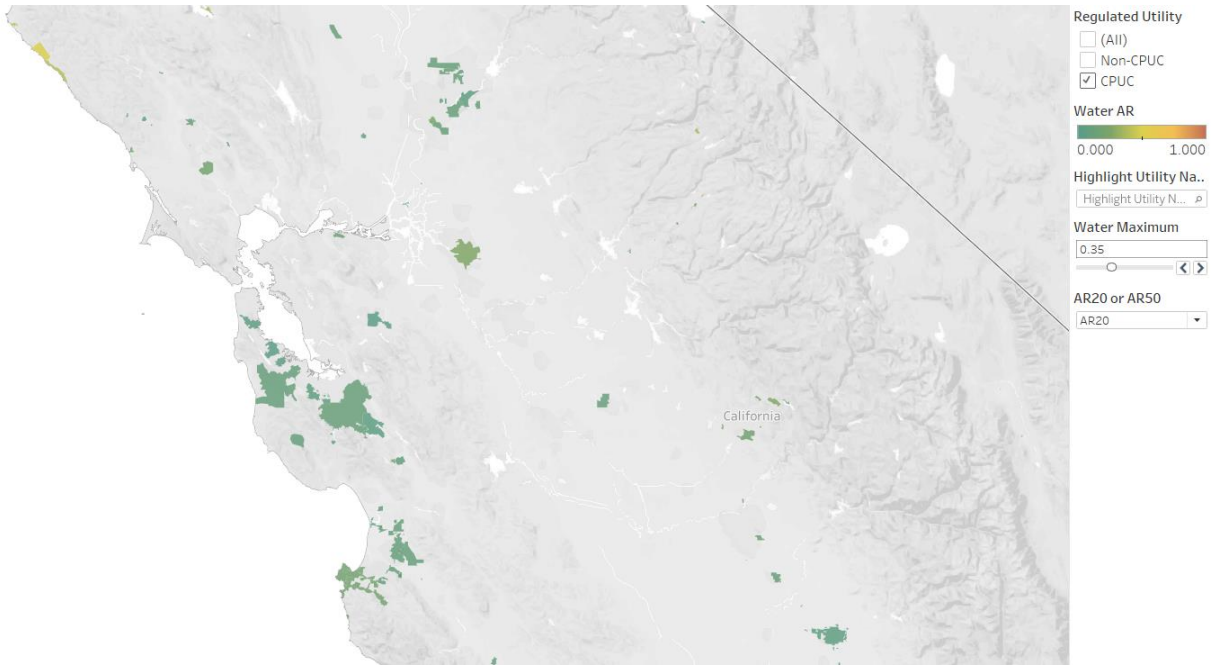

Figure 33: CPUC Regulated Water AR_{20} Results – Northern California (2019)

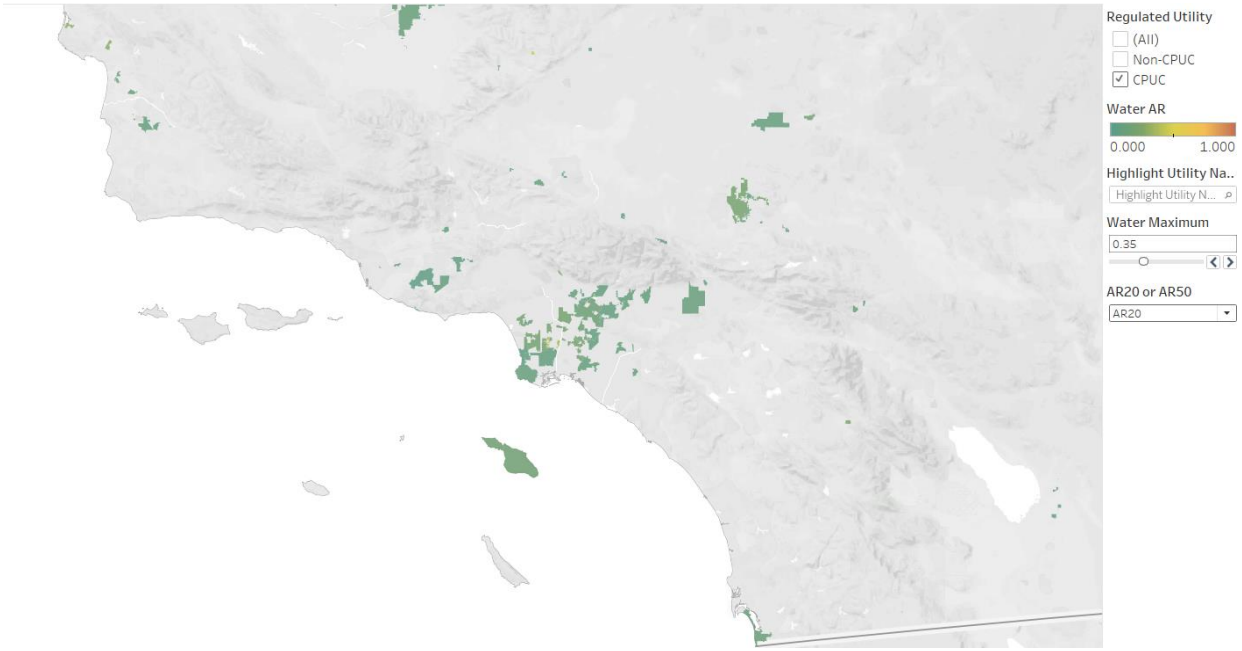

Figure 34: CPUC Regulated Water AR_{20} Results – Southern California (2019)

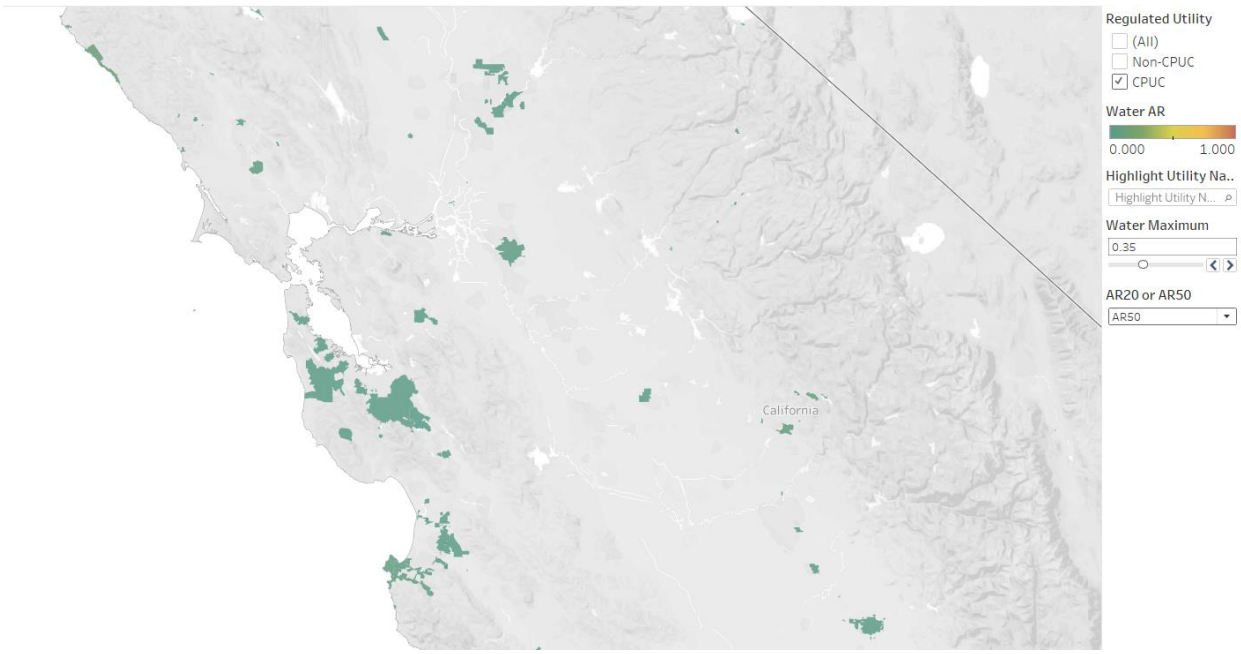

Figure 35: CPUC Regulated Water AR_{50} Results – Northern California (2019)

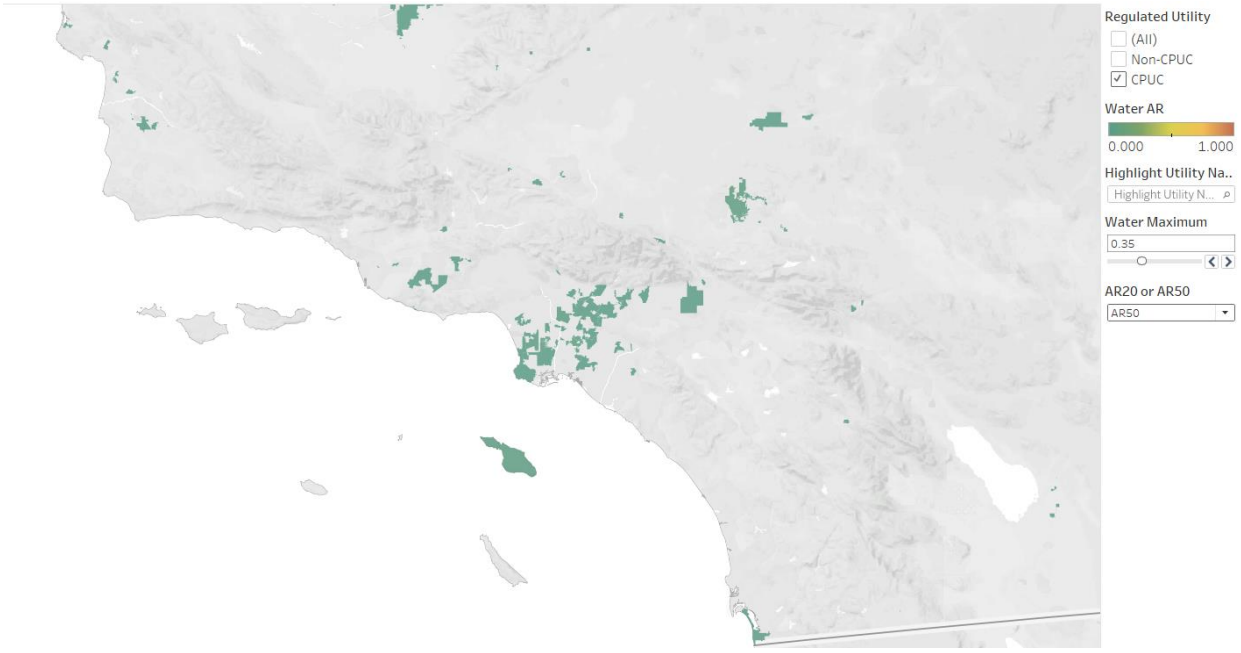

Figure 36: CPUC Regulated Water AR_{50} Results – Southern California (2019)

Ranking Water Utilities

The graph in Figure 37 provides the distribution of 2019 results for all service territories in the state—regulated and unregulated—starting with the utility with the highest AR_{20} to the lowest. The figure is weighted by the number of housing units in each ratemaking area: more populated areas

will have a larger gap between points in the horizontal direction. Mirroring the pattern of affordability seen in the other industries, most systems have AR values clustered around a narrow range between 0 and 10 percent. However, approximately 10 percent of households statewide have higher AR_{20} values of between 10 percent and 20 percent, and a very small number of households experience critical affordability concerns, with AR_{20} values exceeding 30 percent.

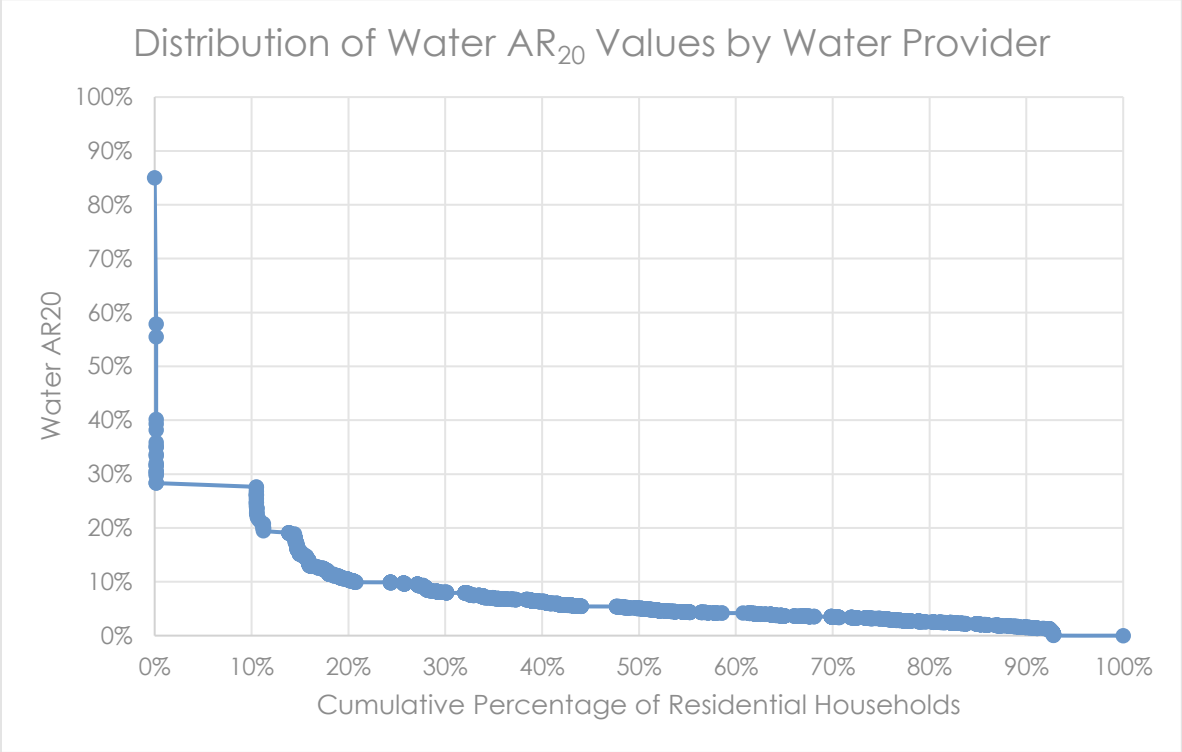

Figure 37: Distribution of AR_{20} Results (2019)

Figure 38 shows the distribution of AR_{20} and AR_{50} values based on the percentage of California households that are located within service territories that have an AR value of a given range. For AR_{20}, it shows that majority of the households have an AR_{20} below 15 percent, with nearly all households falling below 10 percent. It is the housing units served by the remaining providers that are of greatest concern, who may be spending two to four times as much of their household budget on essential water service compared to the rest of the distribution. As AR_{50} measures affordability for households with higher incomes, the water AR_{50} values are all under 5 percent, indicating that affordability of essential water service is a much greater concern for lower-income customers compared to median-income customers.

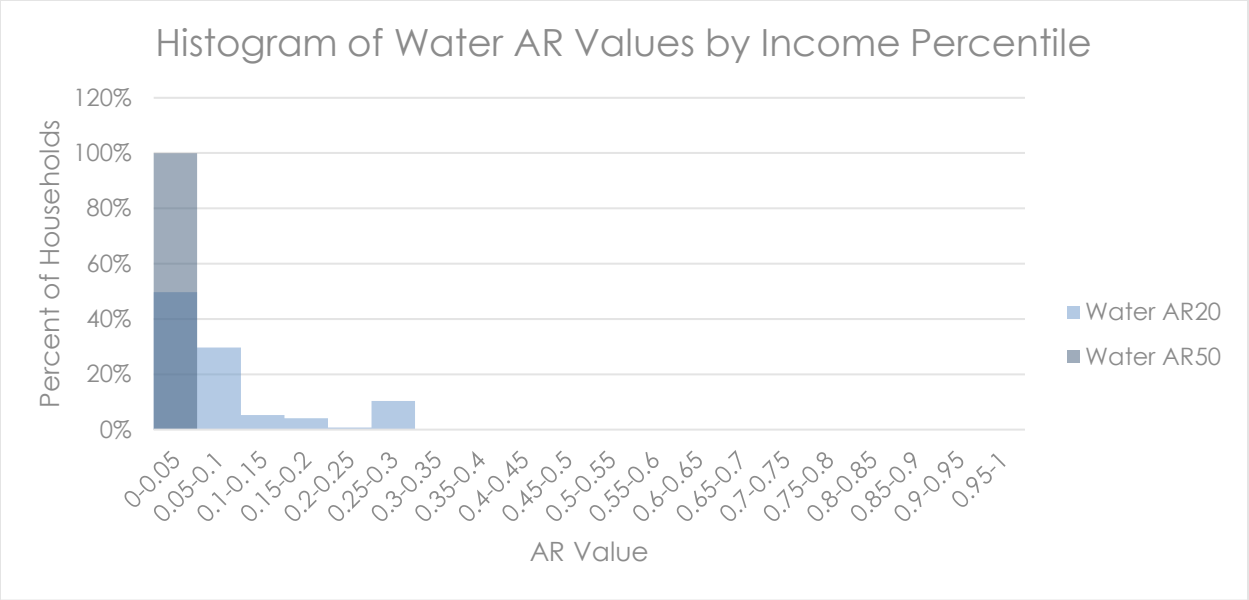

Figure 38: Water Histogram of AR Values by Income Percentile

Table 8 below lists the CPUC regulated utilities with the highest AR_{20} values in 2019.

Name	AR_{20}	20th Percentile Income (Annual)	Predicted Housing Cost (Annual)
Del Oro Water Company - Buzztail Dist.	17.98%	$18,372.86	$10,013.74
North Gualala Water Company	17.51%	$18,849.16	$8,039.94
Pinon Valley Water Company	16.16%	$20,757.02	$7,870.83
Del Oro Water Company - Strawberry Div.	14.63%	$25,589.47	$8,895.80
Point Arena Water Works	14.50%	$18,848.27	$8,039.59
Del Oro California Pines District	14.25%	$17,523.85	$7,017.38
Sea Ranch Water Company	14.16%	$35,775.57	$14,620.50
Liberty Utilities – Compton	14.15%	$21,540.50	$12,584.93
Havasu Water Company	14.02%	$18,103.09	$6,852.80
Liberty Utilities – Lynwood	13.04%	$22,350.86	$12,719.58

Table 8: Highest Water AR_{20}

Table 9 below lists the CPUC regulated utilities with the lowest AR_{20} values in 2019.

Name	AR_{20}	20th Percentile Income (Annual)	Predicted Housing Cost (Annual)
California Water Service - San Mateo	1.29%	$53,645.78	$22,695.78
Great Oaks Water Company	1.39%	$54,924.21	$21,256.06
California Water Service - Livermore	1.48%	$60,498.72	$22,233.74
California American Water - Thousand Oaks	1.65%	$46,934.95	$19,929.81
Llano Del Rio Water Company	1.69%	$37,930.68	$15,272.73
California Water Service - Lucerne	1.72%	$44,160.63	$19,895.66
California Water Service - Hermosa Redondo	1.81%	$53,082.46	$22,457.93
Golden State Water Company - Arden-Cordova	2.02%	$29,598.09	$11,435.44
California Water Service - Visalia	2.03%	$23,862.00	$9,458.69
Rolling Green Utilities, Inc.	2.05%	$25,589.47	$8,895.80

Table 9: Lowest Water AR_{20}

Table 10 below lists the CPUC regulated utilities with the highest AR_{50} values in 2019.

Name	AR_{50}	50th Percentile Income (Annual)	Predicted Housing Cost (Annual)
Pinon Valley Water Company	4.71%	$49,983.80	$7,870.83
Del Oro Water Company - Strawberry Div.	4.67%	$57,576.04	$8,895.80
Sea Ranch Water Company	4.37%	$83,187.91	$14,620.50
Del Oro Water Company - California Pines District	4.35%	$39,634.81	$7,017.38
Lake Alpine Water Company	4.29%	$57,576.04	$8,895.80
North Gualala Water Company	4.25%	$47,953.73	$8,039.94
Havasu Water Company	3.81%	$42,756.00	$6,852.80
Susan River Park Water Co.	3.66%	$49,740.50	$6,464.07
Point Arena Water Works	3.39%	$47,951.87	$8,039.59
R.R. Lewis Small W.C.	3.17%	$64,621.62	$11,657.99

Table 10: Highest Water AR_{50}

Table 11 below lists the CPUC regulated utilities with the lowest AR_{50} values in 2019.

Name	AR_{50}	50th Percentile Income (Annual)	Predicted Housing Cost (Annual)
California Water Service - San Mateo	0.37%	$129,419.75	$22,695.78
Great Oaks Water Company	0.43%	$128,359.31	$21,256.06
California Water Service - Lucerne	0.47%	$108,821.34	$19,895.66
Llano Del Rio Water Company	0.50%	$92,868.07	$15,272.73
California American Water - Thousand Oaks	0.50%	$108,144.19	$19,929.81
California Water Service - Livermore	0.50%	$136,412.00	$22,233.74
California Water Service - Los Altos	0.54%	$153,542.85	$24,570.54
California Water Service - Visalia	0.54%	$58,966.86	$9,458.69
California Water Service - Hermosa Redondo	0.57%	$121,120.22	$22,457.93
West San Martin Water Works Inc	0.57%	$107,048.81	$18,202.54

Table 11: Lowest Water AR_{50}

2018-2019 Change in AR

One of the goals in developing the affordability framework is the development of a time series to track trends in affordability over time using a common language. For water, these comparisons must be made with some caution: due to a difference in data sources, the data used for 2018 is based on end-of-year information, while 2019 data is a yearly average. With the development of a water cost and rate tracking tool expected in this proceeding's second phase, a standardized reporting template will make yearly comparisons more accurate and reliable going forward.

Increases in AR included here are limited mostly to the Commission's Class A utilities: The Class As are on a regular rate case schedule with intervening escalation year increases, and thus experience rate changes on a more consistent basis than the smaller utilities. Temporal comparisons of AR will become more useful as a longer time series is developed and more rate changes among the smaller systems are observed, but it is still useful to consider the relative changes in affordability over a shorter window.

Some of the systems experiencing the largest AR_{20} increases already have some of the highest AR_{20} values, especially those in the 20^{th} percentile income level. Generally, these systems have high ARs due to low household incomes, so that a small increase in rates has an outsize impact on disposable income. That said, even among the AR_{20} values, most of the changes in affordability are fairly minimal, with around 90 percent of Commission-regulated water providers experiencing a change of 2 percent or less in either direction, as shown in Figure 39.

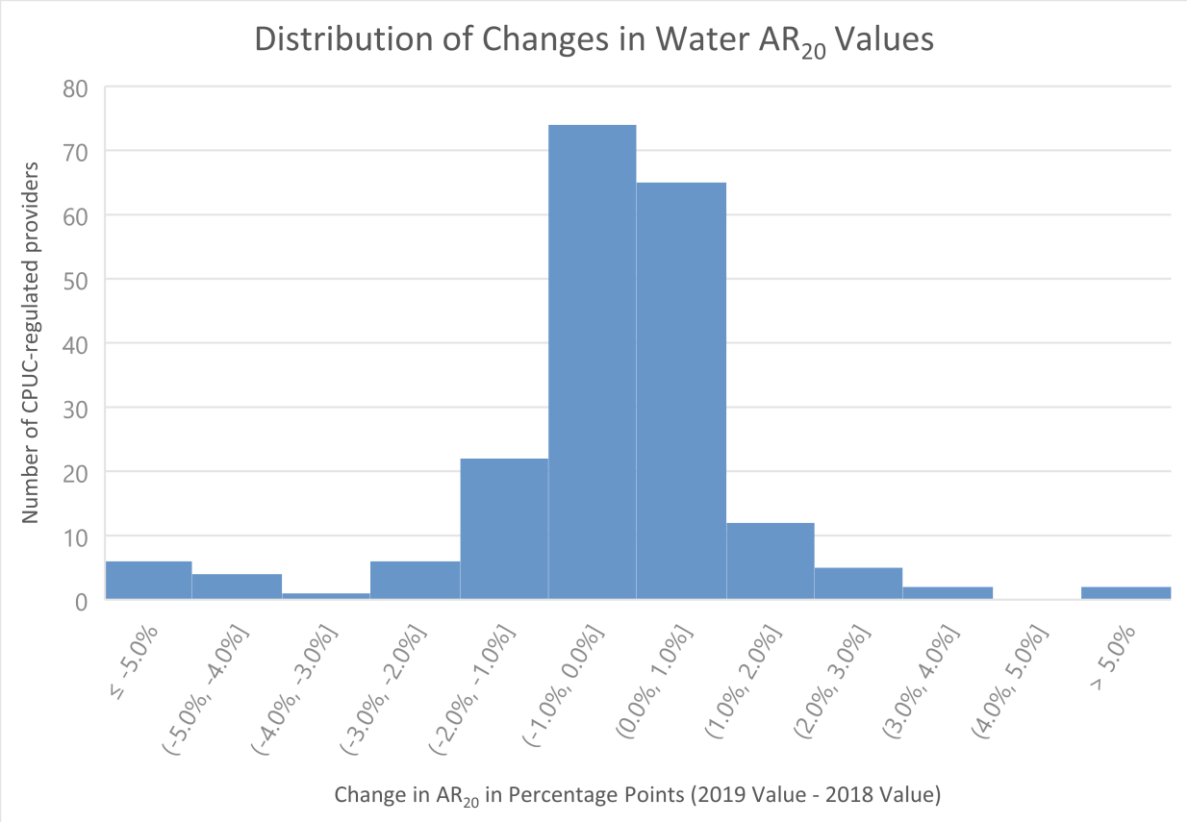

Figure 39: Distribution of Changes in Water AR_{20} Values

The maps in Figure 40 and Figure 41 depict the changes in AR_{20} between 2018 and 2019 change in AR_{20} value on a scale from -100 percent to 100 percent, defined here as the 2019 value minus the 2018 value (a positive value indicates an increase in affordability ratio while a negative value indicates a decrease). As with the maps for the 2019 AR values, the maps below focus on a few key areas of interest.[60]

[60] A more complete interactive map can be found at https://www.cpuc.ca.gov/delta-2019/.

Figure 40: Change in Water AR_{20} Value Between 2018 and 2019 (2019 Value Minus 2018 Value) – Northern California

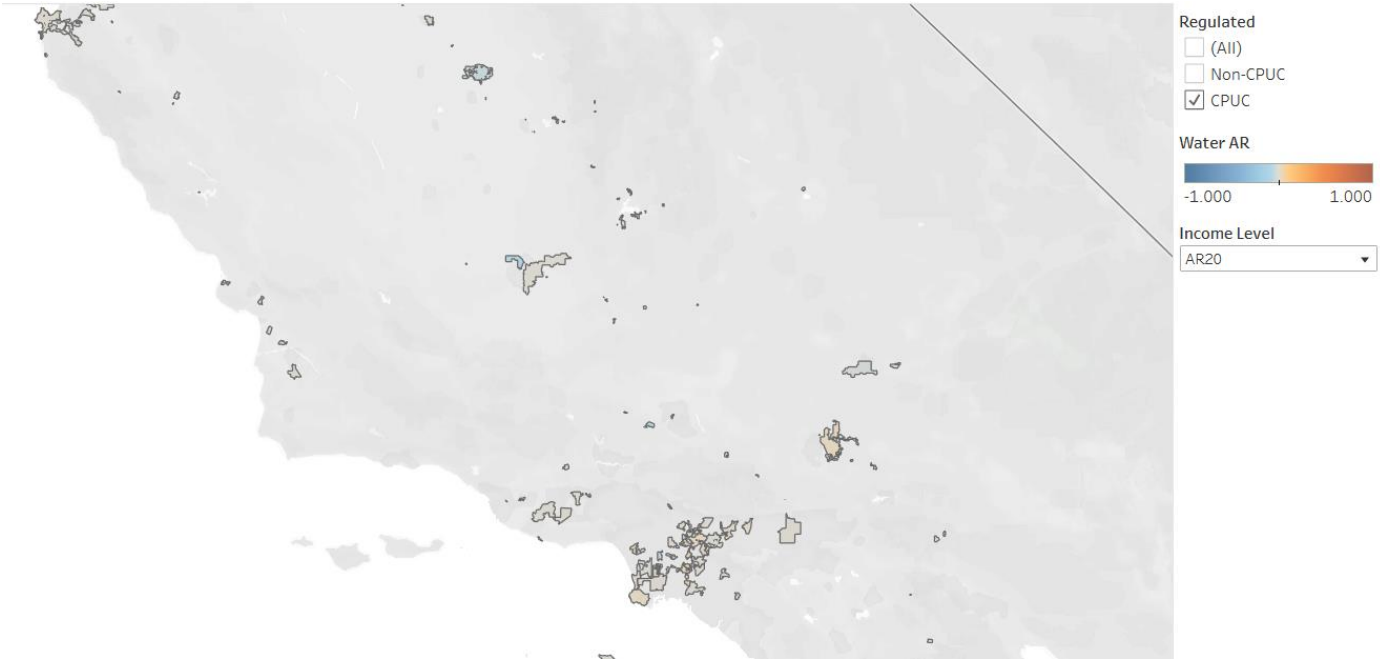

Figure 41: Change in Water AR_{20} Value Between 2018 and 2019 – Southern California

Table 12 shows the 10 CPUC regulated water utilities that saw the biggest decrease in AR_{20} between 2018 and 2019, meaning that these areas became more affordable. As above, since AR_{20} is given as a percentage, the changes in the AR_{20} values themselves are represented in percentage points rather than the percent changes in AR_{20} values.

PWSID	Name	AR_{20} Change
CA1910010	California Water Service Co. - Lancaster	-54.5
CA1500374	California Water Service Co. - Grand Oaks Water System	-12.9
CA1500333	California Water Service Co. - Fremont Valley	-12.4
CA1510055	California Water Service Co. - North Garden	-7.8
CA1910077	Golden State Water Company - Florence/Graham	-6.4
CA1910243	California Water Service Co. - Leona Valley	-6.2
CA3410045	California American Water - Arden	-4.8
CA2701257	California American Water - Garrapata	-4.1
CA5410016	California Water Service Co. - Visalia	-4.1
CA1910223	Golden State Water Company - South San Gabriel	-4.0

Table 12: Water AR_{20} Decrease from 2018 to 2019 (Negative Value Indicates Service Has Become More Affordable)

Table 13 shows the 10 CPUC regulated water utilities with the largest increase in AR_{20} between 2018 and 2019, meaning that these areas became less affordable.

PWSID	Name	AR_{20} Change
CA1500407	California Water Service Co. - Split Mountain Water System	5.5
CA1910004	Golden State Water Company - Artesia	4.3
CA1910098	Golden State Water Company - Norwalk	3.5
CA1910021	Liberty Utilities - Compton	2.8
CA1910161	Liberty Utilities - Lynwood	2.7
CA1910030	Golden State Water Company - Culver City	2.3
CA3600010	Liberty Utilities Apple Valley	2.3
CA1910211	Liberty Utilities - Bellflower-Norwalk	2.2
CA3610003	Liberty Utilities (Apple Valley Ranchos) Corp.	2.2
CA3110150	California American Water - West Placer	2.0

Table 13: Water AR_{20} Increase from 2018 to 2019 (Positive Value Indicates Service Has Become Less Affordable)

Hours at Minimum Wage

The maps in Figure 42 and Figure 43 depict the results of the HM for 2019 split between Northern California and Southern California for easier visibility. The transition from Northern California to Southern California is split using Monterey as the geographic border.[61]

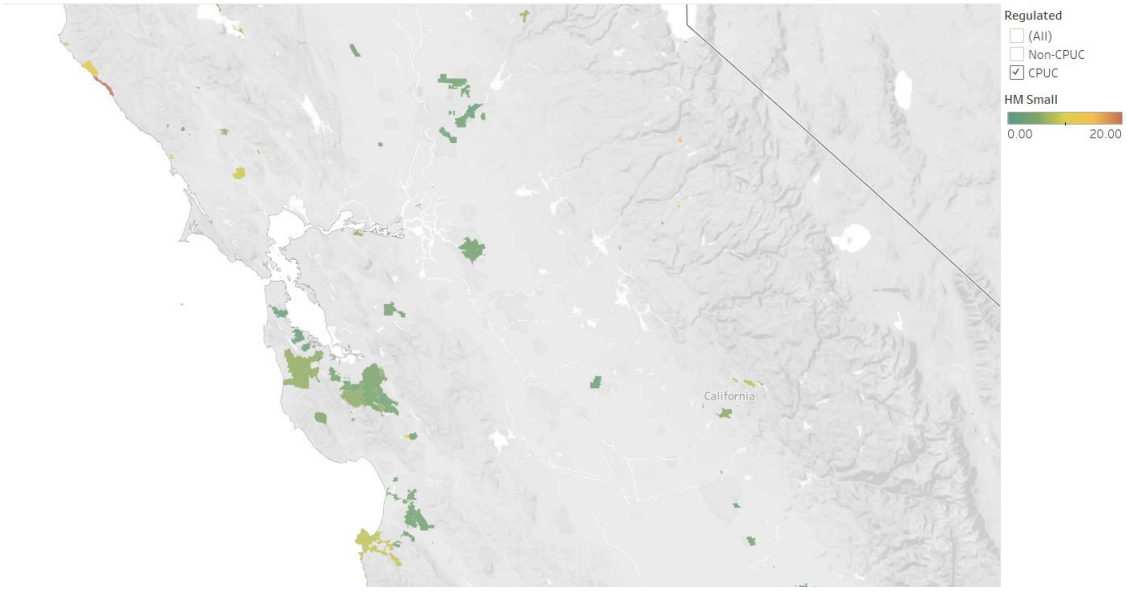

Figure 42: Water HM Northern California (2019)

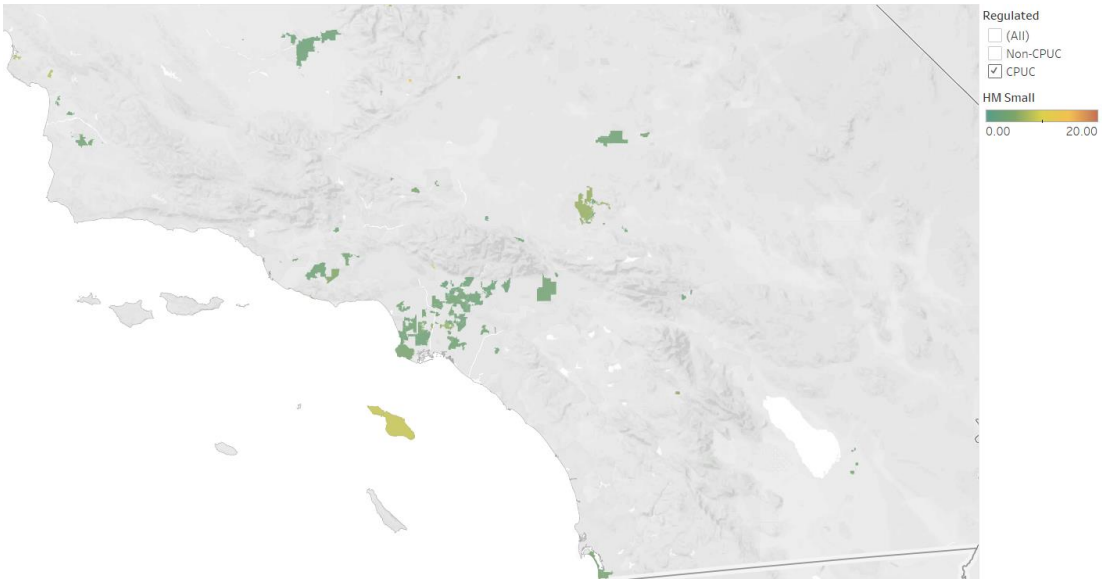

Figure 43: Water HM Southern California (2019)

[61] These maps can be found in interactive form at https://www.cpuc.ca.gov/hm-2019/.

Table 14 indicates the areas that have the highest HM values for 2019.

PWSID	Name	HM
CA4910007	The Sea Ranch Water Company	20.83
CA5510007	Del Oro Water Company - Strawberry Div.	15.30
CA0210001	Lake Alpine Water Company	14.38
CA1500540	Pinon Valley Water Company	13.82
CA4300575	Twin Valley Inc	11.42
CA2310007	North Gualala Water Company	11.42
CA4600017	R.R. Lewis Small W.C.	11.36
CA1800503	Susan River Park Water Co.	10.44
CA2701257	California American Water - Garrapata	10.12
CA5510011	Cold Springs Water Co	9.69

Table 14: Water Highest HM (2019)

Table 15 indicates the areas that have the lowest HM values for 2019.

PWSID	Name	HM
CA5400935	California Water Service Co. - Visalia	1.84
CA1010001	Bakman Water Company	1.91
CA4110008	California Water Service - San Mateo	2.03
CA3410003	Golden State - Arden-Cordova	2.11
CA1400010	Pierpoint Springs Water Co.	2.14
CA1900849	Rolling Green Utilities, Inc.	2.15
CA1900849	Llano Del Rio Water Company	2.21
CA1710005	California Water Service Co. - Redwood Valley	2.22
CA1100404	Del Oro Water Company - Black Butte District	2.22
CA5200560	Mira Monte Water Co.	2.27

Table 15: Water Lowest HM (2019)

AR/SEVI - Top 10 Percent and 20 Percent Areas

A combined analysis of AR and SEVI can help to pinpoint areas where communities are particularly vulnerable to high rates and where affordability is already concerning based on current conditions. That is, areas with high AR values and high SEVI values are generally less affordable than areas which have a high value in only one of the two metrics. The maps in Figure 44 and Figure 45 indicate the areas that have an AR_{20} in the top 20 percent and 10 percent as well as a high SEVI value in the top 20 percent.[62] Each number indicates the Census Bureau GEOID of each census tract.[63]

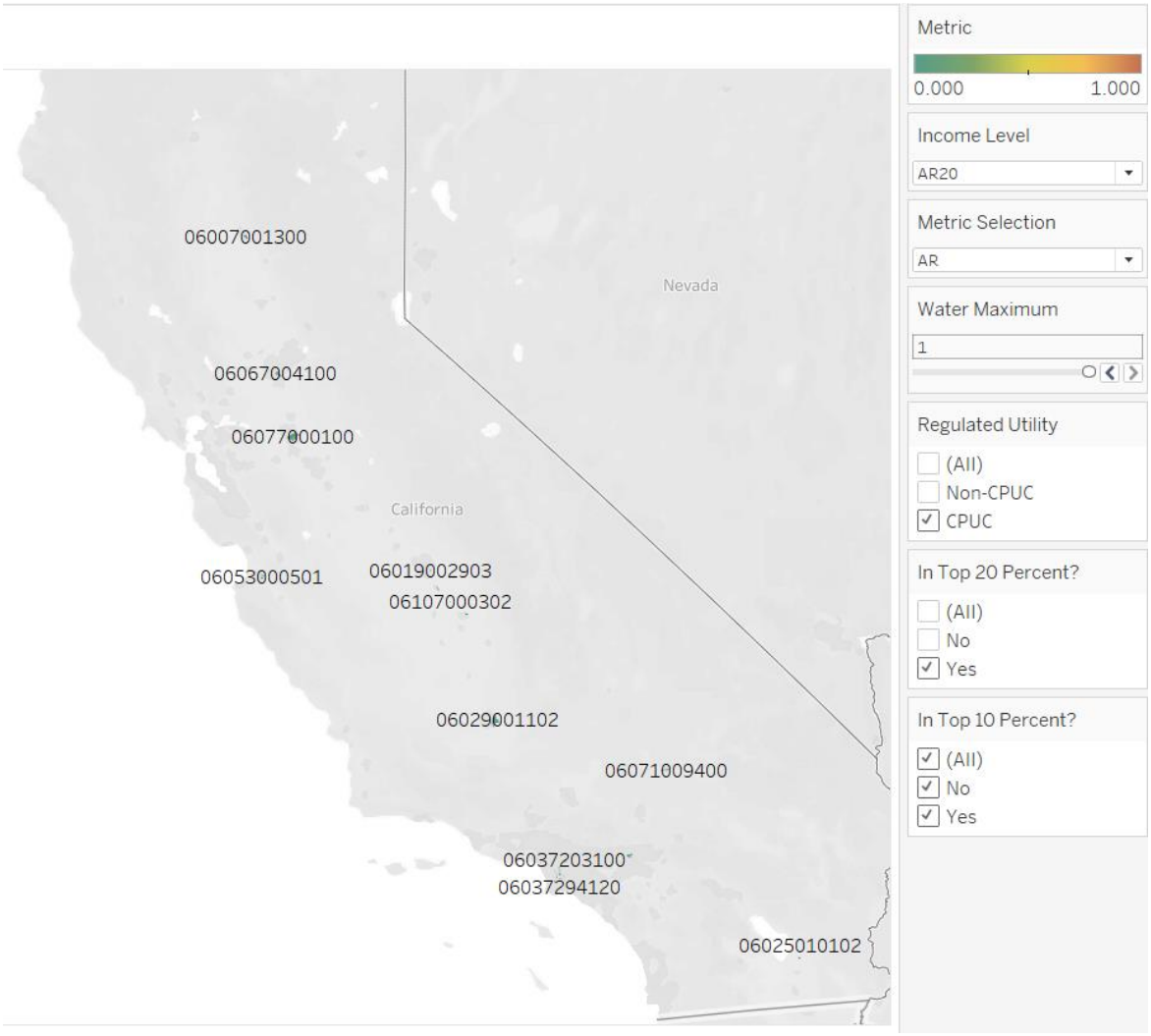

Figure 44: Census Tracts with Top 20 Percent of Water AR_{20} and SEVI Values

[62] These maps can be found in interactive form at https://www.cpuc.ca.gov/AR-SEVI-2019/.

[63] For more information about GEOIDs, please refer to https://www.census.gov/programs-surveys/geography/guidance/geo-identifiers.html.

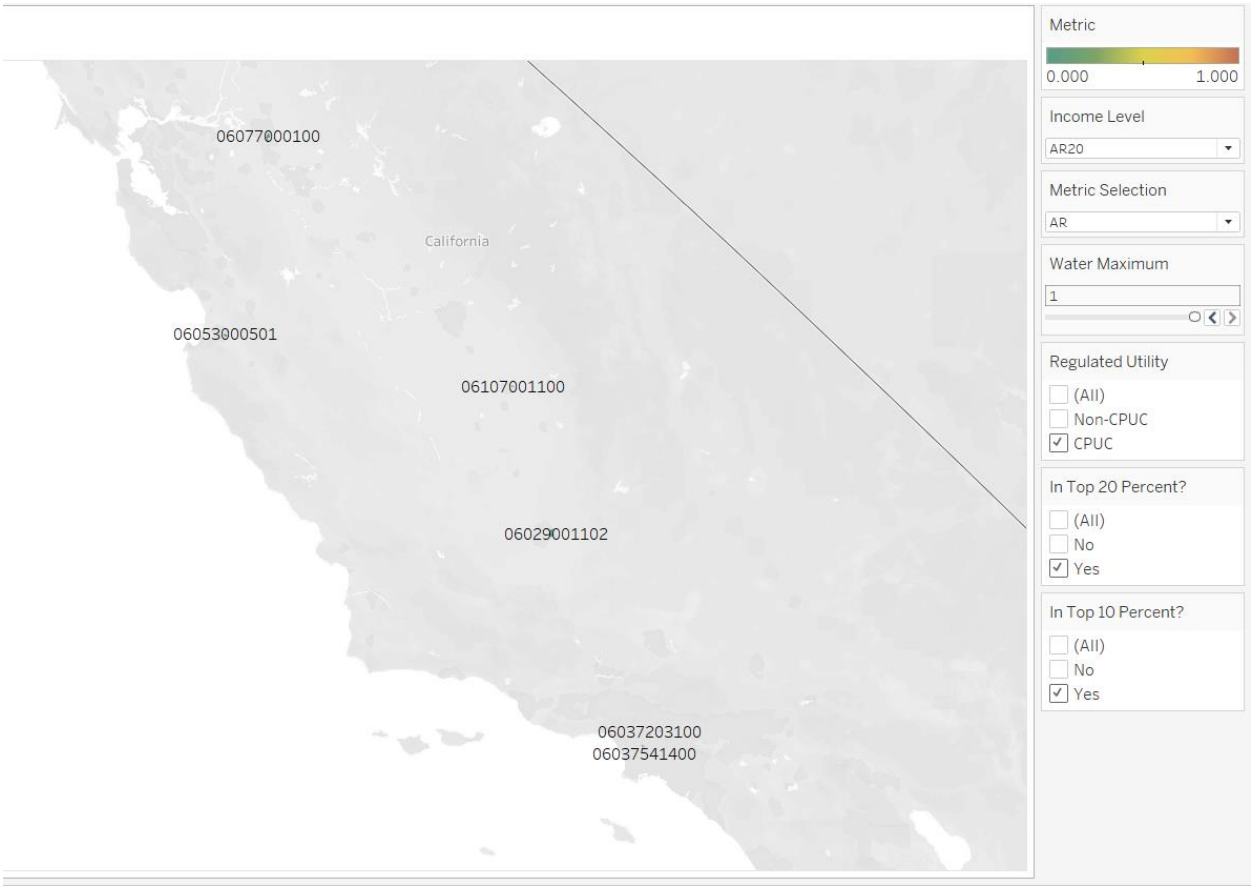

Figure 45: Census Tracts with Top 10 Percent of Water AR_{20} and SEVI Values

For more information, tables for the water utilities and tracts in the top 10 percent and 20 percent can be found in the supplemental appendix.[64]

Water Affordability Conclusions

Affordability problems are greatest in two distinct groups of water systems. The first group of systems, containing small utilities as well as some of the Class As, is characterized by high ARs and high SEVI values. These systems tend to have incomes that are well below the state average for each income percentile, so that even a comparatively small essential service charge takes up a disproportionate amount of the household's budget. These systems vary geographically with

[64] The list of census tracts is too long to include in this report. Instead, a spreadsheet with the list of census tracts is available on the Affordability Report website located here: https://www.cpuc.ca.gov/2019-Annual-Affordability-Report/

income: these systems are located in low-income parts of urban areas, as well as throughout the Central Valley.

Systems in the second group tend to have high essential service charges, leading to both high AR scores and high HM values. These systems tend to have relatively high AR_{50} scores despite incomes comparable to the statewide median, emphasizing the impact of high essential service charges even for the average ratepayer. As many of these small systems are located in rural areas, essential service charges will be high due to high costs of providing service and a small customer base over which to spread those costs.

For water, as with the other industries, affordability concerns are most pronounced for a small portion of systems: these systems tend to fall within both of the aforementioned groups. Of the top 10 systems with the highest HM, four are also in the list of systems with the top 10 AR_{20}, and seven are in the list of top ten AR_{50}. That is, the systems with the greatest affordability concerns are burdened by both a high essential service charge and a low ability to pay it.

Communications

This section covers the affordability of essential communications utility service, which includes fixed broadband service of 25/3 and basic residential telephone service.

Affordability Ratio

Unlike electric, gas, and water service providers, communications service providers do not have exclusive service areas. As such, staff adopts the following steps to derive the communications essential service charges to calculate AR values.

For this report, staff considered only the ILECs' service areas and their basic service as reported in their annual tariff filings for voice services. For broadband services, however, staff collected the most recent rates and shapefiles from the CPUC-issued annual data request to over 150 California broadband service providers. For future reports, staff will continue this methodology of data collection. As a result, staff anticipates the composition of communications service providers and their respective service areas being considered in the AR calculation will vary over time.

The ongoing variations in service provider-service area compositions make it impossible to analyze the AR metric across consistent geographies. To mitigate this, staff computed PUMA-based weighted average AR values and designated an AR value for each PUMA geography.

For broadband service, all 265 PUMAs in California have services provided by two or more service providers. To calculate a PUMA-based AR value, a separate weighting factor is applied to each service provider-service area composition using the methodology detailed in the *Aggregation* section of the Revised Staff Proposal,[65] which is adopted by D.20-07-032. Based on that methodology, the weighting factor considers the following: 1) If a service provider offers services for the entire census block, then the weighting considers the entire population of housing units in that block. 2) If a service provider offers services for only part of a census block, then the weighting considers a proportionally sized number of housing units in that block.

PUMA-Based AR_{20}

Figure 46 depicts the PUMA-based AR_{20} values for communications. Once again, the color scale has been set to be consistent with the bundled AR maps (0 percent = green, 35 percent and higher = red) to allow for easy comparison of AR results across industries.[66]

[65] Affordability Metrics Framework Staff Proposal R.18-07-006 (January 24, 2020) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M325/K620/325620620.PDF

[66] This map can be found in interactive form at https://www.cpuc.ca.gov/ar-2019/.

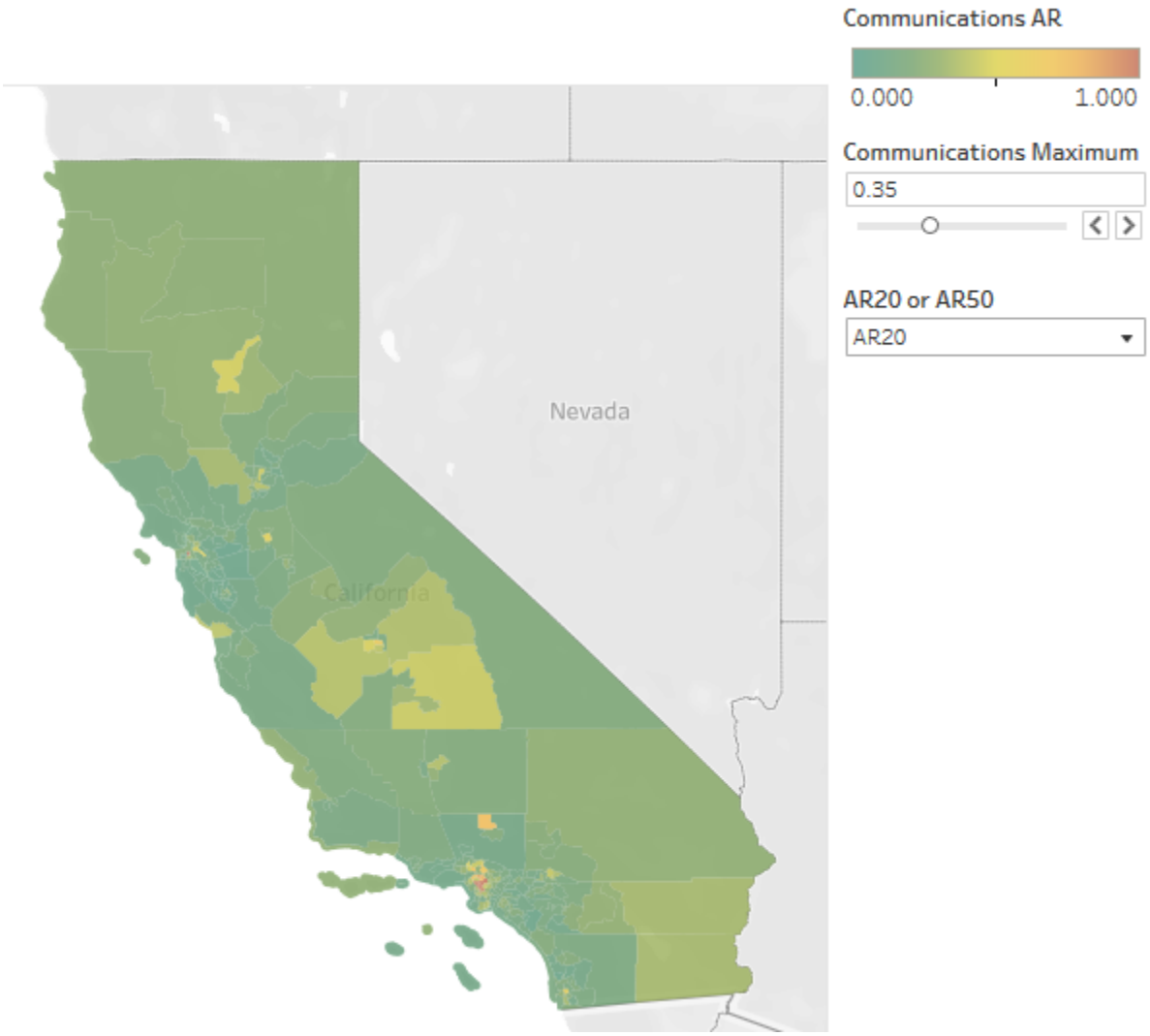

Figure 46: Communications PUMA-based AR_{20} (2019)

While the map appears to be primarily on either the green or yellow scale, there are slivers of red that represent seven PUMAs where households with income in the 20th percentile need to spend more than 35 percent of their income minus housing and other essential utilities for essential communications services. All seven PUMAs are located in urban areas, with the top six in Los Angeles County. Table 16 provides the PUMA geography details, along with their AR_{20} values, annual income, and predicted monthly housing costs for these seven PUMAs. Similar to the patterns observed in other industries, these seven PUMAs have extremely low 20th percentile income values ranging from $11,746/year to $17,986/year, which is roughly half of the statewide average of $32,029/year.

In fact, five of these seven PUMAs, all located within Los Angeles County, have AR_{20} values greater than 98 percent, an indication that affording essential communications services is virtually

impossible. Households at the 20th percentile income level in these PUMAs must subscribe to communications service below essential levels in order to make ends meet.

PUMA	County/City	AR_{20}	20th Percentile Income (Annual)	Predicted Housing $Cost_{20}$ (Annual)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park) PUMA	100.0%	$11,746	$13,533
03751	Los Angeles County (South Central)--LA City (South Central/Watts) PUMA	100.0%	$14,245	$11,850
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills) PUMA	99.9%	$15,270	$12,257
03750	Los Angeles County (South Central)--LA City (South Central/Westmont) PUMA	99.9%	$14,223	$11,728
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights) PUMA	98.5%	$12,517	$10,179
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon) PUMA	49.3%	$16,164	$11,493
07503	San Francisco County (Central)--South of Market & Potrero PUMA	42.8%	$17,986	$13,081

Table 16: Seven Highest Communications PUMA-based AR_{20} (2019)

Figure 47 depicts the overall distribution of AR_{20} across all PUMAs, starting with the highest AR_{20} to the lowest. As the graph indicates, the seven PUMAs referenced previously appear to have significantly higher AR_{20} values than the rest of the state, with values greater than 40 percent. Excluding these seven PUMAs, majority of the remaining 258 PUMAs have communications AR_{20} values below an inflection point at around 15 percent.

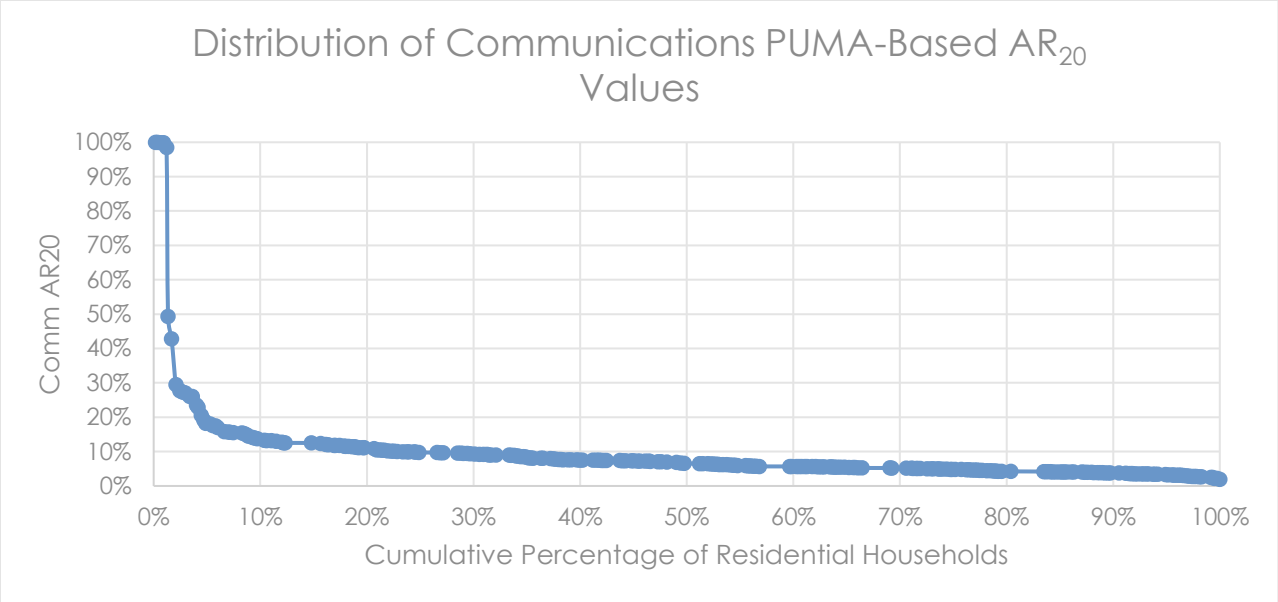

Figure 47: Distribution of Communications AR_{20} by PUMA (2019)

PUMA-Based AR_{50}

Figure 48 depicts a map of the PUMA-based AR_{50} values for communications. The color scale has been set to be consistent with the bundled AR maps (0 percent = green, 35 percent and higher = red) to allow for easy comparison of AR results across industries. In this map, not a single PUMA is depicted in red. In fact, all PUMAs have different shades of green. This indicates that for households with income in the 50th percentile, none of them need to spend a significant portion of their income minus housing and other essential utilities for essential communications services.

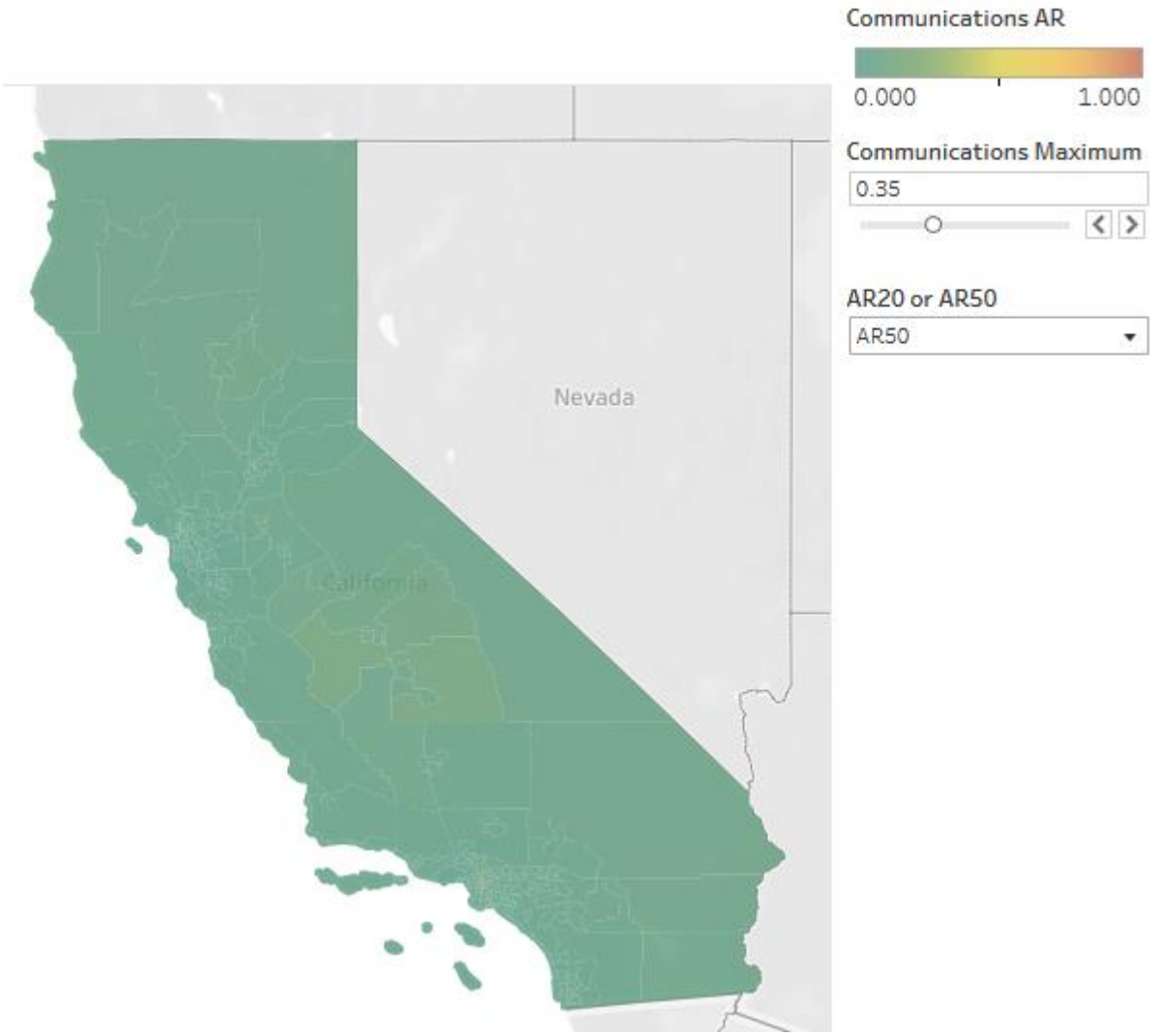

Figure 48: Communications PUMA-based AR_{50} (2019)

AR_{20} vs. AR_{50} – A Comparative View

To illustrate the relationship between AR_{20} and AR_{50} values for essential communications services, staff examined both sets of AR values together. In the histogram in Figure 49, lighter blue represents PUMA-based communications AR_{20} values and darker blue represents PUMA-based communications AR_{50} values. It is quite evident that the majority of households in the 50th percentile income level in California can afford essential communications services. However, for households in the 20th percentile income level, affordability of communications services varies substantially throughout the state, with some households experiencing extremely unaffordable outcomes.

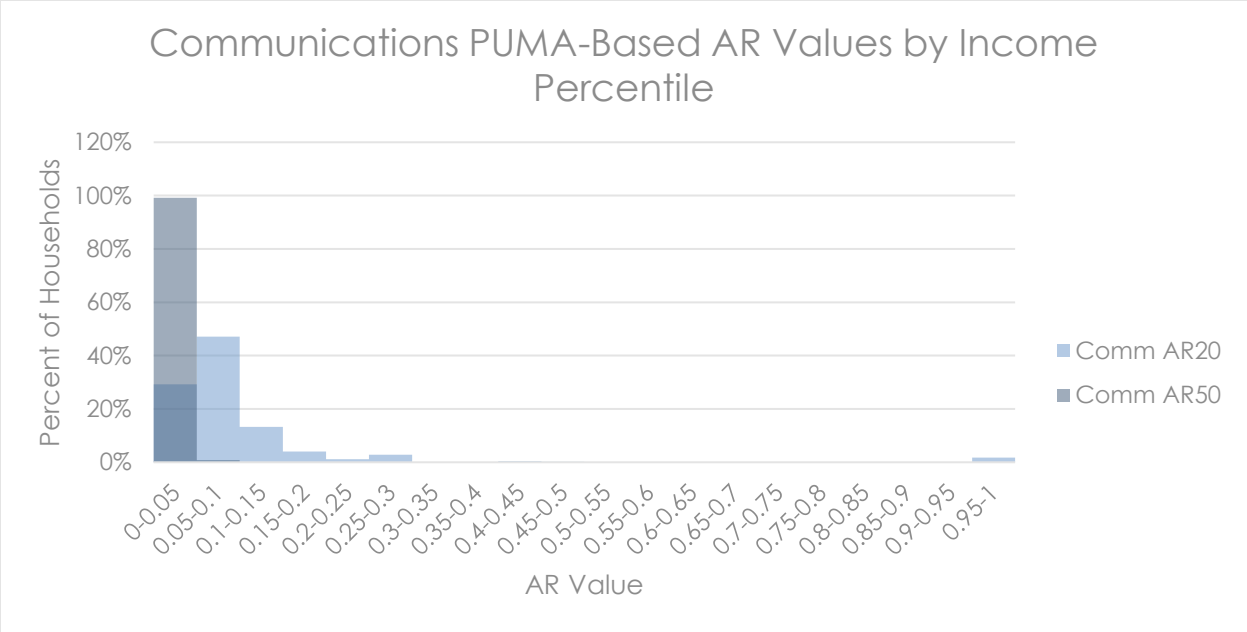

Figure 49: Histogram of Communications PUMA-based AR Values by Income Percentile (2019)

Ranking PUMAs

In this section, the least affordable PUMAs based on both AR_{20} and AR_{50} values are identified to better understand where they are, and how severe their affordability issues are.

Top 5 Percent Least Affordable PUMA-Based AR_{20}

Table 17 lists the 13 least affordable PUMAs with AR_{20} values in the 95th percentile and higher. Similar to the analysis in the previous subsection, the majority of the PUMAs on this list are located in urban areas.

There are several interesting observations here. For of all, the 13 least affordable PUMAs are all located in urban areas like Los Angeles county and San Francisco county. Looking at each of these PUMA's corresponding AR_{50} values, there is not a strong positive correlation. Just because a PUMA has a high AR_{20} value, it does not mean it also has a high AR_{50} value. In fact, some of these PUMAs have AR_{50} values as low as 1.6 and 1.7 percent, which represents the 41st and 46th percentile among AR_{50} results respectively.

PUMA	County/City	AR_{20}	20th Percentile Income (Annual)	Predicted Housing $Cost_{20}$ (Annual)	AR_{50}	50th Percentile Income (Annual)	Predicted Housing $Cost_{50}$ (Annual)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park) PUMA	100.0%	$11,746	$13,533	5.8%	$33,266	$14,511
03751	Los Angeles County (South Central)--LA City (South Central/Watts) PUMA	100.0%	$14,245	$11,850	4.8%	$35,569	$13,344
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills) PUMA	99.9%	$15,270	$12,257	3.6%	$43,715	$15,378
03750	Los Angeles County (South Central)--LA City (South Central/Westmont) PUMA	99.9%	$14,223	$11,728	3.8%	$40,927	$13,579
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights) PUMA	98.5%	$12,517	$10,179	4.1%	$39,451	$14,438
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon) PUMA	49.3%	$16,164	$11,493	4.7%	$35,465	$12,831
07503	San Francisco County (Central)--South of Market & Potrero PUMA	42.8%	$17,986	$13,081	1.6%	$79,740	$20,974
03732	Los Angeles County (Central)--LA City (East Central/Hollywood) PUMA	29.5%	$18,848	$12,991	3.0%	$50,620	$17,146
03734	Los Angeles County--LA City (East Central/Silver Lake, Echo Park & Westlake) PUMA	27.7%	$17,524	$11,415	3.3%	$45,896	$15,234
03733	Los Angeles County (Central)--LA City (Central/Koreatown) PUMA	27.3%	$19,192	$13,035	4.2%	$39,639	$14,760
03703	Los Angeles County (North Central)--Lancaster City PUMA	26.8%	$16,207	$11,263	2.4%	$51,724	$13,447
03731	Los Angeles County (Central)--West Hollywood & Beverly Hills Cities PUMA	26.0%	$26,655	$20,306	1.7%	$81,853	$24,292
03721	Los Angeles County (North)--LA City (Northeast/North Hollywood & Valley Village) PUMA	26.0%	$20,360	$14,091	2.8%	$52,459	$17,153

Table 17: 95th Percentile Communications PUMA-based AR_{20} (2019)

Top 5 Percent Least Affordable PUMA-Based AR_{50}

Table 18 examines the 13 least affordable PUMAs with AR_{50} values in the 95th percentile and higher, along with their corresponding AR_{20} values. In contrast to the PUMAs identified in Table 17, these 13 PUMAS represent a mix of urban and rural areas. Looking at their corresponding AR_{20} values, there is a stronger positive, linear correlation. These PUMAs all have AR_{20} values that are in the 79th percentile and above.

PUMA	County/City	AR_{20}	20th Percentile Income (Annual)	Predicted Housing $Cost_{20}$ (Annual)	AR_{50}	50th Percentile Income (Annual)	Predicted Housing $Cost_{50}$ (Annual)
03746	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park) PUMA	100.0%	$11,746	$13,533	5.8%	$33,266	$14,511
01901	Fresno County (West)--Selma, Kerman & Coalinga Cities PUMA	15.6%	$20,862	$7,611	5.5%	$43,511	$9,239
10703	Tulare County (Outside Visalia, Tulare & Porterville Cities) PUMA	17.6%	$17,524	$7,017	5.3%	$39,635	$8,790
03751	Los Angeles County (South Central)--LA City (South Central/Watts) PUMA	100.0%	$14,245	$11,850	4.8%	$35,569	$13,344
03745	Los Angeles County (Central)--LA City (Southeast/East Vernon) PUMA	49.3%	$16,164	$11,493	4.7%	$35,465	$12,831
01907	Fresno County (East)--Sanger, Reedley & Parlier Cities PUMA	13.9%	$22,396	$8,221	4.4%	$51,724	$10,837
03733	Los Angeles County (Central)--LA City (Central/Koreatown) PUMA	27.3%	$19,192	$13,035	4.2%	$39,639	$14,760
03744	Los Angeles County (Central)--LA City (East Central/Central City & Boyle Heights) PUMA	98.5%	$12,517	$10,179	4.1%	$39,451	$14,438
03750	Los Angeles County (South Central)--LA City (South Central/Westmont) PUMA	99.9%	$14,223	$11,728	3.8%	$40,927	$13,579
03900	Madera County--Madera City PUMA	11.2%	$24,432	$8,956	3.7%	$53,851	$10,862
03747	Los Angeles County (Central)--LA City (Central/West Adams & Baldwin Hills) PUMA	99.9%	$15,270	$12,257	3.6%	$43,715	$15,378
01904	Fresno County (Central)--Fresno City (Southwest) PUMA	17.5%	$15,779	$7,868	3.6%	$39,168	$9,394
03742	Los Angeles County (Central)--Huntington Park City, Florence-Graham & Walnut Park PUMA	15.2%	$20,032	$12,351	3.6%	$41,271	$13,473

Table 18: 95th Percentile Communications PUMA-based AR_{50} (2019)

A Detailed PUMA-Based AR_{20} Study

As mentioned above, staff elected to use a PUMA-based approach to review communications AR to better assess and compare results over time. However, this PUMA-based approach may obscure some of the details at a more granular level. For example, staff examined PUMA 11102 – Ventura County (Southeast) – Thousand Oaks City, which has a low PUMA-based AR_{20} value of 3.6 percent, putting it just beneath the 12th percentile among all PUMAs. Table 19 lists all service provider-service area compositions within the PUMA along with their corresponding number of housing units. As the table indicates, majority of the housing units lie in service provider-service area compositions with AR_{20} values between 3.4 percent to 3.8 percent. However, a small number of housing units pay a much higher percent of their disposable income for their essential communications services, as indicated by their AR_{20} values of 16.1 percent and 16.4 percent respectively. These varying AR_{20} values are all derived from the same 20th percentile income and predicted housing cost, which means these two high AR_{20} values are driven entirely from high cost of service.

PUMA	County/City	Housing Units	AR_{20}	20th Percentile Income (Annual)	Predicted Housing $Cost_{20}$ (Annual)
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	12	16.4%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	193	16.1%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	661	4.8%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	2,101	4.4%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	698	3.8%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	7,760	3.7%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	43,816	3.5%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	471	3.5%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	367	3.4%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	84	1.3%	$47,043	$1,666
11102	Ventura County (Southeast)--Thousand Oaks City PUMA	560	1.1%	$47,043	$1,666

Table 19: Communications AR Values for PUMA 11102 – Ventura County (Southeast) Thousand Oaks City (2019)

Hours at Minimum Wage

Hours at minimum wage (HM) presents a perspective of how many hours of labor it takes to afford the monthly cost for essential communications service for those who are making minimum wage. The communications HM ranges broadly from 1.5 hours to 75.2 hours, with the median being 6.3 hours. Similar to findings in the PUMA-based AR_{20} analysis, there are some areas where it is impossible to afford essential communications services, which appears to be results of having essential communications services at unreasonable rates.[67]

Figure 50 depicts the communications HM to afford the monthly cost for essential communications service.[68]

[67] The service provider-service area compositions where HM is greater than 70 hours share the same and only service provider in their respective service areas, where a broadband service of 20 Mbps downstream / 20 Mbps upstream costs $800/month.

[68] This map can be found in interactive form at https://www.cpuc.ca.gov/hm-2019/.

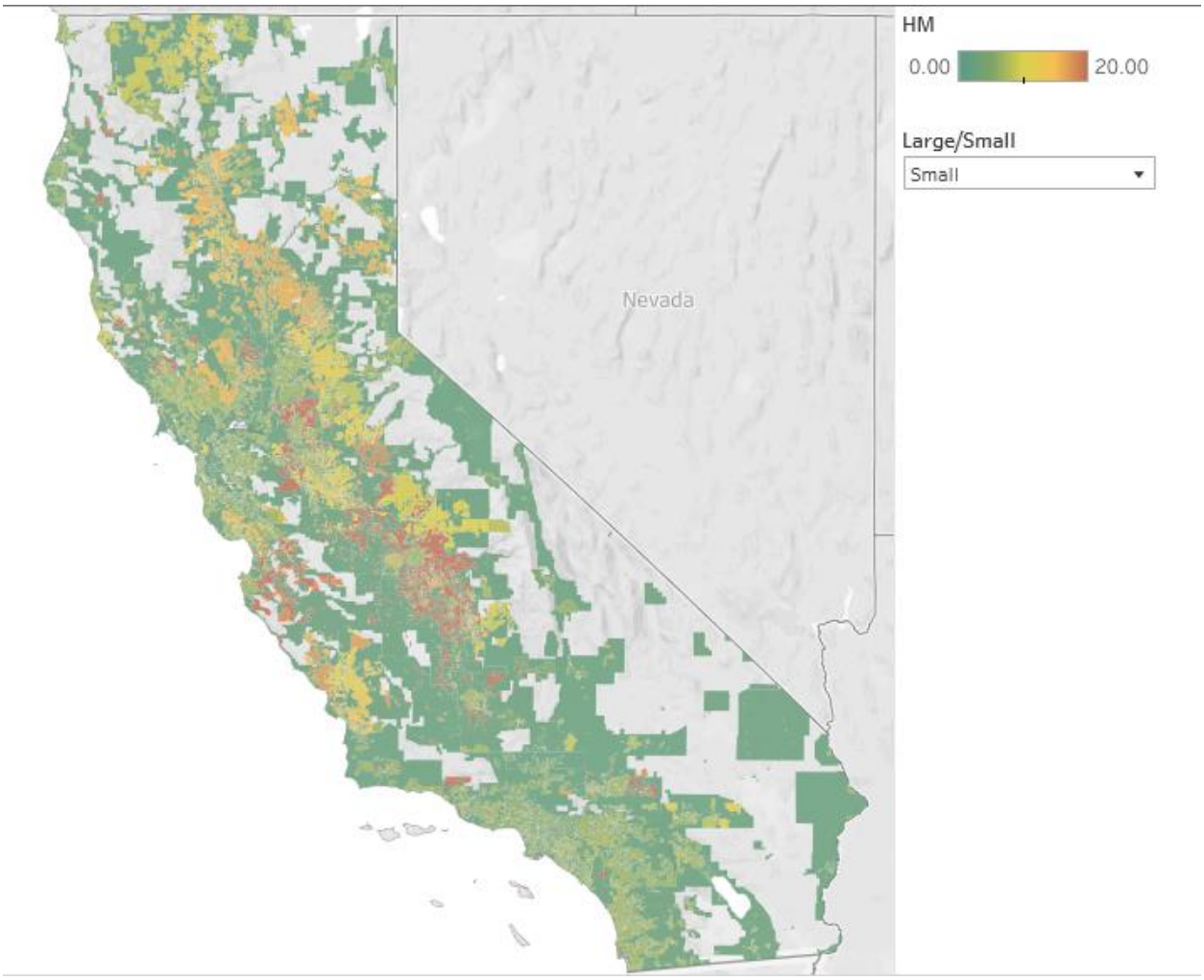

Figure 50: Communications HM Results (2019)

AR/SEVI - Top 10 Percent and 20 Percent Areas

By combining both the AR rankings and SEVI rankings onto the same map, it highlights which geographic areas face the most severe affordability issues.

The two maps in Figure 51 and Figure 52 identify the census tracts with both a SEVI index and communications AR_{20} above the 80th percentile and above the 90th percentile respectively.[69] Every census tract that is shaded in the maps below are either in the top 20 percent or 10 percent least affordable areas based on both SEVI and communications AR_{20} values. Essentially, they represent the areas that need to be prioritized because these low-income communities are facing the most severe affordability issues.

[69] These maps can be found in interactive form at https://www.cpuc.ca.gov/AR-SEVI-2019/.

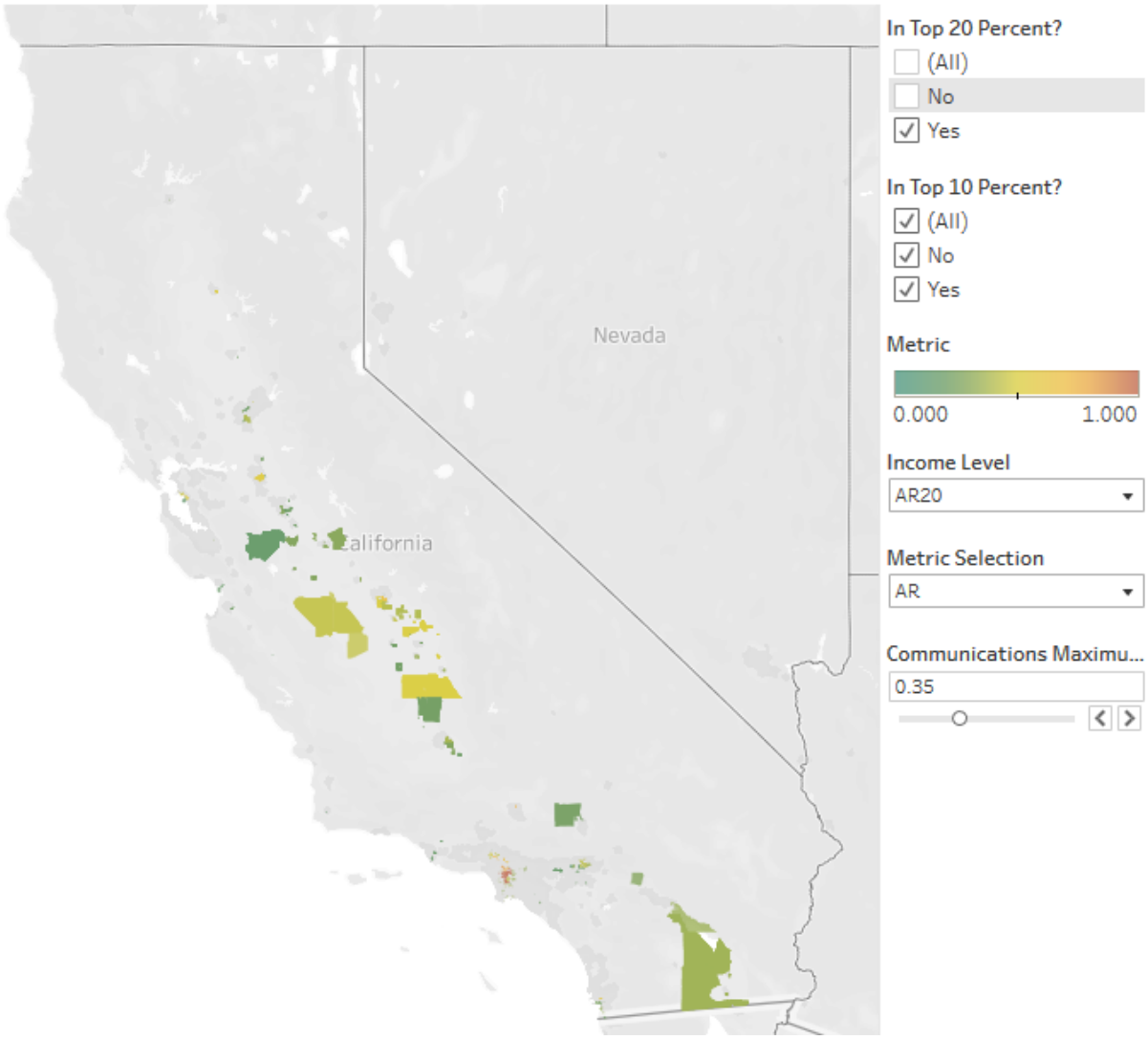

Figure 51: Census Tracts with Top 20 Percent of Communications AR_{20} and SEVI Values (2019)

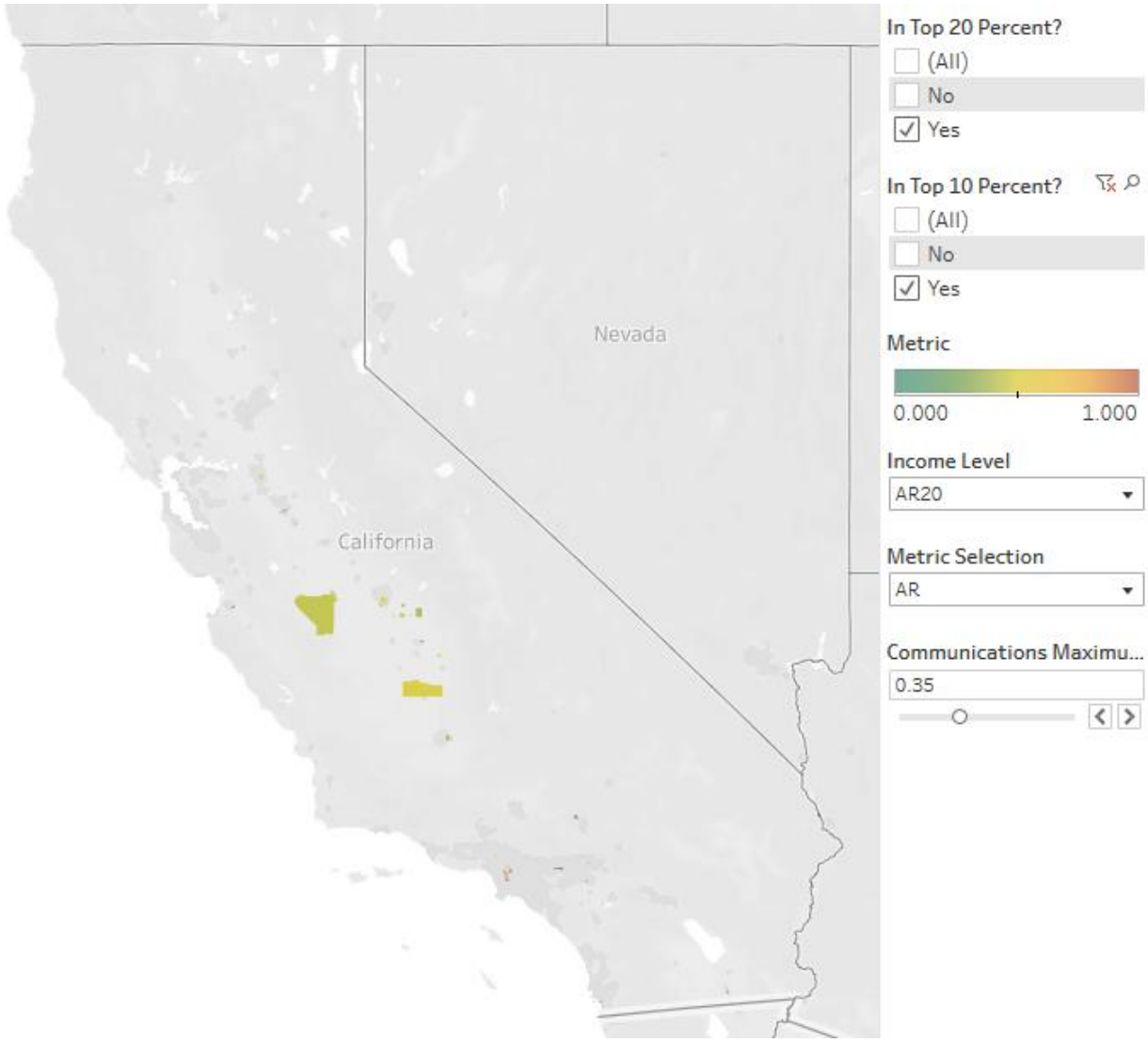

Figure 52: Census Tracts with Top 10 Percent of Communications AR_{20} and SEVI Values (2019)

Communications Affordability Conclusions

Essential communications services, namely the broadband component, present both affordability and accessibility challenges for specific geographic areas. In particular, this report identifies affordability, or a lack thereof, most pronounced in specific geographic areas where income levels are low and the costs of essential broadband services are high.

The AR_{20} analysis highlights PUMAs with AR_{20} values in the 95th percentile or higher, and these PUMAs are all located within Los Angeles and San Francisco counties. The top 20 percent least affordable areas as identified by the AR/SEVI analysis are spread out virtually across the entire state,

including but not limited to areas in Butte, Sacramento, Fresno, Kern, Riverside, and Imperial counties. The HM map, which highlights areas with high HM values spread out across the state, further supports both analyses above.

The results from these different metrics are consistent: affordability challenges are widespread across the state of California. Whether it is urban versus rural or coastal versus inland, affordability challenges can occur in any geography with the combination of low-income and high cost of service. Using these metrics, the Commission can now identify specific geographic areas with significant affordability concerns, and prioritize them in both ongoing and future efforts.

The metrics here show the digital divide[70] is wide in specific areas of the state. Public purpose programs that are designed to provide access to broadband should be evaluated to determine if they also result in affordable rates for the communities they serve. Until there is a geographically-focused solution to address areas with low-income and high cost of service, communities in those areas will continue to be left behind, and the digital divide will continue to widen.

[70] The CPUC is responsible for ensuring consumers have safe, reliable, affordable, and universal access to telecommunications services. The CPUC has oversight responsibilities for several Public Purpose Programs that ensure universal access to telecommunications services. In particular, the California Advanced Services Fund (CASF) provides grants to broadband service providers, public housing, and regional consortia to help provide broadband in underserved areas to bridge the digital divide.

Conclusions

Using the affordability metrics established in D.20-07-032 to evaluate the most recently available socioeconomic and utility cost data, staff has identified the geographic areas with the least affordable utility services. Each of the three metrics provides a unique perspective into utility affordability: 1) AR is used to identify where utility services (either bundled or considered individually) are least affordable for households at a particular point of the income distribution; 2) SEVI index is used to identify communities that will be least able to afford increases in essential service charges; and 3) HM is used to identify where low-income households will have the most difficulty paying for utility services regardless of the socioeconomic condition of their neighbors by focusing on minimum wage earners.

Using these metrics, staff has shown that affordability concerns are most acutely felt by a minority of households in the state located in specific geographic areas. Much of this report is devoted to identifying those specific areas based on the 2019 analysis for individual utility services, as well as for utility services as a bundle. These results will be refreshed on an annual basis and changes in affordability will be tracked over time through subsequent Annual Affordability Reports. This information should be used by the Commission to identify specific communities that should be targeted for further study and consideration. These metrics provide the Commission with the opportunity to have a more granular and geographically-focused approach to address utility service affordability.

In addition to identifying the areas where utility costs are most burdensome for low-income households, this report has identified opportunities for additional research using current and subsequent Annual Affordability Reports. Namely, the Commission should assess whether existing assistance programs are being delivered to the communities that need them most, as determined by the metrics to identify opportunities for improvement. Additionally, the impact of those existing programs should be assessed to see if they are delivering sufficient relief to at-risk households.

Appendix A – List of Electric and Gas Investor-Owned Utilities

CPUC-Jurisdictional Electric Investor-Owned Utilities:

Pacific Gas & Electric

Southern California Edison

San Diego Gas and Electric

PacifiCorp

Bear Valley Electric Service

Liberty CalPeco

CPUC-Jurisdictional Gas Investor-Owned Utilities:

PG&E

SDG&E

Southern California Gas

Southwest Gas

Appendix B – Highest AR/SEVI Census Tracts

The table below shows the census tracts in which bundled AR_{20} and SEVI values are both in the top 10 percent of values.

PUMA	County	Census Tract ID	SEVI Value	SEVI Percentile	Bundled AR_{20}	Bundled AR_{50}	Bundled AR_{20} Percentile	Bundled AR_{50} Percentile
00104	Alameda	408800	90.8	91%	38.9%	8.0%	92%	85%
00104	Alameda	409600	90.6	91%	38.9%	8.0%	92%	85%
01903	Fresno	002800	94.1	94%	49.6%	10.4%	95%	94%
01903	Fresno	002502	97.2	97%	49.6%	10.4%	95%	94%
01903	Fresno	002400	91.8	92%	49.6%	10.4%	95%	94%
01903	Fresno	002501	93.9	94%	49.6%	10.4%	95%	94%
01904	Fresno	002400	91.8	92%	40.8%	10.8%	92%	96%
01904	Fresno	000501	92.0	92%	40.8%	10.8%	92%	96%
01904	Fresno	001000	90.3	90%	40.8%	10.8%	92%	96%
01904	Fresno	000200	90.6	91%	40.8%	10.8%	92%	96%
01904	Fresno	000600	90.4	90%	40.8%	10.8%	92%	96%
03708	Los Angeles	122410	93.0	93%	42.1%	8.3%	93%	87%
03721	Los Angeles	124103	90.1	90%	58.7%	10.4%	96%	94%
03721	Los Angeles	122410	93.0	93%	58.7%	10.4%	96%	94%
03721	Los Angeles	123203	91.1	91%	58.7%	10.4%	96%	94%
03722	Los Angeles	128303	96.9	97%	42.8%	10.5%	93%	95%
03722	Los Angeles	128210	95.5	96%	42.8%	10.5%	93%	95%
03722	Los Angeles	127400	90.1	90%	42.8%	10.5%	93%	95%
03723	Los Angeles	117520	90.9	91%	45.8%	10.6%	94%	95%
03723	Los Angeles	117408	94.1	94%	45.8%	10.6%	94%	95%
03723	Los Angeles	120106	95.2	95%	45.8%	10.6%	94%	95%
03723	Los Angeles	119340	93.4	94%	45.8%	10.6%	94%	95%
03723	Los Angeles	120105	92.2	92%	45.8%	10.6%	94%	95%
03723	Los Angeles	120108	93.3	93%	45.8%	10.6%	94%	95%
03723	Los Angeles	120103	93.6	94%	45.8%	10.6%	94%	95%
03723	Los Angeles	120030	92.3	92%	45.8%	10.6%	94%	95%
03723	Los Angeles	117405	92.8	93%	45.8%	10.6%	94%	95%

03730	Los Angeles	218120	91.2	91%	39.8%	7.7%	92%	83%
03732	Los Angeles	191810	90.7	91%	62.9%	11.0%	97%	97%
03732	Los Angeles	192610	91.7	92%	62.9%	11.0%	97%	97%
03733	Los Angeles	211310	91.8	92%	60.1%	14.9%	97%	99%
03733	Los Angeles	213201	90.0	90%	60.1%	14.9%	97%	99%
03734	Los Angeles	208302	92.4	93%	60.5%	12.1%	97%	97%
03734	Los Angeles	209820	95.1	95%	60.5%	12.1%	97%	97%
03734	Los Angeles	224320	94.6	95%	60.5%	12.1%	97%	97%
03734	Los Angeles	208301	94.5	95%	60.5%	12.1%	97%	97%
03734	Los Angeles	980010	91.2	91%	60.5%	12.1%	97%	97%
03734	Los Angeles	224310	94.9	95%	60.5%	12.1%	97%	97%
03734	Los Angeles	208720	91.4	92%	60.5%	12.1%	97%	97%
03734	Los Angeles	209520	90.9	91%	60.5%	12.1%	97%	97%
03734	Los Angeles	209403	94.2	94%	60.5%	12.1%	97%	97%
03744	Los Angeles	206050	95.6	96%	99.2%	14.3%	98%	98%
03744	Los Angeles	205120	91.1	91%	99.2%	14.3%	98%	98%
03744	Los Angeles	199900	92.4	93%	99.2%	14.3%	98%	98%
03744	Los Angeles	204600	91.5	92%	99.2%	14.3%	98%	98%
03744	Los Angeles	203720	95.1	95%	99.2%	14.3%	98%	98%
03744	Los Angeles	204420	95.8	96%	99.2%	14.3%	98%	98%
03744	Los Angeles	203100	93.2	93%	99.2%	14.3%	98%	98%
03744	Los Angeles	204300	94.5	95%	99.2%	14.3%	98%	98%
03745	Los Angeles	231900	92.8	93%	79.4%	16.4%	98%	99%
03745	Los Angeles	226420	90.3	90%	79.4%	16.4%	98%	99%
03745	Los Angeles	228100	92.9	93%	79.4%	16.4%	98%	99%
03745	Los Angeles	229300	91.6	92%	79.4%	16.4%	98%	99%
03745	Los Angeles	231100	91.9	92%	79.4%	16.4%	98%	99%
03745	Los Angeles	226410	90.3	90%	79.4%	16.4%	98%	99%
03745	Los Angeles	228710	91.6	92%	79.4%	16.4%	98%	99%
03745	Los Angeles	228900	92.2	92%	79.4%	16.4%	98%	99%
03745	Los Angeles	229410	94.6	95%	79.4%	16.4%	98%	99%
03746	Los Angeles	224420	95.5	96%	100.0%	19.7%	100%	100%
03746	Los Angeles	221810	90.5	91%	100.0%	19.7%	100%	100%
03746	Los Angeles	221900	91.2	91%	100.0%	19.7%	100%	100%
03746	Los Angeles	221302	94.4	94%	100.0%	19.7%	100%	100%
03746	Los Angeles	221120	93.3	93%	100.0%	19.7%	100%	100%

03746	Los Angeles	221303	92.4	93%	100.0%	19.7%	100%	100%
03746	Los Angeles	231400	90.8	91%	100.0%	19.7%	100%	100%
03746	Los Angeles	222700	99.6	100%	100.0%	19.7%	100%	100%
03746	Los Angeles	231210	94.0	94%	100.0%	19.7%	100%	100%
03746	Los Angeles	221110	92.4	93%	100.0%	19.7%	100%	100%
03746	Los Angeles	221602	93.0	93%	100.0%	19.7%	100%	100%
03750	Los Angeles	232120	92.8	93%	100.0%	13.5%	99%	98%
03750	Los Angeles	237720	93.7	94%	100.0%	13.5%	99%	98%
03750	Los Angeles	238310	91.5	92%	100.0%	13.5%	99%	98%
03750	Los Angeles	237101	90.4	91%	100.0%	13.5%	99%	98%
03750	Los Angeles	231720	92.8	93%	100.0%	13.5%	99%	98%
03750	Los Angeles	231710	91.5	92%	100.0%	13.5%	99%	98%
03750	Los Angeles	240500	90.1	90%	100.0%	13.5%	99%	98%
03751	Los Angeles	242700	93.3	93%	100.0%	16.7%	100%	100%
03751	Los Angeles	243100	90.6	91%	100.0%	16.7%	100%	100%
03751	Los Angeles	242600	90.1	90%	100.0%	16.7%	100%	100%
03751	Los Angeles	242300	90.4	91%	100.0%	16.7%	100%	100%
03751	Los Angeles	240500	90.1	90%	100.0%	16.7%	100%	100%
03751	Los Angeles	239502	92.2	92%	100.0%	16.7%	100%	100%
03751	Los Angeles	239330	91.9	92%	100.0%	16.7%	100%	100%
03751	Los Angeles	239601	95.8	96%	100.0%	16.7%	100%	100%
03751	Los Angeles	239701	92.7	93%	100.0%	16.7%	100%	100%
03751	Los Angeles	239602	94.6	95%	100.0%	16.7%	100%	100%
03751	Los Angeles	241120	92.0	92%	100.0%	16.7%	100%	100%
03751	Los Angeles	240900	90.9	91%	100.0%	16.7%	100%	100%
03751	Los Angeles	239501	92.7	93%	100.0%	16.7%	100%	100%
03751	Los Angeles	240010	90.5	91%	100.0%	16.7%	100%	100%
03751	Los Angeles	240600	90.2	90%	100.0%	16.7%	100%	100%
07108	San Bernardino	006500	91.2	91%	37.0%	9.2%	91%	91%
07108	San Bernardino	004900	93.1	93%	37.0%	9.2%	91%	91%
07108	San Bernardino	005600	91.9	92%	37.0%	9.2%	91%	91%
07108	San Bernardino	005500	95.2	95%	37.0%	9.2%	91%	91%
07108	San Bernardino	005800	90.3	90%	37.0%	9.2%	91%	91%

07317	San Diego	002302	95.1	95%	48.3%	10.7%	95%	95%
07503	San Francisco	012301	92.7	93%	75.1%	6.3%	98%	64%
07702	San Joaquin	000500	93.4	94%	43.9%	10.0%	94%	93%
07702	San Joaquin	000600	93.5	94%	43.9%	10.0%	94%	93%
07702	San Joaquin	002202	91.5	92%	43.9%	10.0%	94%	93%
07702	San Joaquin	002300	95.6	96%	43.9%	10.0%	94%	93%
07702	San Joaquin	000700	93.7	94%	43.9%	10.0%	94%	93%
07702	San Joaquin	000100	92.6	93%	43.9%	10.0%	94%	93%
07702	San Joaquin	002401	94.2	94%	43.9%	10.0%	94%	93%
07702	San Joaquin	002402	90.0	90%	43.9%	10.0%	94%	93%

Table 20: Census Tracts with AR and SEVI Values in Top 10%