THE ELECTRIC AFFORDABILITY FACTBOOK

BY STEVE MITNICK

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The Sustainable Resilient Affordable Debates

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By Steve Mitnick, Executive Editor
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Foreword

There is much talk about affordability these days in the electric utilities industry and in utility regulation. It is unclear though, in many of the conversations, about what is the meaning of affordability that is being discussed. Is the concern we have about the affordability of electric bills currently? Or is the concern about the affordability of electric bills in coming years after the industry makes and regulation allows substantial investment in the energy transformation?

For they are mostly two separate concerns, each important in their own right. Our conversations must not conflate the two.

When we are talking about the affordability of electric bills currently, the questions that flow from the conversation are quite naturally, for which utility customers are we most concerned, that is, what characterizes the customers most challenged by their electric bills and why? And what solutions do utilities and regulators have in their toolbox to make electric bills more affordable for them?

This is not to say that we should not invest our time and talents to protect all other utility customers from charges in their electric bills that are not used and useful expenditures and investments by the utility. This has been a fundamental mandate of electric utility regulation since states started the economic regulation of electric utilities in 1907. Affordability has long been on the Mt. Rushmore of electric utility goals along with reliability and safety. More recently, increasingly clean has been added to our pantheon of goals.

It is to say however that with the increased concerns expressed in many quarters about electric bill affordability, if we are talking about affordability in the current timeframe rather than in the timeframe of coming years of the energy transformation, the focus ought to be on those customers most challenged by their electric bills. Because this Electric Affordability Factbook demonstrates with the data that for most American households, to the extent they have affordability pressures, it is across the board with the goods and services they need and want generally, not a particular expense like electric bills that is most frequently around two percent of their household total expenditures.

And if, on the other hand, we are talking about the affordability of electric bills in coming years after the industry makes and regulation allows substantial investment in the energy transformation, then the questions that flow from the conversation are quite naturally, what shall be the magnitude of the impacts on electric bills, inflation-adjusted and per capita, and how will that affect the buying power of a range of households in various financial situations to continue purchasing the goods and services they need and want?

Only once before in the industry's history has a very substantial increase in utility investment disrupted the remarkably consistent tracking of electric rates and bills with general inflation. That is, except for the early and mid-nineteen eighties, the natural pressure valves of customer demand growth, utility productivity improvements, and the constraints imposed by utility regulation have kept inflation-adjusted rates and bills rather steady during periods and slowly declining during other periods.

After the oil shock and Three Mile Island accident, both in the spring of 1979, nuclear and coal power plant construction accelerated and so too its costs. As measured by the U.S. Department of Commerce/Bureau of Economic Analysis, residential electric bills as a percentage of all household consumption expenditures hit an all-time

high three years later, at 2.27 percent, in 1982. It remained high throughout the eighties.

The percentage has generally been decreasing ever since, with occasional interruptions such as when Hurricane Katrina in the summer of 2005 drove up the prices that natural gas-fired power plants paid for the fuel. In 2021, the electric bills percentage had fallen all the way to 1.25 percent. With the gas price spike last year from Russia's invasion of Ukraine, the percentage has gone up, to 1.34 percent.

So, do we believe that the affordability of electric bills, after the industry makes and regulation allows substantial investment in the energy transformation, will repeat the history of the nineteen eighties? That the natural pressure valves of customer demand growth, utility productivity improvements, and the constraints imposed by utility regulation – that have kept inflation-adjusted rates and bills rather steady during periods and slowly declining during other periods – shall fail us now?

It is widely expected that robust customer demand growth in the coming years will be unprecedented, at least since the mid-nineteen sixties. And if one believes as I do in the industry's innovation and the discipline of utility regulation, then perhaps we will be able to avoid an energy transformation affordability crisis that some have feared.

Executive Summary

There is precious little that electric utilities and utility regulation can do to lessen the burden on the many households that face challenges making ends meet, every month, every week, and even every day. This wouldn't be the case if these households' electric bills were a sizable slice of their expenditures to get by. But only a minority of such households are presented by their electric utilities with bills exceeding three percent of their expenditures in total, as this Factbook has shown, particularly for such households not living in the south, and particularly for such households living in cities.

What can we do to move the affordability needle for these households? Put another way, what holds the most promise to do so that is in the toolbox of electric utilities and utility regulation?

Restraining an electric utility's revenue requirements – for rate base investment, return on investment, and operations and maintenance expense – may make sense for myriad other reasons. Such as to ensure consistency with the used and useful principle, the just and reasonable principle, and other ratemaking foundational mandates. But restraining revenue requirements is, frankly, no more than a blunt tool with minimal potential to make a difference in the financial situation of households having difficulty in making ends meet.

This author, and I suppose most readers of this Factbook, cannot truly appreciate the financial situation of such households. That is, the challenge of paying for shelter, food, transportation, healthcare, and other necessities (including utilities) on, say, two thousand dollars per month of very limited income supplemented by monies and money equivalents from government, institutions, and other third parties.

Though, if the electric bill for a household living in a small urban apartment averages seventy-five dollars per month, and if utility regulation can considerably cut a proposed increase in revenue requirements, that might filter down to this household as a cut from a three-dollar monthly increase to a two-dollar monthly increase. That one dollar difference would no doubt be welcomed. But its impact would be too small, regrettably, to really relieve this household's burden.

Very fortunately, there are alternative tools available to electric utilities and utility regulation that are more focused on the economic plight of these households with greater potential to make a difference for them.

Twenty-Five Takeaways from This Factbook

1. In only one year since 2016 has the average increase of electric rates outpaced the Consumer Price Index, in 2022. (Chapter I)
2. For the fifty-three million households in the lowest two income quintiles, their average total expenditures on all goods and services consistently and substantially exceeds their reported income before and after taxes. (Chapter II)
3. For more than nine-tenths of the four and six-tenths million households headed by those of age sixty-five and older, with income less than fifteen thousand, without any earners, their electric bills can be an enormous and unrepresentative percent of income. (Chapter II)
4. Making any comparisons of electric bills to income is misleading. (Chapter II)
5. Across all the nation's lowest income quintile households, electric bills averaged 3.7 percent of what they spent money on. (Chapter II)
6. From 1997 to 2022, household total expenditures per

capita nationally increased a hundred and fifty-nine percent while residential electric bills increased a hundred and twelve percent. (Chapter II)

7. In 2022, electric bills averaged 1.9 percent of household total expenditures in the West, 2.0 percent in the Northeast, and 2.1 percent in the Midwest, but 2.9 percent in the South. (Chapter II)
8. In 2022, the average monthly electric bill for the twenty-six million households living outside urban areas was a hundred and sixty-six dollars. It was generally more than twenty percent less for households living in big cities. (Chapter II)
9. For the seven million households that had income of thirty thousand and below in the West Census region, in 2022, their electric bills average 2.5 percent of their total expenditures. In the Northeast Census region, this average was 2.8 – 2.9 percent. (Chapter III)
10. For economically stressed households, purchasing goods and services generally has become unaffordable for them. The electric bill, whether two, three, or four percent of their purchasing, is just one of the more noticeable purchases and one of the contributors to their unaffordability challenge. (Chapter IV)
11. Household total expenditures, inflation-adjusted, per capita, grew significantly in the U.S. during the fifteen-year period of 2008 through 2022. This is true nationally, in every state since 2008, and in all but eight of the states since 2021. (Chapter V)
12. Bottom half households' net worth grew significantly over the last dozen years, though it is still under three percent of all household net worth. (Chapter V)
13. The current average of checkable deposits and currency held by bottom half households is only slightly above four thousand dollars. (Chapter V)
14. Across the households most likely to have their buying power fall short of their needs, they are predominantly young unmarried females, usually with low incomes, especially those renting their home. (Chapter V)
15. Four percent of adults in October 2023 said they have missed paying their energy bills almost every month, seven percent have missed some months, and six percent have missed one or two months over the past year. (Chapter VI)
16. For those that said they have missed paying their energy bills almost every month, sixty-one percent are female, fifty-seven percent were unmarried, fifty-two percent had children in the household, forty percent were not employed, and forty-six percent used borrowings from friends or family over the past seven days. (Chapter VI)
17. The largest and most volatile factor in electric utility costs nationally is a direct and indirect function of the price of natural gas. (Chapter VII)
18. In just the past three years, the share of fuel and purchased power expenses has risen dramatically, relative to utility operating revenues. And the price index for natural gas purchased by power plants has gone from 149.4 to 208.4 to 272.2. (Chapter VII)
19. Electric and gas bills continue to track each other closely. And this matters so much when discussing electric bill affordability because gas prices are fundamentally volatile. (Chapter VII)
20. Is there anything in our operations, policy, and regulatory toolbox that can really make a difference for the households having the most difficulty paying bills of every kind? (Chapter VIII)
21. Compare that $14.31 monthly savings for the household in this example to the $2.70 monthly savings by restraining utility revenue requirements, cutting a regulatory increase in half. This illustrates the power of energy efficiency to be a difference maker for the financial situation of lowest income quintile households. (Chapter VIII)
22. Households that live in large single-family detached houses have the highest electric bills for a simple reason. They have the greatest volumes of interior space to cool (and heat if they heat electrically as is common in the South). The data is hands-down on this. For instance, in 2022, the average monthly electric bill of homeowners nationally was a hundred and sixty-one dollars and the average for renters was a hundred and one dollars. (Chapter VIII)
23. The lowest income quintile averages 0.4 earners per household out of 1.6 people, the next to the lowest income quintile averages 0.9 earners out of 2.1 people, the middle income quintile averages 1.3 earners out of 2.4 people, the next to the highest income

quintile averages 1.8 earners out of 2.9 people, and the highest income quintile averages 2.1 earners out of 3.2 people. Their average incomes before taxes were $14,191, $37,441, $65,659, $108,730, and $244,025. Their average electric bills as a percentage of average household total expenditures were 3.7 percent, 3.2 percent, 2.7 percent, 2.2 percent, and 1.6 percent. (Chapter VIII)

24. For sixty percent of all households nationally in the middle, next to the highest, and highest income quintiles, especially if they live in cities in the Northeast, Midwest, and West Census regions, decisions and orders over revenue requirements have a modest effect on their home budgets. (Chapter VIII)
25. Substantially accelerating community solar development could have a significant effect on electric affordability among the households that would benefit most. Savings of twenty, thirty or forty dollars monthly, making available that money to help cover the other necessities of life. (Chapter VIII)

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Chapter I. Electric Rates

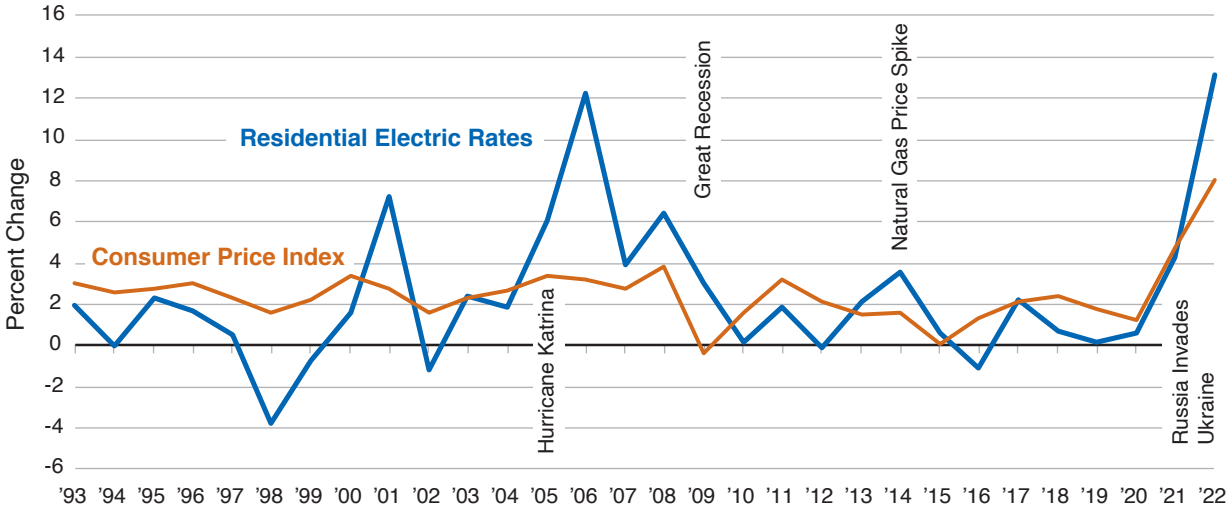
In thirty-three of the hundred and nine years since 1914, through 2022, average residential electric rates, nationally, increased faster than the Consumer Price Index. In four of the years, electric rates and the CPI increased at the same pace. In the remaining seventy-two years, electric rates increased slower than the CPI.

As shown in Figure 1: Electric Rates Rarely Outpace Inflation, in the last thirty of these years, since 1993, increases in average electric rates outpaced the CPI in eleven years, namely 2001, 2003, 2005, 2006, 2007, 2008, 2009, 2013, 2014, 2015, and 2022. In one year, 2017, electric rates and the CPI increased at the same pace. In the remaining eighteen years, electric rates increased slower than the CPI.

In only one year since 2016 has the average increase of electric rates outpaced the CPI. That was the last year for which we have annual data, 2022. Though the electric rate increase last year exceeded the CPI increase by more than five percent; slightly more, at five and one tenth percent. In the entire history of this data since 1914, the electric rate increase exceeded the CPI by more than five percent in just six other years, namely 1921, 1922, 1932, 1933, 1974, and 2006.

What did the last three years of this group have in common? In 1974, 2006, and 2022, the supply of a critical fuel in the nation's electricity generation was subject to a worldwide price shock. (The other four years, 1921, 1922, 1932, and 1933, also have in common that they were years of severe economic recessions.)

Figure 1: Electric Rates Rarely Outpace Inflation



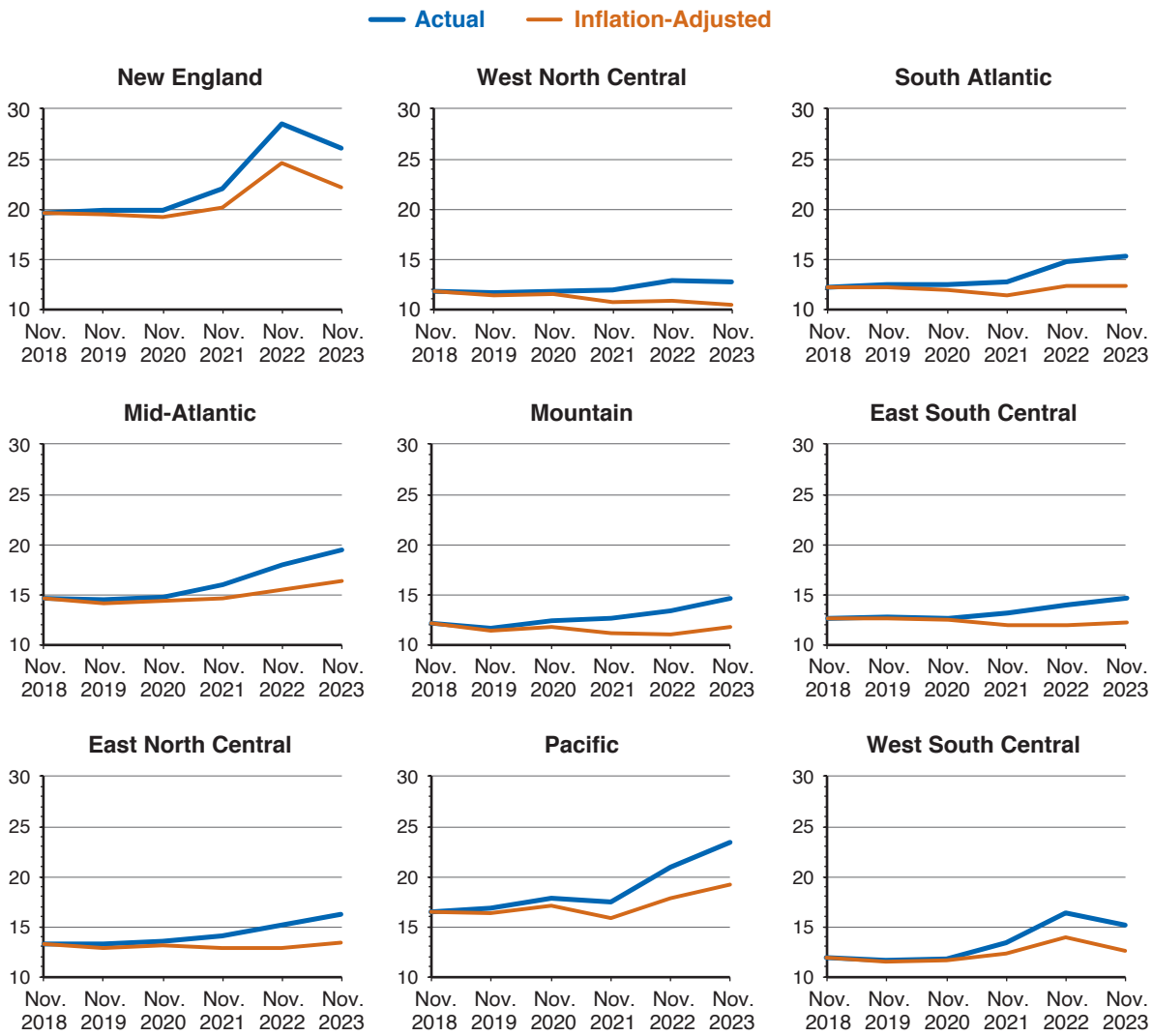
Percent Year-over-Year Increase or Decrease

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index.

While national averages are instructive, breaking down residential electric rates, electric bills, and inflation by region can be especially insightful. For electric rates and inflation, this breakdown is shown in Figure 2: Electric Rates Inflation-Adjusted by Region. Note that electric rates per kilowatt-hour are generally significantly greater in three Census divisions, those being New England, Mid-Atlantic, and the Pacific. This has been true whether electric rates are expressed as their actual amounts or are inflation-adjusted. Electric rates are generally significantly lower in West North Central and Mountain.

The effect of the spike in natural gas prices from Russia's invasion of Ukraine is evident in this graph. Note the atypical bump in inflation-adjusted electric rates in the last couple of years, in New England, Mid-Atlantic, Pacific, and West South Central particularly. The costs of electric generation in those Census divisions are more dependent on natural gas prices.

Figure 2: Electric Rates Inflation-Adjusted by Region



For each of the nine Census Divisions, the average actual residential rate per kWh is deflated here by the Consumer Price Index for that Census Division.

Residential Electric Rate, in Cents per kWh.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index.

Chapter II. Electric Bills

Electric bill affordability is oftentimes expressed in relation to household income. That residential electric bills are a certain percentage of household income, and the supposition is that ratio is a reliable measure of the burden of electric bills. An examination of Figure 3: Expenditures Exceed Income for Two Lowest Income Quintiles should make it clear that affordability should instead be based on the share of household total expenditures rather than on the share of income.

This is because for the fifty-three million households in the lowest two income quintiles, their average total expenditures on all goods and services consistently and substantially exceeds their reported income before and after taxes. How is this possible? Because low- and moderate-income households generally have substantial buying power beyond their income.

This is the case for households of the retired, for students, for individuals and families receiving government assistance. And for many with significant unreported income (tips, cash transactions, freelance work, even illegal activity).

For example, according to the authoritative U.S. Department of Labor/Bureau of Labor Statistics' Consumer Expenditure Survey, there were nearly five million households in the country in 2021-2022 that had both an age sixty-five or over "reference person" and an income before taxes of less than fifteen thousand dollars per year. This group accounts for more than three percent of all the households in the U.S. Demographically, these households are primarily individuals living alone, averaging seventy-five years of age, and nearly two-thirds are women.

Less than a tenth of them are earning an income. That is, more than nine-tenths of them are not earning an income.

That less than a tenth that do earn an income bring up the average per household income before taxes to around eight and a half thousand dollars annually. Yet the average per household total expenditures on all goods and services for these nearly five million households – including both those earning and not earning an income – was more than three times greater, at twenty-seven thousand dollars annually.

Their electric bills averaged a little more than one thousand dollars annually. As a function of their average income before taxes, their average electricity cost them quite a considerable amount, almost thirteen percent. But what does this stat mean? Not much when you consider that for the more than nine-tenths of this group that do not earn an income, their electricity costs them an infinite percent.

As a function of their average household total expenditures on all goods and services, a far more indicative measure of their buying power, their average electricity costs them a more doable four percent. This stat does make sense. All the households in this group have expenditures representative of their buying power made possible from all sources – income and otherwise – even though more than nine-tenths of them are not earning income.

More broadly, for all the twenty-seven million households in the lowest income quintile, their buying power as represented by their average household total expenditures was well more than twice their average income before taxes. Demographically, these households are a mix of families, individuals, and unrelated individuals with one thing in common, their low income before taxes, an average $14,191 in 2022. Lowest quintile households averaged 1.6 people each, of which a third were age sixty-five or older, a fourth earned income, and a fifth were children.

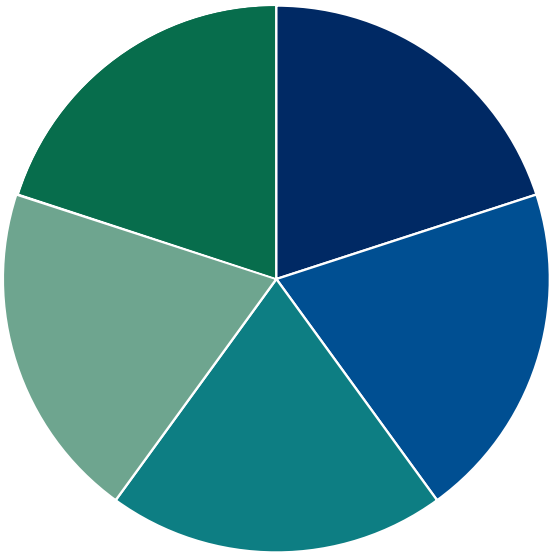
Almost a third did not own or lease a vehicle.

All this suggests that very many of these households had little or no income during the year. And it again suggests that making any comparisons of electric bills to income is misleading.

For that lowest income quintile, that part of the population we focus upon most in this Electric Affordability Factbook, their electric bills averaged $1,205 annually. Their total expenditures averaged $32,612, which was well more than twice their average income.

This means that electric bills were 3.7 percent of what they spent their money on. And it means that they had $31,407 left over, after paying electric bills, to spend on shelter, food, transportation, healthcare, and the other goods and services they need and want. And it means that if electric bills increased by, say, five percent to $1,262 annually, all other things being equal, electricity's share would rise to 3.9 percent, and they would have $57 less per annum or $4.75 per month to spend on shelter, food, etc.

Figure 3: Expenditures Exceed Income for Two Lowest Income Quintiles



Highest Quintile

Income before taxes	$244,025
After taxes	$196,794
Total expenditures	$140,654
Electricity	$2,185

Lowest Quintile

Income before taxes	$14,191
After taxes	$16,337
Total expenditures	$32,612
Electricity	$1,205

Next to Highest Quintile

Income before taxes	$108,730
After taxes	$99,891
Total expenditures	$81,957
Electricity	$1,835

Next to Lowest Quintile

Income before taxes	$37,441
After taxes	$39,300
Total expenditures	$47,657
Electricity	$1,527

Middle Quintile

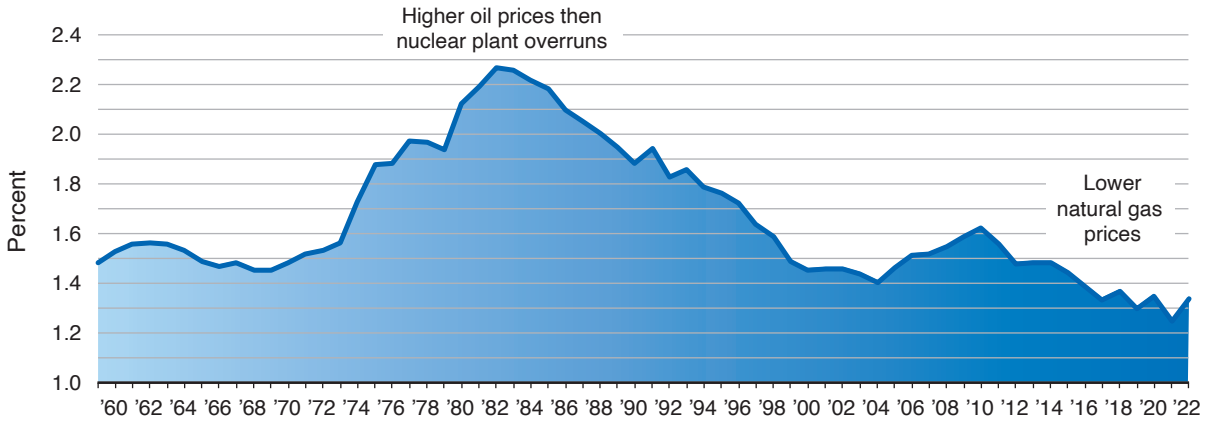
Income before taxes	$65,659
After taxes	$63,676
Total expenditures	$61,950
Electricity	$1,664

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

In general, the trend has been that residential electric bills have become a smaller share of household total expenditures. Though there have been temporary blips over time, most prominently during the nineteen eighties when increased prices for the oil-based power plant fuels in the late seventies and then nuclear plant construction cost overruns in the early and mid-eighties drove up electric rates and bills. See Figure 4: U.S. Electric Bills as Percent of Total Expenditures.

The last nine years have seen residential electric bills at a historically low share of household total expenditures. This was due in large part to moderate prices for the power plant fuel natural gas. The electric bill share of expenditures ticked up in 2022 however, along with increased natural gas prices, a side effect of Russia's invasion of Ukraine.

Figure 4: U.S. Electric Bills as Percent of Total Expenditures



U.S. Residential Electric Bills as Percent of U.S. Personal Consumption Expenditures.

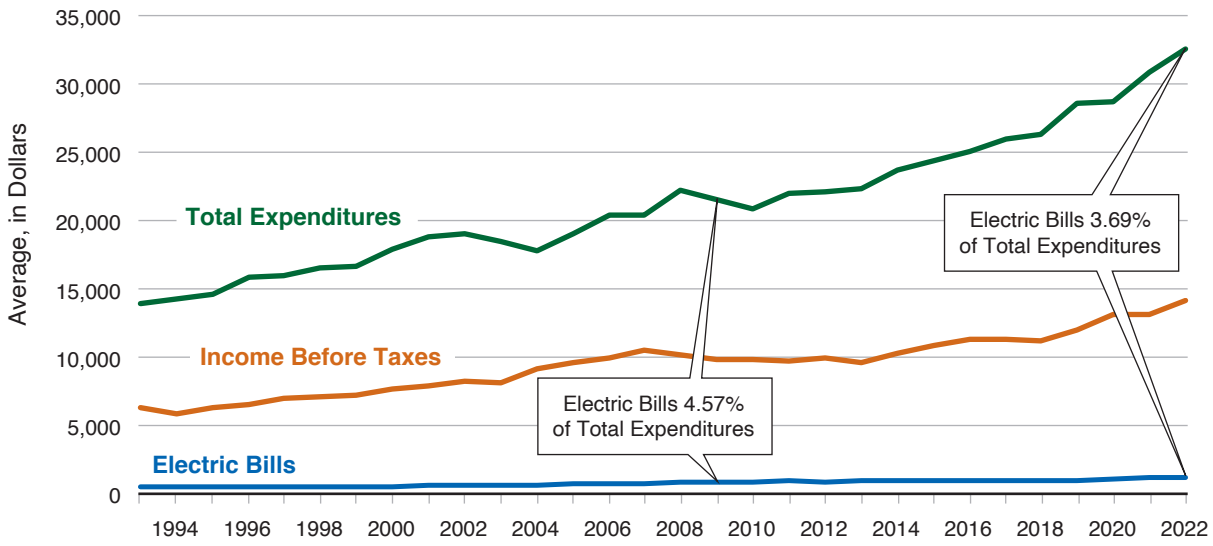
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

When we talk about electric bill affordability, we naturally focus on the nation's lowest income households. Of the hundred and thirty-four million households in the country, the one-fifth of all of them with the lowest income – nearly twenty-seven million households – are aggregated by the Bureau of Labor Statistics for analysis purposes as being within the lowest income quintile. Figure 5: U.S. Lowest Quintile Income, Total Expenditures, Electric Bills shows the lowest income quintile's income before taxes, household total expenditures on all goods and services, and electric bills for every one of the thirty years from 1993 through 2022. With the normal effect of inflation, income, total expenditures, and electric bills consistently rise over time, even for lowest quintile households.

As discussed above, on average, the total expenditures of lowest quintile households are always much greater than their income. This is the case for all thirty years in the Figure. And the reason as we have stated is that the share of wallet of electric bills should be based upon household total expenditures, not household income, which is typically supplemented by other sources of buying power of lowest quintile households.

As for all five income quintiles of American households, the share of residential electric bills as a percentage of household total expenditures for low income quintile households has generally been decreasing. For instance, during the great recession year of 2009, paying their electric bills took 4.57 percent of the total expenditures of low quintile households. In 2022, paying their electric bills took 3.69 percent of their total expenditures.

Figure 5: U.S. Lowest Quintile Income, Total Expenditures, Electric Bills



Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Let's break down electric bill shares of household total expenditures by state. See Figure 6: Per Capita Total Expenditures Outpaced Per Capita Electric Bills in Nearly Every State. It compares state-by-state household expenditures in 1997 to that a quarter century later, in 2022.

Nationally, from 1997 to 2022, household total expenditures increased 159 percent on a per capita basis. While residential electric bills increased considerably less than that, at 112 percent. This is why residential electric bills in 1997 were 1.64 percent of what the Bureau of Economic Analysis calls "personal consumption expenditures" and in 2022 they had fallen to 1.34 percent.

A side note for the reader is necessary at this point. Electric bills' share of household expenditures is consistently lower when based upon U.S. Department of Commerce/Bureau of Economic Analysis data than when based upon U.S. Department of Labor/Bureau of Labor Statistics data. This is because of the denominator, household total expenditures. While the BLS denominator comes from surveys of consumers asking what they spend money on,

the BEA denominator comes from broader economic analyses of consumer spending, which include expenditures by third parties on behalf of consumers such as insurance, pensions, government, and other institutions. This report employs data from both BEA and BLS. But it is careful to use each data source separately and to never intermix or compare data from both sources.

Now, back to the Figure. In all but four of the states, during the last quarter century, household total expenditures per capita increased by more than did residential electric bills. This means that the share of electric bills in household expenditures usually shrunk over this time period. In some states, the shrinking share of electric bills was striking.

In Florida, for example, household total expenditures per capita increased 151 percent while residential electric bills increased 78 percent. In Louisiana, total expenditures per capita increased 167 percent while electric bills increased 71 percent. In Texas, total expenditures per capita increased 158 percent while electric bills increased 71 percent. As a result, electric bills' share of total expenditures dropped from 1.95 percent to 1.38 percent in Florida, from 2.78 percent to 1.78 percent in Louisiana, and from 2.24 percent to 1.48 percent in Texas.

Figure 6: Per Capita Total Expenditures Outpaced Per Capita Electric Bills in Nearly Every State

	Percent Increase Per Capita Total Expenditures	Percent Increase Per Capita Electric Expenditures		Percent Increase Per Capita Total Expenditures	Percent Increase Per Capita Electric Expenditures
Alabama	141%	114%	Montana	186%	133%
Alaska	155%	148%	Nebraska	160%	129%
Arizona	146%	104%	Nevada	130%	74%
Arkansas	163%	92%	New Hampshire	162%	116%
California	187%	161%	New Jersey	155%	117%
Colorado	166%	134%	New Mexico	151%	149%
Connecticut	144%	179%	New York	187%	115%
Delaware	135%	113%	North Carolina	148%	80%
District of Columbia	151%	97%	North Dakota	189%	139%
Florida	151%	78%	Ohio	147%	97%
Georgia	140%	98%	Oklahoma	151%	87%
Hawaii	148%	147%	Oregon	158%	124%
Idaho	150%	100%	Pennsylvania	158%	105%
Illinois	155%	102%	Rhode Island	162%	195%
Indiana	149%	143%	South Carolina	154%	87%
Iowa	144%	94%	South Dakota	182%	134%
Kansas	140%	94%	Tennessee	141%	101%
Kentucky	152%	143%	Texas	158%	71%
Louisiana	167%	71%	Utah	173%	127%
Maine	177%	102%	Vermont	162%	111%
Maryland	138%	96%	Virginia	151%	94%
Massachusetts	162%	157%	Washington	169%	111%
Michigan	151%	205%	West Virginia	168%	134%
Minnesota	134%	132%	Wisconsin	152%	172%
Mississippi	163%	103%	Wyoming	176%	157%
Missouri	142%	107%	**United States**	**159%**	**112%**

Percent increases from 1997 to 2022.

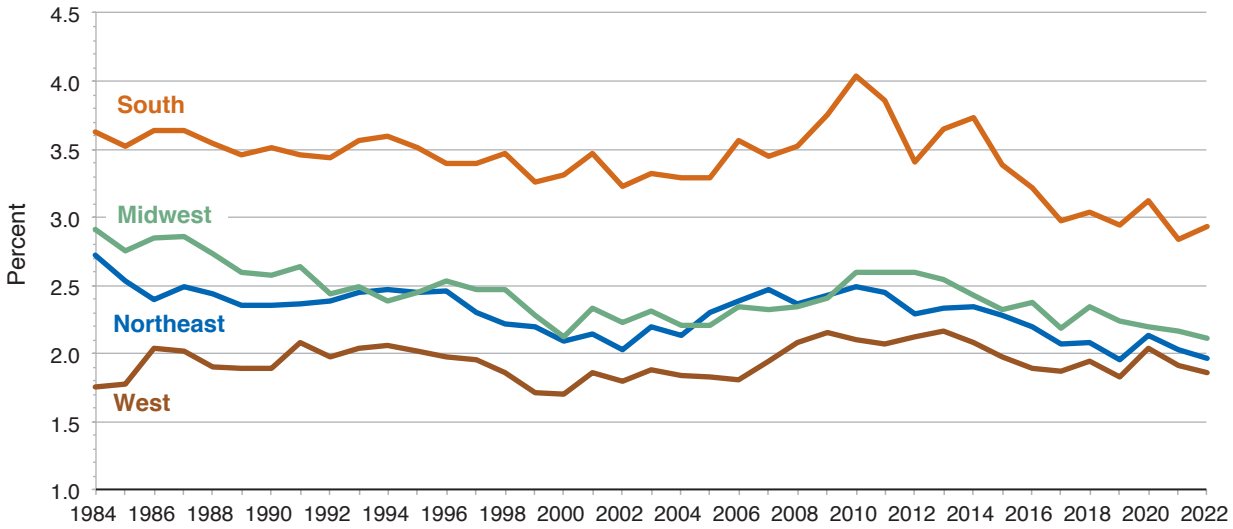
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

This next Figure goes back to the use of U.S. Department of Labor/Bureau of Labor Statistics data. In it, we can see that the share of residential electric bills in household total expenditures is generally declining since the year that BLS started collecting this data in 1984.

Figure 7: Electric Bills as Percent of Total Expenditures by Region also shows that the electric bills' share is higher in the South than in the other three Census regions – the Northeast, Midwest, and West.

In 2022, for example, electric bills were on average 1.9 percent of household total expenditures in the West, for the thirty million households there, 2.0 percent in the Northeast, for the twenty-three million households there, 2.1 percent in the Midwest, for the twenty-eight million households there, but 2.9 percent in the South, for the fifty-two million households there. That is quite a gap between the electric bills' share in the South versus the rest of the country.

Figure 7: Electric Bills as Percent of Total Expenditures by Region



Residential Electric Bills as Percent of Total Expenditures on All Goods and Services

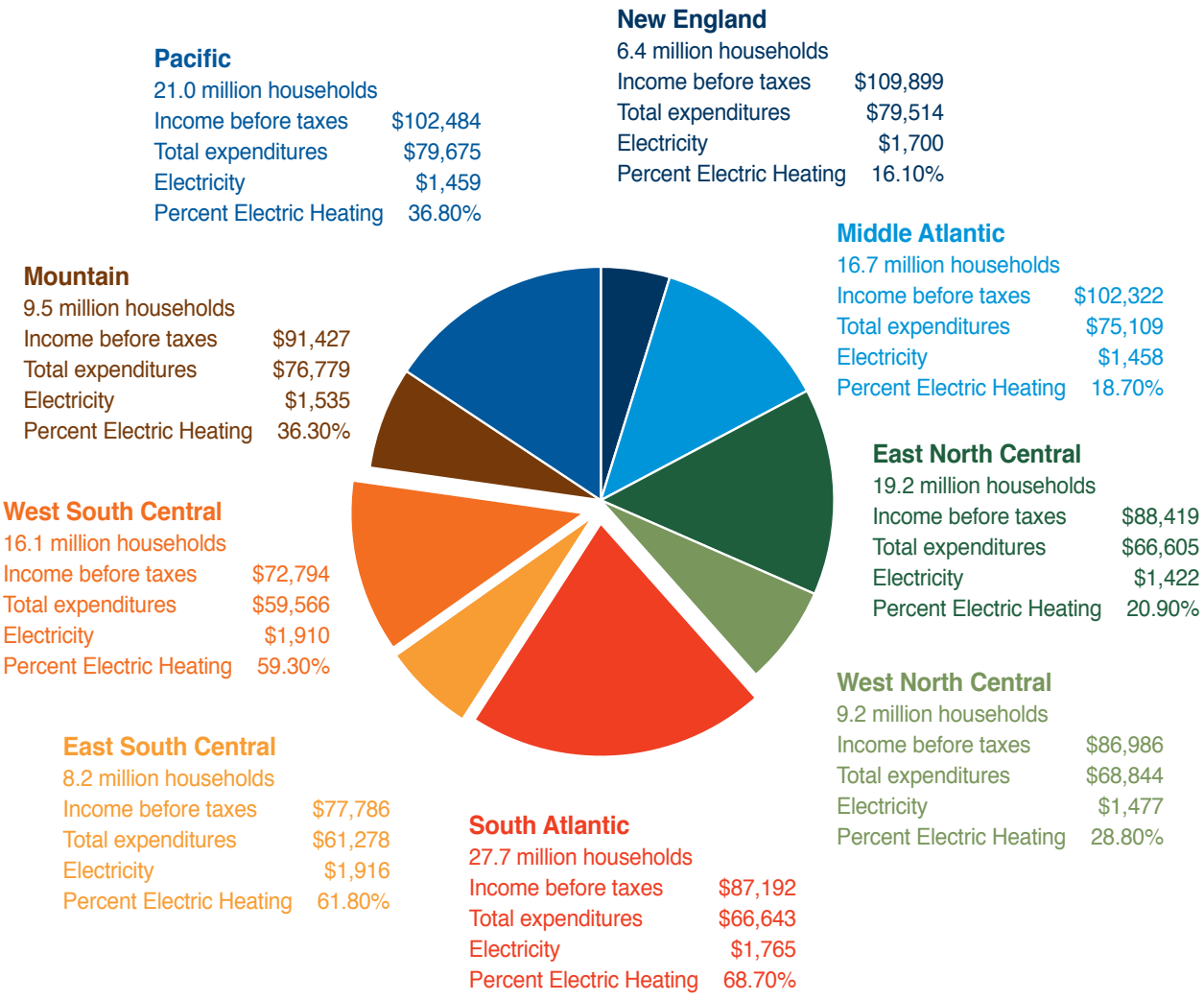
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

One of the most important facts that the reader can take away from the data is that national figures on electric bill affordability are greatly distorted by the differences in electric use in the South versus the other parts of the country. This consequential fact is illustrated in Figure 8: Electric Bills Highest in the South.

Just look at the average residential electric bill in 2022 in the two Census divisions East South Central and West South Central. The averages were $1,916 and $1,910 respectively, for the eight million and sixteen million households in these Census divisions. On a monthly basis, that averages $160 and $159 per month. In contrast, for four other Census divisions – East North Central, Middle Atlantic, Pacific, and West North Central – the average residential electric bills were $1,422, $1,458, $1,459, and $1,477 respectively. On a monthly basis, that averages $119, $122, $122, and $123 per month.

In other words, residential electric bills in much of the South average around thirty percent higher than in many of the states from which people are moving southward. This fact alone causes national averages of electric bills to rise.

Figure 8: Electric Bills Highest in the South



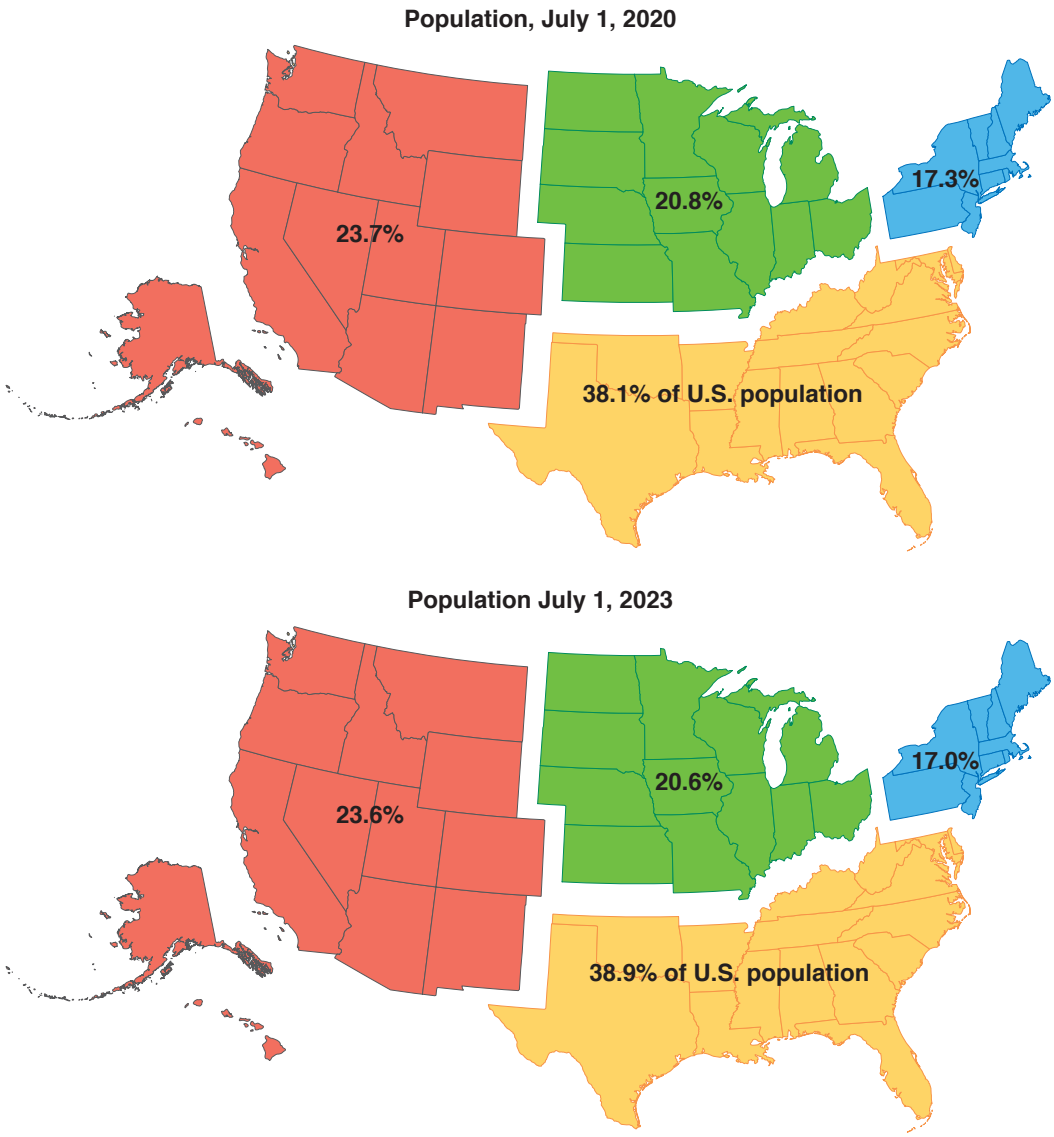
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, 2021-2022, and U.S. Department of Commerce, Census Bureau.

In just the three years from the first of July 2020 to the first of July of 2023, as you can see in Figure 9: Population Shifting Southward, Driving Up National Average Electric Bills, the proportion of U.S. Population residing in the South Census region has increased substantially, from 38.1 percent to 38.9 percent.

At the same time, the proportion residing in the Northeast Census Region has decreased three tenths of a percent, from 17.3 to 17.0 percent. The proportions of residents in the Midwest and West Census regions also decreased, by two tenths and one tenth of a percent respectively.

The average residential electric bill is so much higher in the South. $160 monthly there on average as opposed to, for instance, $131 monthly in the Northeast. It is therefore inevitable that national averages will be driven up as the proportion grows of all Americans that reside in the South and the proportion shrinks that reside in the Northeast, Midwest, and West.

Figure 9: Population Shifting Southward, Driving Up National Average Electric Bills



Average Monthly Electric Bill, 2022. Northeast: $131. Midwest: $123. West: $129. South: $160.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

When we think about electric bill affordability, we often focus in on low income families living in our inner cities. Yet, residential electric bills tend to be lower in cities, particularly the nation's largest cities. And electric bills tend to be higher outside cities, in small towns and rural areas. This fact is shown in Figure 10: Big City Electric Bills Lower.

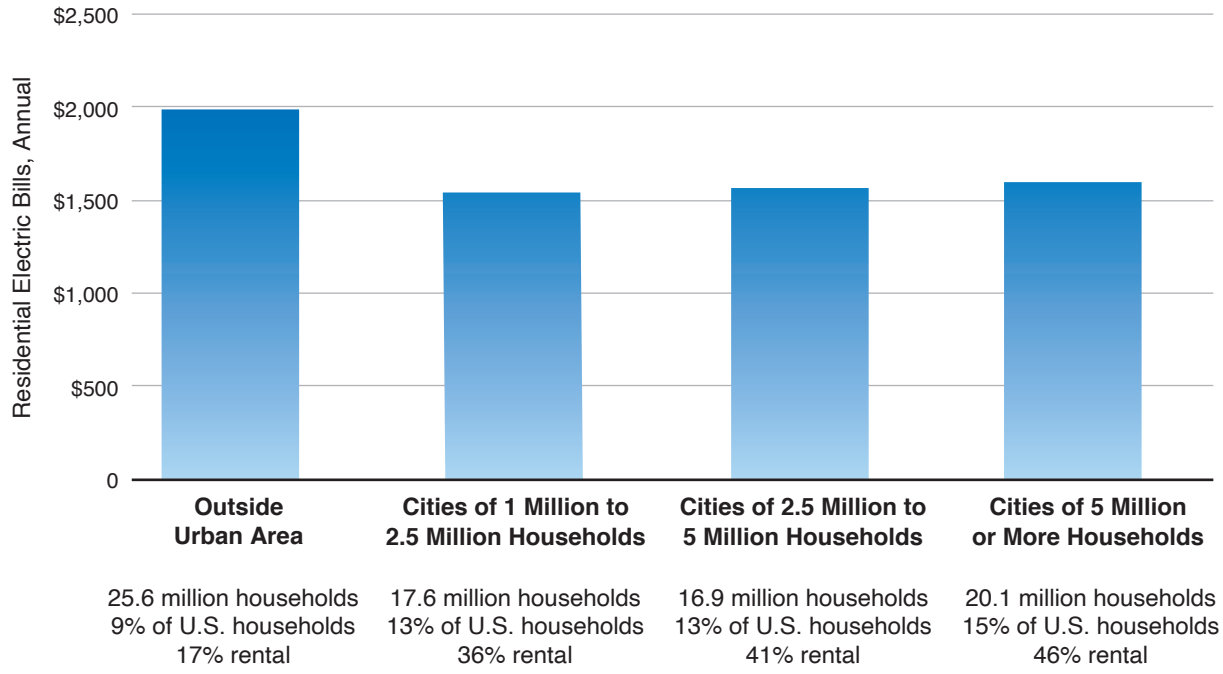
Of the hundred and thirty-four million households in the U.S., twenty-six million of them are located outside urban areas. The remaining hundred and nine million households, with rounding, are located in urban areas. Including fifteen million households in the smallest cities with a population of less than a hundred thousand people.

The average annual electric bill for those twenty-six million households outside urban areas was $1,991 in 2022. On a monthly basis, that comes out to $166. The numbers are quite different for the households within urban areas, especially in cities with a population of more than a million people. The average annual electric bill for the eighteen million households in cities of a million to two and a half million in population was $1,553. That's $129 per month on average. It's not much different for the seventeen million households in cities of two and a half million to five million in population, and for the twenty million households in cities with more than five million in population.

Why the large gap between the electric bills of households outside urban areas and those within them? The difference can be explained in large part by the percentage of households in either type of area that rent their home versus own their home.

Only seventeen percent of households outside urban areas rent their homes. While thirty-six percent to forty-six percent of households in the three categories of our biggest cities rent their homes. Since households' energy bills are proportional to the size of their home, with a lesser volume of interior space to cool and heat, and since rented homes are usually smaller and in multi-family buildings, denser urban areas that are predominantly smaller rented homes typically have smaller energy bills.

Figure 10: Big City Electric Bills Lower



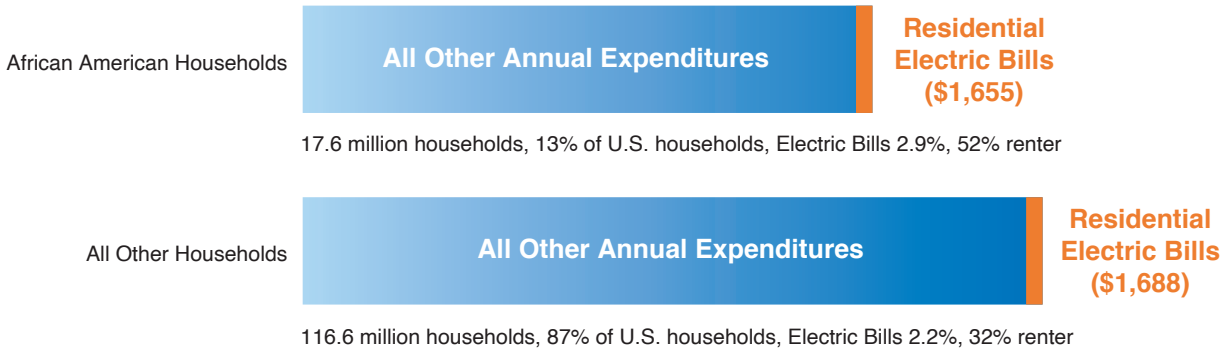
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

The average residential electric bill of the eighteen million African American households was $1,655 in 2022, or $138 monthly. This was below the average annual electric bill of all other households, that being $1,688, or $141 monthly, although not by all that much. See Figure 11: African Americans' Electric Bills Higher Share of Total Expenditures.

A fifty-two percent majority of African American households are renters rather than homeowners, which is noteworthy considering that only thirty-two percent of all other households are renters rather than homeowners. Renters tend to have significantly lower electric bills. So why don't African American households have significantly lower electric bills? One reason is that they are located disproportionately in the South Census region, which generally has higher residential electric bills. Though this question is a good one for further investigation.

While the residential electric bills of African American households are not much different on average from those of all other households in the country, their income before and after taxes and their household total expenditures are quite different. In particular, in 2022, the average total expenditures of African American households was $57,996 and those of all other households averaged $75,211. As a consequence, electric bills were 2.9 percent of total expenditures in the average African American household and 2.2 percent in the average of all other households.

Figure 11: African Americans' Electric Bills Higher Share of Total Expenditures



Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Chapter III. Low Income Households

Figure 12: Low Income Household Budgets in the South is a profile of the six million households in the South Census region that had income before taxes below fifteen thousand dollars in 2022 and the eight million households in that region that had income before taxes of fifteen thousand to thirty thousand. These two low income household categories accounted for twenty eight percent of all households in the South.

For both low income groups, their average income after taxes exceeds their average income before taxes and their average total expenditures greatly exceed either. This further drives home the point made above that for low income households, total expenditures rather than income is the more accurate measure of their buying power.

Note the statistics in the Figure on the percentage of these households headed by women rather than men (what the Bureau of Labor Statistics calls the "reference person"), the percentage that rent rather than own their home, and the percentage that don't own or lease a vehicle. These stats are all much higher than those for households with average income before taxes greater than thirty thousand dollars per annum.

The average annual electric bills of these two low income groups are $1,425 and $1,559. This amounts to 4.9 percent and 4.4 percent of their total expenditures, respectively. These are relatively high percentages. Which is not surprising given that these are aggregations of low income households in the Census region with the highest average residential electric bills, the South.

Figure 12: Low Income Household Budgets in the South

	Less Than $15,000 Income Before Taxes	$15,000 to $29,999 Income Before Taxes
Average Demographics		
Number of Households, Millions	6.2	8.5
Income Before Taxes	$7,204	$22,427
Income After Taxes	$9,867	$25,160
Age	53.5	60.6
Persons in Household	1.7	1.8
Percent Women	62%	61%
Percent Renter	56%	41%
Percent Don't Own/Lease Vehicle	31%	16%
Average Expenditures		
Shelter	$6,527	$7,489
Food	$5,018	$4,709
Transportation	$4,588	$6,023
Healthcare	$2,416	$3,695
Entertainment	$1,258	$1,252
Apparel and Services	$1,204	$764
Household Furnishings and Equipment	$1,121	$1,211
Telephone Services	$816	$958
Electricity	$1,425	$1,559
Other	$4,558	$7,588
Total	**$28,931**	**$35,248**

Figure 13: Low Income Household Budgets in the Northeast is a profile of the two million households in the Northeast Census region that had income before taxes below fifteen thousand dollars in 2022 and the three million households in that region that had income before taxes of fifteen thousand to thirty thousand. These two low income household categories accounted for twenty three percent of all households in the Northeast.

For both low income groups, as for the South Census region, their average income after taxes exceeds their average income before taxes and their average total expenditures greatly exceed either. This again further drives home the point made above that for low income households, total expenditures rather than income is the more accurate measure of their buying power.

Note the statistics as well in the Figure on the percentage of these households headed by women rather than men (what the Bureau of Labor Statistics calls the "reference person"), the percentage that rent rather than own their home, and the percentage that don't own or lease a vehicle. These stats are all much higher than those for households with average income before taxes greater than thirty thousand dollars per annum, as was the case for low income households in the South.

In particular, seventy-four percent of these households with income before taxes below fifteen thousand dollars per annum rent their homes rather own them. Across all Northeast households this stat is just thirty-seven percent.

The average annual electric bills of these two low income groups are $788 and $1,022. This amounts to 2.8 percent and 2.9 percent of their total expenditures, respectively. These are relatively modest percentages, far less than for the low income households in the South discussed above.

Figure 13: Low Income Household Budgets in the Northeast

	Less Than $15,000 Income Before Taxes	$15,000 to $29,999 Income Before Taxes
Average Demographics		
Number of Households, Millions	2.2	3.1
Income Before Taxes	$7,905	$22,399
Income After Taxes	$9,812	$24,983
Age	54.1	62.1
Persons in Household	1.5	1.7
Percent Women	63%	62%
Percent Renter	74%	54%
Percent Don't Own/Lease Vehicle	54%	35%
Average Expenditures		
Shelter	$8,062	$10,095
Food	$4,707	$5,142
Transportation	$3,490	$4,847
Healthcare	$2,509	$4,299
Entertainment	$1,067	$1,257
Apparel and Services	$1,294	$729
Household Furnishings and Equipment	$803	$1,036
Telephone Services	$653	$950
Electricity	$788	$1,022
Other	$4,920	$6,542
Total	**$28,293**	**$35,919**

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Figure 14: Low Income Household Budgets in the Midwest is a profile of the three million households in the Midwest Census region that had income before taxes below fifteen thousand dollars in 2022 and the four million households in that region that had income before taxes of fifteen thousand to thirty thousand. These two low income household categories accounted for twenty four percent of all households in the Midwest.

For both low income groups, again, their average income after taxes exceeds their average income before taxes and their average total expenditures greatly exceed either. And again, the percentage that rent rather than own their home, and the percentage that don't own or lease a vehicle are all much higher than those for households with average income before taxes greater than thirty thousand dollars per annum.

The average annual electric bills of these two low income groups are $1,019 and $1,125. This amounts to 3.4 percent of their total expenditures for both groups.

Figure 14: Low Income Household Budgets in the Midwest

	Less Than $15,000 Income Before Taxes	$15,000 to $29,999 Income Before Taxes
Average Demographics		
Number of Households, Millions	2.6	4.2
Income Before Taxes	$8,068	$22,184
Income After Taxes	$10,597	$24,738
Age	55.2	60.9
Persons in Household	1.6	1.6
Percent Women	60%	62%
Percent Renter	62%	45%
Percent Don't Own/Lease Vehicle	37%	19%
Average Expenditures		
Shelter	$7,219	$7,782
Food	$4,791	$4,245
Transportation	$3,969	$5,017
Healthcare	$3,011	$4,062
Entertainment	$1,398	$1,513
Apparel and Services	$1,140	$659
Household Furnishings and Equipment	$1,201	$1,079
Telephone Services	$744	$831
Electricity	$1,019	$1,125
Other	$5,869	$6,857
Total	**$30,361**	**$33,170**

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Figure 15: Low Income Household Budgets in the West is a profile of the three million households in the West Census region that had income before taxes below fifteen thousand dollars in 2022 and the four million households in that region that had income before taxes of fifteen thousand to thirty thousand. These two low income household categories accounted for twenty one percent of all households in the West.

For both low income groups, again, their average income after taxes exceeds their average income before taxes and their average total expenditures greatly exceed either. And again, the percentage that rent rather than own their home, and the percentage that don't own or lease a vehicle are all much higher than those for households with average income before taxes greater than thirty thousand dollars per annum.

The average annual electric bills of these two low income groups are $923 and $1,055. This amounts to 2.5 percent of their total expenditures for both groups. These are relatively modest percentages, far less than for the low income households in the South discussed above and even less than in the Northeast and Midwest regions.

Figure 15: Low Income Household Budgets in the West

	Less Than $15,000 Income Before Taxes	$15,000 to $29,999 Income Before Taxes
Average Demographics		
Number of Households, Millions	2.7	3.7
Income Before Taxes	$6,961	$22,678
Income After Taxes	$9,208	$25,108
Age	54.3	58.5
Persons in Household	1.6	1.7
Percent Women	52%	55%
Percent Renter	67%	57%
Percent Don't Own/Lease Vehicle	36%	18%
Average Expenditures		
Shelter	$10,689	$10,860
Food	$6,009	$6,112
Transportation	$4,869	$6,296
Healthcare	$2,949	$3,818
Entertainment	$1,480	$2,222
Apparel and Services	$998	$1,121
Household Furnishings and Equipment	$1,259	$1,362
Telephone Services	$688	$860
Electricity	$923	$1,055
Other	$6,471	$7,778
Total	**$36,335**	**$41,484**

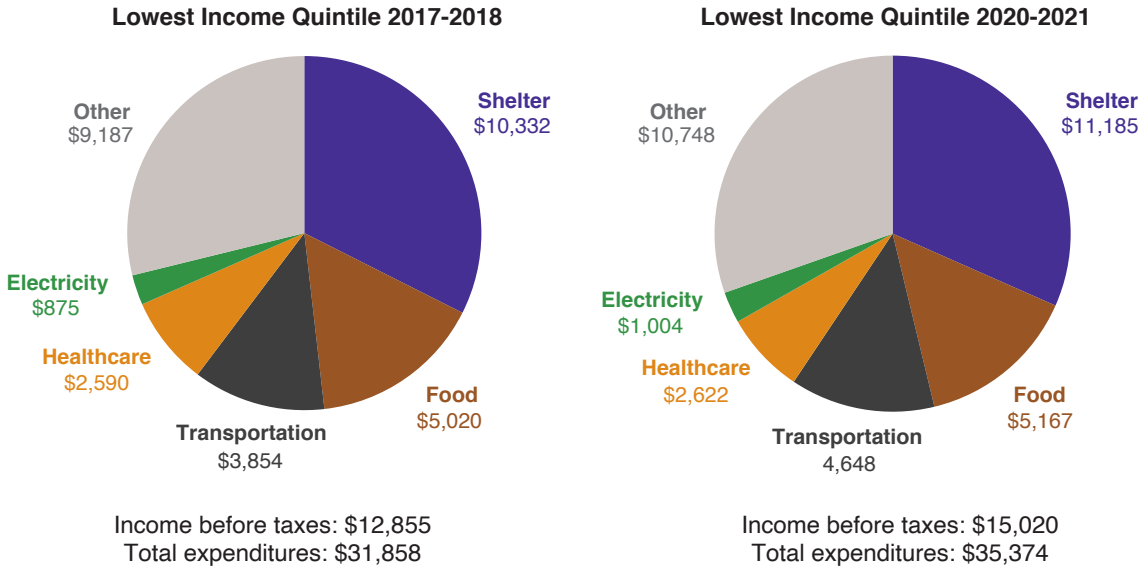
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Now, let us take a deep dive into understanding the economic situation of the lowest income quintile households in different parts of the country. First up, those in California. Of the twenty-seven million lowest income quintile households nationally, nearly three million of them reside in the Golden State. In Figure 16: Expenditures of California's Lowest Income Quintile, we analyze their buying power and key changes over the most recent three-year period for which we have data, from 2017-2018 to 2020-2021.

Note that their expenditures on shelter, food, transportation, and healthcare take up the lion's share of their buying power. In 2020-2021, on average, these four classes of expenditures accounted for two-thirds of all that they spent money on, or as a percentage in tenths, 66.8 percent. Electric bills accounted for 2.8 percent of all that they spent money on. The remaining 30.4 percent of their buying power was spent on other goods and services, that is, aside from shelter, food, transportation, healthcare, and electric bills.

From 2017-2018 to 2020-2021, over the three-year period, their average residential electric bill increased 14.7 percent. Their household total expenditures increased 11.0 percent. Had their electric bill increased at the same rate as total expenditures, 11.0 percent, then their average electric bill would have been $972 per year or $81 monthly, rather than what it was, $1,004 per year or $84 monthly. They would have $3 more per month to spend.

Figure 16: Expenditures of California's Lowest Income Quintile



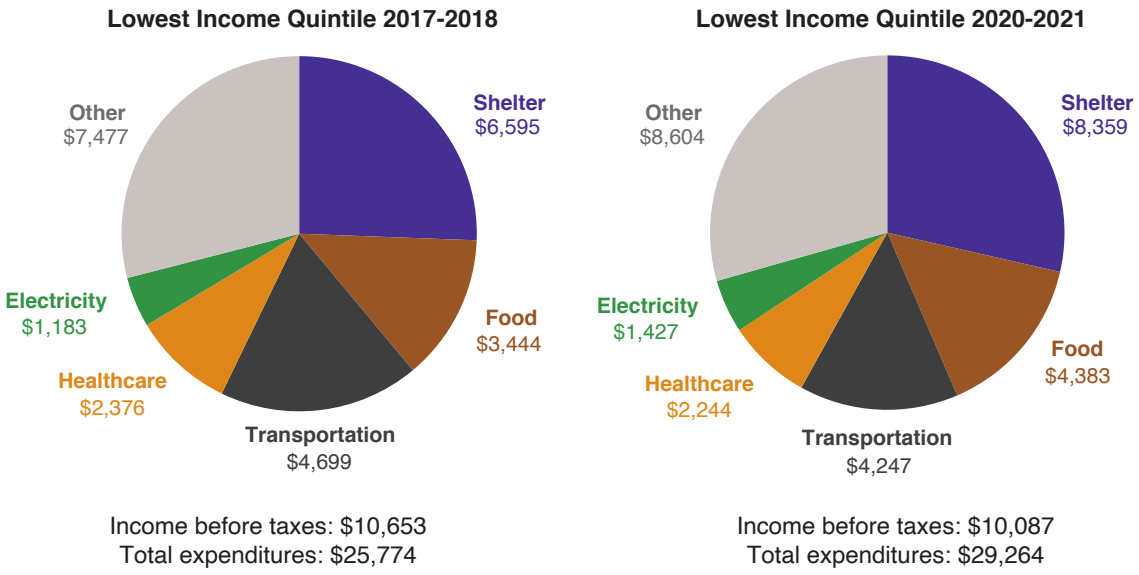
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Next up, the lowest income quintile households in Texas. Over two million such households reside in the Lone Star State. In Figure 17: Expenditures of Texas' Lowest Income Quintile, as we did above for the lowest income quintile in California, we analyze their buying power and key changes over the most recent three-year period for which we have data, from 2017-2018 to 2020-2021.

Their expenditures on shelter, food, transportation, and healthcare again take up the lion's share of their buying power. In 2020-2021, on average, these four classes of expenditures accounted for very nearly two-thirds of all that they spent money on, or as a percentage in tenths, 65.7 percent. Electric bills however accounted for 4.9 percent, far more than in California. The remaining 29.4 percent of their buying power was spent on all other goods and services, aside from shelter, food, transportation, healthcare, and electric bills.

From 2017-2018 to 2020-2021, over the three-year period, their average residential electric bill increased 20.6 percent. Their household total expenditures increased 13.5 percent. Had their electric bill increased at the same rate as total expenditures, 13.5 percent, then their average electric bill would have been $1,343 per year or $112 monthly, rather than what it was, $1,427 per year or $119 monthly. They would have $7 more per month to spend.

Figure 17: Expenditures of Texas' Lowest Income Quintile



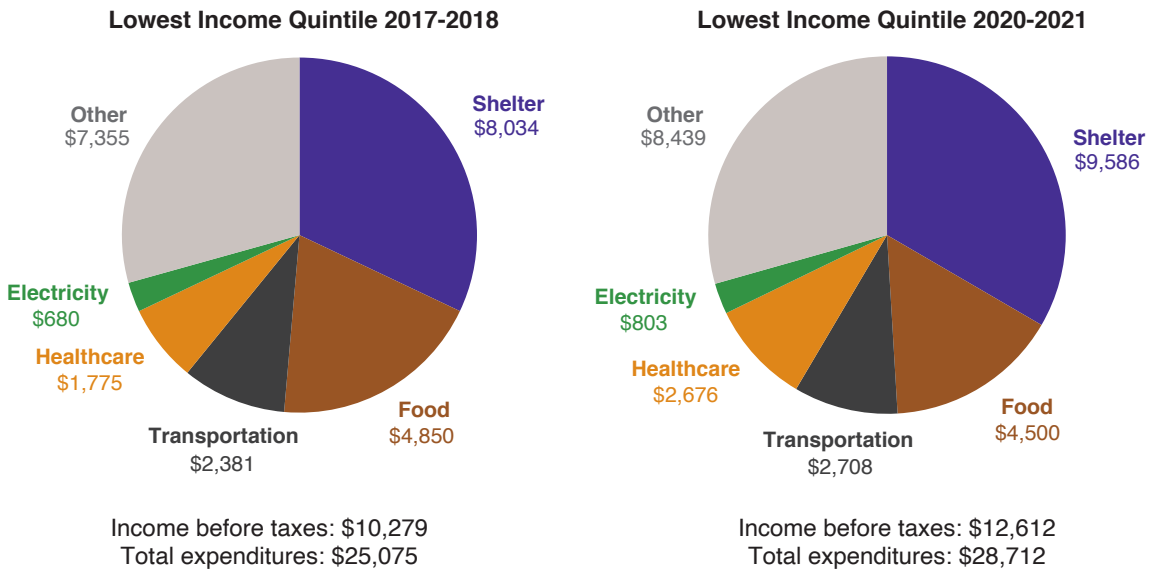
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

This time, we go to another populous state, but in the northeastern U.S., New York. One and a half million such households reside in the Empire State. In Figure 18: Expenditures of New York's Lowest Income Quintile, as we did above for the lowest income quintiles in California and Texas, we analyze their buying power and key changes over the most recent three-year period for which we have data, from 2017-2018 to 2020-2021.

Their expenditures on shelter, food, transportation, and healthcare again take up the lion's share of their buying power. In 2020-2021, on average, these four classes of expenditures accounted for slightly above two-thirds of all that they spent money on, or as a percentage in tenths, 67.8 percent. Electric bills accounted for 2.8 percent, the same as in California. The remaining 29.4 percent of their buying power was spent on all other goods and services, aside from shelter, food, transportation, healthcare, and electric bills, the same as in Texas.

From 2017-2018 to 2020-2021, over the three-year period, their average residential electric bill increased 18.1 percent. Their household total expenditures increased 14.5 percent. Had their electric bill increased at the same rate as total expenditures, 14.5 percent, then their average electric bill would have been $779 per year or $65 monthly, rather than what it was, $803 per year or $67 monthly. They would have $2 more per month to spend.

Figure 18: Expenditures of New York's Lowest Income Quintile



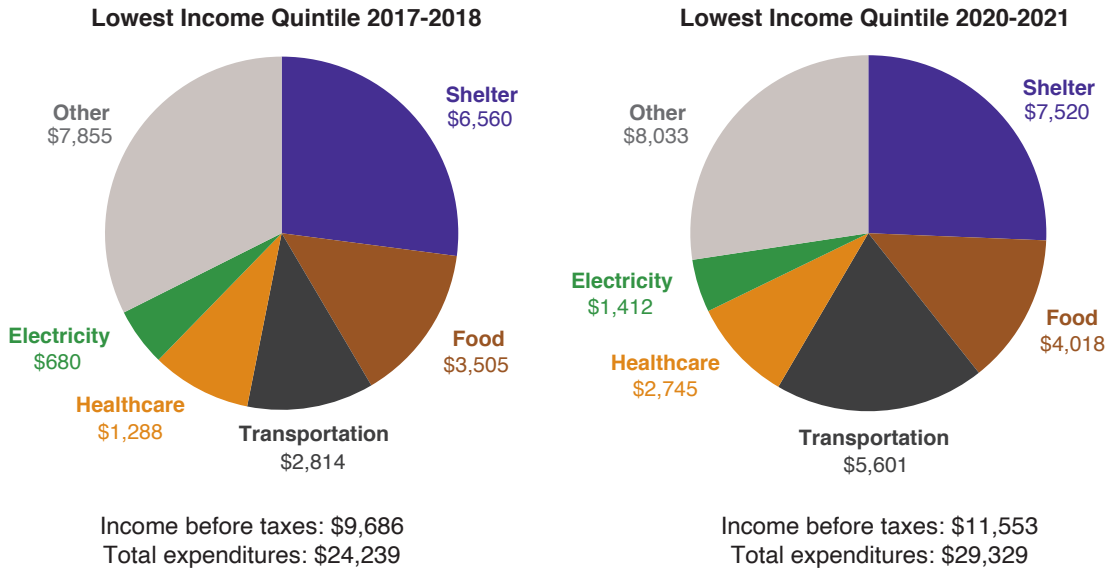
Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

Last, we go to a fourth populous state, but in the southeastern U.S., Florida. Nearly two million such households reside in the Sunshine State. In Figure 19: Expenditures of Florida's Lowest Income Quintile, as we did above for the lowest income quintiles in California, Texas, and New York, we analyze their buying power and key changes over the most recent three-year period for which we have data, from 2017-2018 to 2020-2021.

Their expenditures on shelter, food, transportation, and healthcare again take up the lion's share of their buying power. In 2020-2021, on average, these four classes of expenditures accounted for slightly above two-thirds of all that they spent money on, or as a percentage in tenths, 67.8 percent, the same as in New York. Electric bills however accounted for 4.8 percent, almost the same as in Texas. The remaining 27.4 percent of their buying power was spent on all other goods and services, aside from shelter, food, transportation, healthcare, and electric bills, the least percentage of these four large states.

From 2017-2018 to 2020-2021, over the three-year period, their average residential electric bill increased only 9.6 percent. Their household total expenditures increased 21.0 percent, a considerably faster rate than the increase of their expenditures for electricity.

Figure 19: Expenditures of Florida's Lowest Income Quintile



Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey.

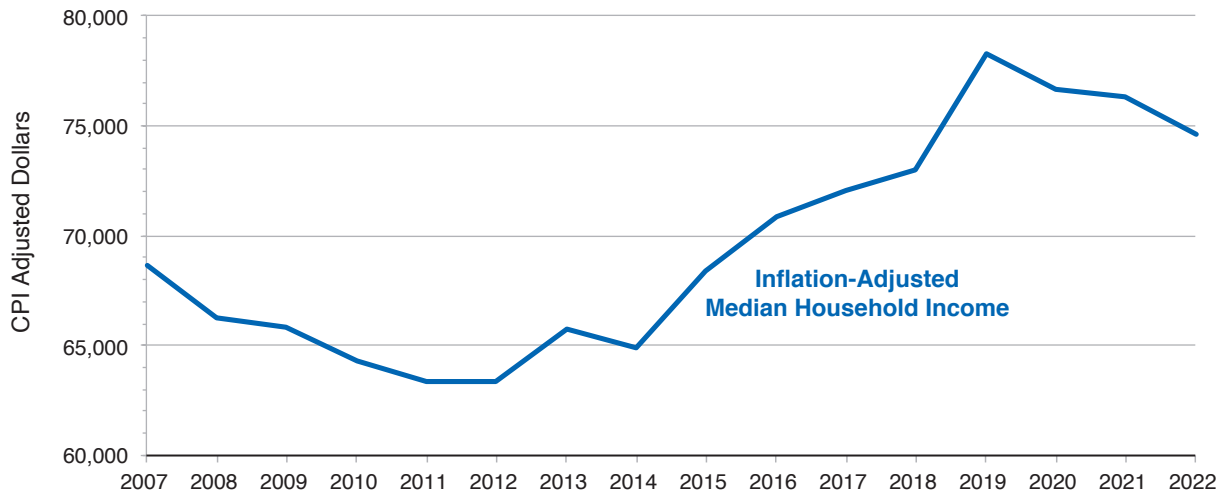
Chapter IV. Inflation

Household incomes in the U.S. have, on average, not risen much faster than the rate of inflation over the last fifteen years, which has meant that a sizable proportion of households find it challenging to buy the goods and services they need and want. One way to see this is shown in Figure 20: Inflation-Adjusted Annual Income Has Been Stagnant.

From 2007, before the great recession, to 2022, median inflation-adjusted income across all American households, rose 8.7 percent. That is over an extended fifteen-year time period.

Since the mathematical term "median" means in this context the middle, in which half of all households are above and half are below, the implication is that several tens of millions of households have experienced very little or no growth in inflation-adjusted income. No wonder many consumers are concerned about affordability.

Figure 20: Inflation-Adjusted Annual Income Has Been Stagnant

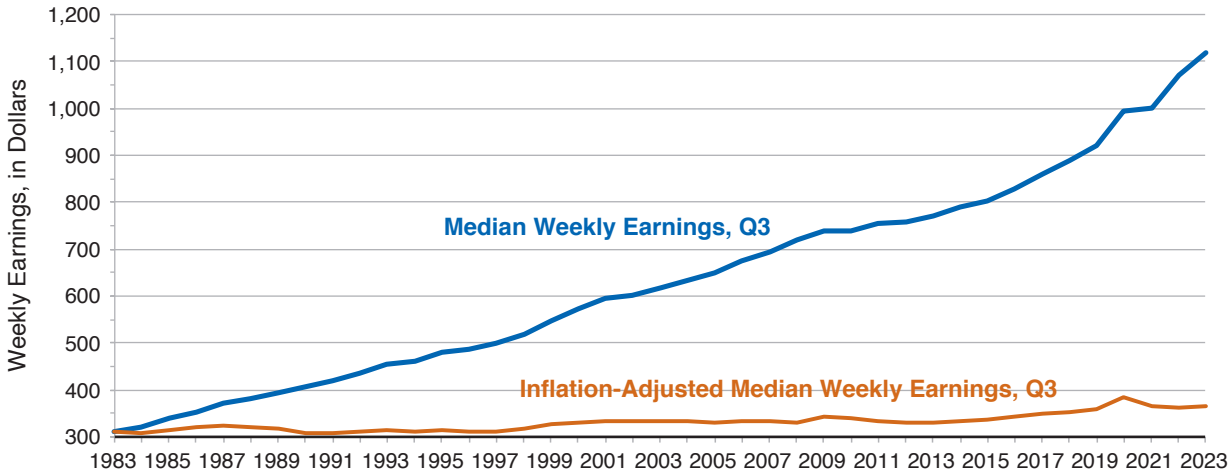


Source: U.S. Department of Commerce, Census Bureau.

The same trend can be seen by examining the median weekly earnings data series. Here in Figure 21: Inflation-Adjusted Weekly Income Has Also Not Grown, we go all the way back to 1983, forty years ago.

When inflation is taken into account, the long-term stagnation in household buying power is evident in this graph. Of course, tens of millions of American households have experienced growth in their earnings and income. But the point is that tens of millions of households have not.

Figure 21: Inflation-Adjusted Weekly Income Has Also Not Grown



Wage and Salary Workers Median Usual Weekly Earnings, in Dollars.

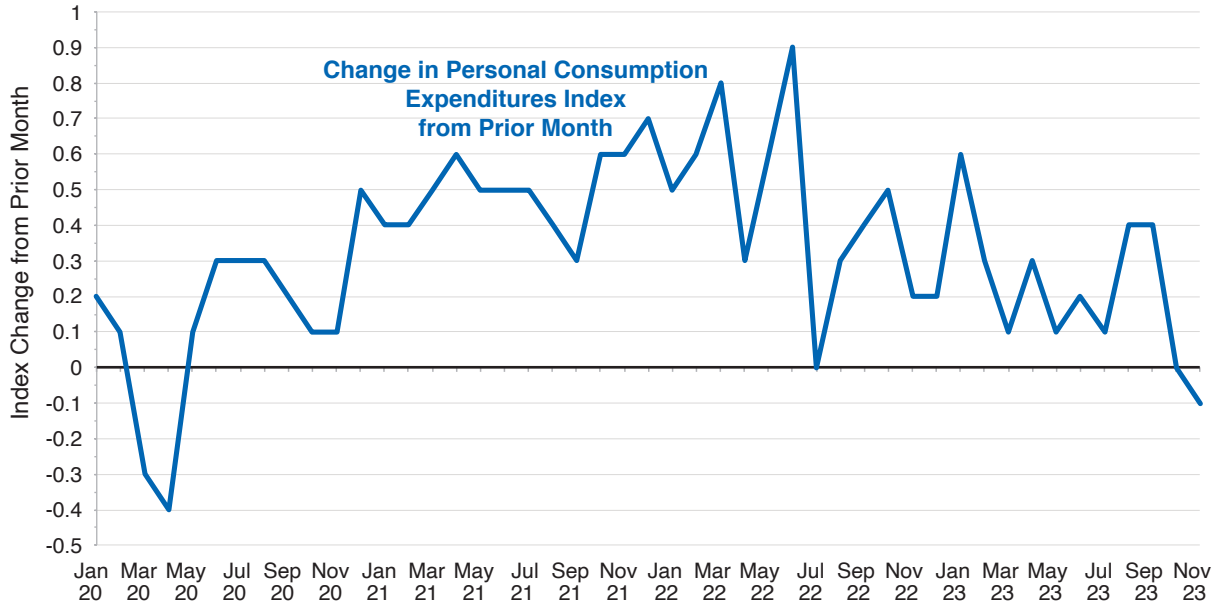
Source: U.S. Department of Labor, Bureau of Labor Statistics, and Federal Reserve Bank of St. Louis.

The spike in inflation during the later stages of the pandemic and the subsequent months is well known. Less well known, as demonstrated in Figure 22: After Pandemic Inflation, Price Increases Easing in Recent Months, is that inflation has considerably slowed in the last few months.

The Federal Reserve Bank is following this closely of course. Their compelling interest rates to rise has apparently come to an end. It would not be surprising if the new year brings with it a continuation of moderate inflation and the Fed following suit with adjustments downward of interest rates.

American households would feel this most directly in shelter and transportation costs and in their credit bills. A range of the goods and services we need and want will seem more affordable.

Figure 22: After Pandemic Inflation, Price Increases Easing in Recent Months

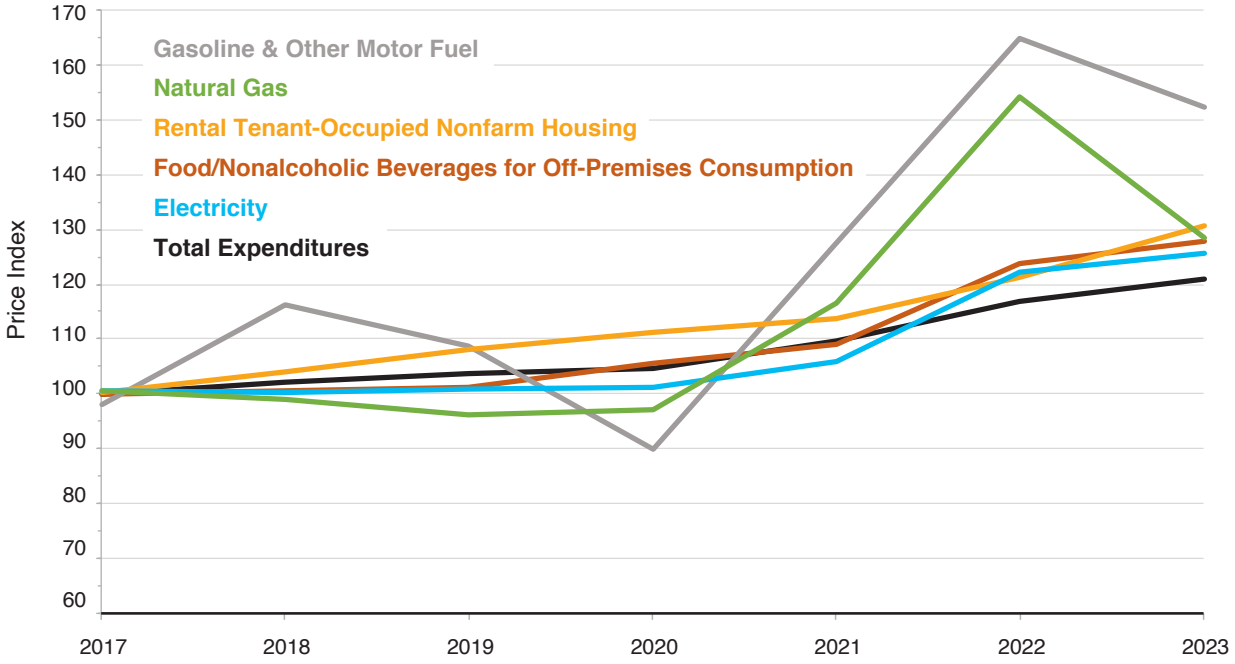


Source: U.S. Department of Commerce, Bureau of Economic Analysis.

In Figure 23: Inflation for Key Household Expenses Before, During, After Pandemic, we show the recent trends in inflation's ups and downs for food, gasoline, home rents, utilities, and expenditures in general. Clearly, inflation was across the board in the summer of 2021 and continuing through the summer of 2022, impacting households in many different directions.

It is said all the time, in the media and elsewhere, that the purchase of this or that class of goods and services has become unaffordable for many economically pressed households, such as filling up the gasoline tank, or renting an apartment. But it is more accurate to say that for economically stressed households, purchasing goods and services generally has become unaffordable for them. Electric bills, whether they are two, three, or four percent of such a household's purchasing, is just one of the more noticeable purchases and one of the contributors to its unaffordability challenge.

Figure 23: Inflation for Key Household Expenditures Before, During, After Pandemic

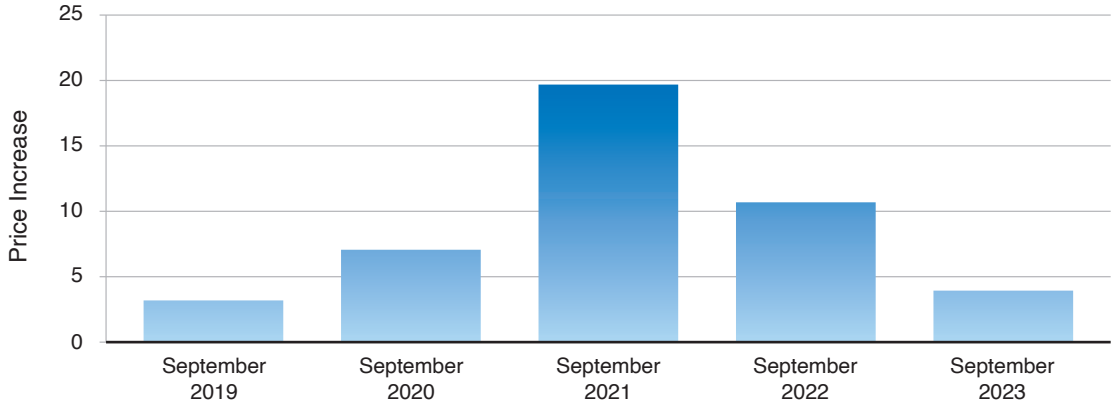


Source: U.S. Department of Commerce, Bureau of Economic Analysis.

The pandemic had numerous political, economic, and social effects, among them supply chain and labor shortages resulting in a spike in the purchase prices of new homes. See Figure 24: Home Prices Went Through the Roof.

Note, particularly, the nearly twenty percent jump in prices in the twelve months from September 2020 to September 2021. With a nearly eleven percent further increase in the following twelve months ending September 2022.

Figure 24: Home Prices Went Through the Roof



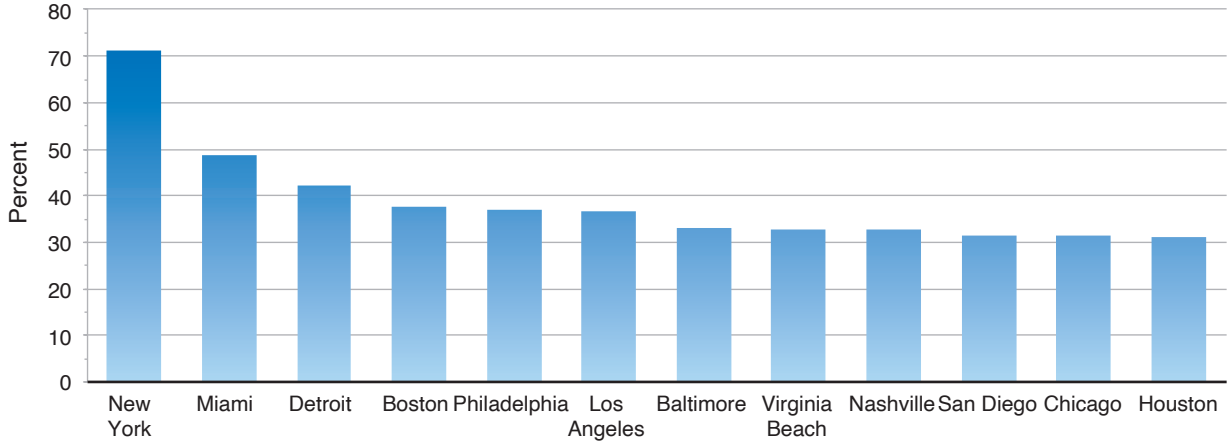
Price Increase, Year-over-Year, Existing Single-Family Homes in the U.S., in Percent.

Source: S&P Dow Jones Indices LLC, S&P/Case-Shiller U.S. National Home Price Index, and Federal Reserve Bank of St. Louis.

It is commonly said that one shouldn't spend more than thirty percent of their income on renting a place to live. The recent inflation in rentals has upended that advice. See Figure 25: Rent Burden for Singles in Twelve Least Affordable Areas.

In these twelve major markets, the median rent for a studio apartment now significantly exceeds thirty percent of the median income of singles. This dynamic has put pressure on the economics of many young people. And also, anecdotally, encouraged many of them to double and triple up in tight living spaces.

Figure 25: Rent Burden for Singles in Twelve Least Affordable Areas



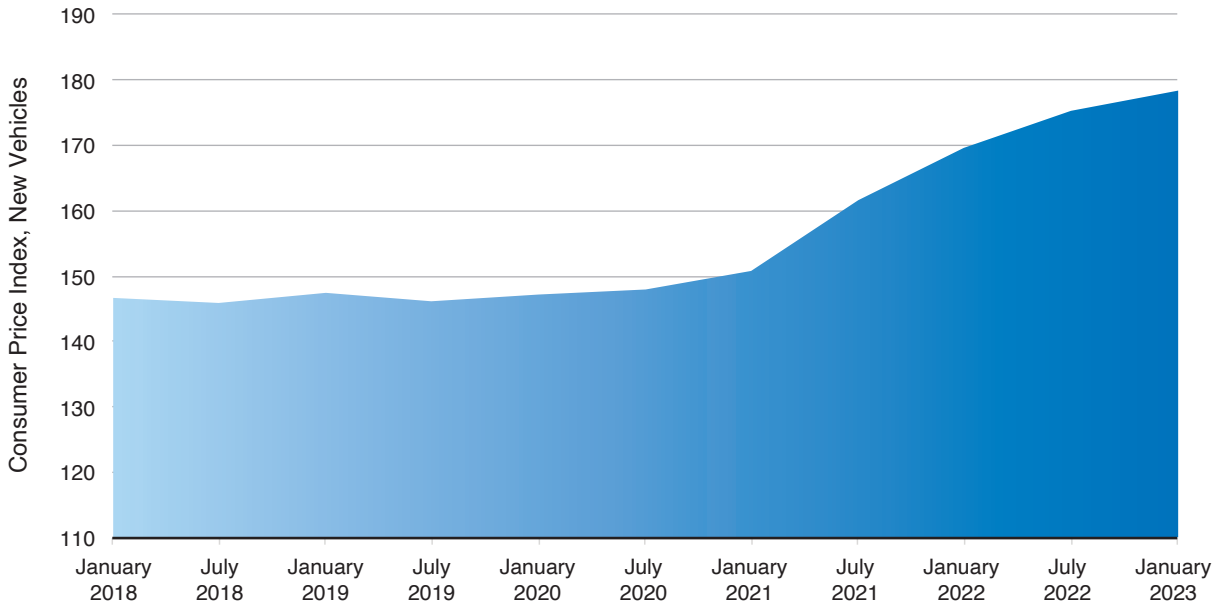
Median Studio Rent as Percent of Median Singles Income, in Percent.

Source: RentHop Singles Index, Updated December 21, 2023.

It is not only in housing where inflation in the price of a necessity has added on to the cash crunch facing many. On the purchase of a car, see Figure 26: New Vehicle Prices Run Off the Road.

Note that the statistical component of the Consumer Price Index for new vehicles was at 178.5 in January of 2023. That's eighteen percent higher than where the new vehicles CPI component was just four years earlier, this run of inflation disrupting the earlier multi-year trend of stable new vehicle prices.

Figure 26: New Vehicle Prices Run Off the Road



Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index.

Chapter V. Household Finances

Notwithstanding the great recession of 2009-2011 and the inflationary spike of 2021-2023, household total expenditures on all goods and services has grown significantly in the U.S. during the fifteen-year period of 2008 through 2022. This is true even when household total expenditures are inflation-adjusted, and even when they are then also expressed on a per capita basis. This is true nationally, in every state since 2008, and in all but eight of the states since 2021. See Figure 27: Household Expenditures Growing, Inflation-Adjusted and Per Capita.

A technical note. The analyses in this Figure and the next are based upon U.S. Department of Commerce/Bureau of Economic Analysis data on household total expenditures, which tend to be higher than U.S. Department of Labor/Bureau of Labor Statistics data on household total expenditures. As we have said above, the former numbers are higher than the latter numbers because BEA includes expenditures made by third parties on behalf of households such as by insurance, pensions, government, and other institutions. Though as long as an analysis consistently uses one or the other, that is, BEA data or BLS data, then it is indeed an orange-to-orange or apple-to-apple comparison, in the vernacular.

Now back to the results of this analysis. Utah's inflation-adjusted per capita expenditures grew a remarkable 36.7 percent during the fifteen-year period, and in both Colorado and New York this growth was 30.0 percent. Kansas had the lowest such growth, at 12.0 percent. Nationally, inflation-adjusted per capita expenditures were 22.2 percent higher in 2022 than they were in 2008, just before the great recession took hold.

What does this mean? That you can take the role of inflation and population growth out of the equation, and still, households in the aggregate were able to purchase more goods and services in the early twenty-twenties than they were able to do in the late twenty-aughts.

Note the critical caveat we just invoked, "in the aggregate." Included within the aggregate is everyone with the means of Elon Musk, Tim Cook, Taylor Swift, and nearly as much, all the way down to the most destitute households in the country.

So, tens of millions of households now have substantially more buying power, pulling up aggregate and average stats. However, importantly, tens of millions of households, among the hundred and thirty-four million households in the U.S., do not. Their buying power, even when their income is boosted up by monies or money equivalents from Social Security, the Supplemental Nutrition Assistance Program, other governmental programs, charities, pensions, savings, support from relatives and friends, etc., inadequately and inconsistently matches their expenditures on necessary goods and services.

The affordability problem faced by those who can do something about the problem, including those of us in the utility and utility regulation line of work, is to identify those truly at the lower end of that scale, and to target them with solutions, directly and effectively. Easier said than done, of course. But some policy and regulatory solutions do stand out as more directly targeted and as more effective.

Figure 27: Household Expenditures Growing, Inflation-Adjusted and Per Capita

	2008 Inflation-Adjusted Per Capita Expenditures	2021 Inflation-Adjusted Per Capita Expenditures	2022 Inflation-Adjusted Per Capita Expenditures	Percent Increase 2008-2022	Percent Increase 2021-2022
Alabama	34,779	40,827	41,618	19.7%	1.9%
Alaska	41,989	47,267	50,003	19.1%	5.8%
Arizona	34,416	43,701	43,239	25.6%	-1.1%
Arkansas	33,296	40,473	42,039	26.3%	3.9%
California	35,684	44,965	46,181	29.4%	2.7%
Colorado	38,470	48,267	50,016	30.0%	3.6%
Connecticut	41,791	50,331	48,924	17.1%	-2.8%
Delaware	41,517	47,721	47,973	15.6%	0.5%
District of Columbia	57,422	64,996	65,469	14.0%	0.7%
Florida	38,084	46,172	46,837	23.0%	1.4%
Georgia	35,338	41,853	42,629	20.6%	1.9%
Hawaii	36,353	40,393	42,493	16.9%	5.2%
Idaho	32,224	39,698	40,830	26.7%	2.9%
Illinois	38,066	44,782	46,247	21.5%	3.3%
Indiana	35,545	42,218	43,717	23.0%	3.6%
Iowa	38,189	43,171	44,300	16.0%	2.6%
Kansas	39,409	42,653	44,131	12.0%	3.5%
Kentucky	34,659	42,183	42,620	23.0%	1.0%
Louisiana	35,614	42,275	42,986	20.7%	1.7%
Maine	38,895	48,794	47,676	22.6%	-2.3%
Maryland	38,341	41,951	43,229	12.7%	3.0%
Massachusetts	44,076	50,994	50,585	14.8%	-0.8%
Michigan	35,480	44,822	45,641	28.6%	1.8%
Minnesota	41,505	45,545	46,604	12.3%	2.3%
Mississippi	32,495	39,036	39,154	20.5%	0.3%
Missouri	40,042	44,704	45,976	14.8%	2.8%
Montana	38,722	48,203	49,560	28.0%	2.8%
Nebraska	39,762	45,366	47,520	19.5%	4.7%
Nevada	36,682	44,402	45,529	24.1%	2.5%
New Hampshire	41,731	50,566	48,696	16.7%	-3.7%
New Jersey	41,881	46,594	47,607	13.7%	2.2%
New Mexico	33,569	40,809	41,047	22.3%	0.6%
New York	36,071	44,627	46,909	30.0%	5.1%
North Carolina	35,537	43,331	43,757	23.1%	1.0%
North Dakota	42,537	49,640	51,158	20.3%	3.1%
Ohio	36,733	44,021	45,013	22.5%	2.3%
Oklahoma	34,858	39,685	40,816	17.1%	2.8%
Oregon	36,525	42,400	42,179	15.5%	-0.5%
Pennsylvania	39,314	46,626	48,097	22.3%	3.2%
Rhode Island	37,183	43,776	43,474	16.9%	-0.7%
South Carolina	35,772	42,061	42,576	19.0%	1.2%
South Dakota	40,107	46,797	47,986	19.6%	2.5%
Tennessee	35,557	43,281	43,446	22.2%	0.4%
Texas	34,923	42,375	43,376	24.2%	2.4%
Utah	32,158	42,529	43,957	36.7%	3.4%
Vermont	41,104	47,631	47,516	15.6%	-0.2%
Virginia	38,639	43,037	43,921	13.7%	2.1%
Washington	37,982	43,967	44,377	16.8%	0.9%
West Virginia	34,907	41,620	42,931	23.0%	3.1%
Wisconsin	38,421	44,769	46,009	19.7%	2.8%
Wyoming	40,195	48,993	49,136	22.2%	0.3%
United States	**37,063**	**44,328**	**45,279**	**22.2%**	**2.1%**

Source: Source: U.S. Department of Commerce, Bureau of Economic Analysis.

It wasn't just total household expenditures that grew substantially during the fifteen-year period of 2008 though 2022, inflation-adjusted and per capita, but income did as well. See Figure 28: Household Income Was Growing but Fell in 2022, Inflation-Adjusted and Per Capita.

We said above with respect to total household expenditures that they grew nationally by 22.2 percent during this period. And in this Figure, we can see that income grew a little bit faster than that, specifically, by 23.1 percent.

This good clip of growth in income during the last fifteen years is true even though inflation-adjusted per capita income fell sharply from 2021 to 2022, by a remarkable 4.6 percent. And by as much as 8.7 percent in Rhode Island, 8.6 percent in the District of Columbia, 8.5 percent in New Hampshire, and 8.2 percent in Oregon. Though even in those three states and D.C. where households were generally hit extra hard last year, their fifteen-year inflation-adjusted per capita income growth was 16.8 percent, 21.2 percent, 22.7 percent, and 19.4 percent, respectively.

Four of the Mountain states grew their household incomes the fastest during the fifteen years. Utah households' inflation-adjusted per capita income grew 38.9 percent, Idaho households' income grew at 37.7 percent, Montana households' income grew at 37.4 percent, and Colorado households' income grew at 36.8 percent. For these households in particular, on average of course, their buying power outran the price increases of most of the goods and services they purchased, including the necessities, their shelter, food, transportation, healthcare, and utilities.

Figure 28: Household Income Was Growing but Fell in 2022, Inflation-Adjusted and Per Capita

	2008 Inflation-Adjusted Per Capita Income	2021 Inflation-Adjusted Per Capita Income	2022 Inflation-Adjusted Per Capita Income	Percent Increase 2008-2022	Percent Increase 2021-2022
Alabama	42,242	52,290	50,053	18.5%	-4.3%
Alaska	51,624	57,623	58,069	12.5%	0.8%
Arizona	38,967	53,694	50,480	29.5%	-6.0%
Arkansas	40,983	53,390	52,430	27.9%	-1.8%
California	43,801	63,271	59,103	34.9%	-6.6%
Colorado	46,677	64,282	63,875	36.8%	-0.6%
Connecticut	61,514	72,206	67,254	9.3%	-6.9%
Delaware	45,923	55,553	55,709	21.3%	0.3%
District of Columbia	60,529	80,287	73,383	21.2%	-8.6%
Florida	43,264	57,193	54,746	26.5%	-4.3%
Georgia	42,027	53,954	50,954	21.2%	-5.6%
Hawaii	42,839	50,224	48,095	12.3%	-4.2%
Idaho	38,633	54,349	53,199	37.7%	-2.1%
Illinois	48,415	61,090	57,654	19.1%	-5.6%
Indiana	43,045	56,596	54,811	27.3%	-3.2%
Iowa	49,431	59,451	58,769	18.9%	-1.1%
Kansas	51,282	58,997	57,958	13.0%	-1.8%
Kentucky	41,032	53,132	50,138	22.2%	-5.6%
Louisiana	47,048	54,860	51,925	10.4%	-5.3%
Maine	42,076	55,479	51,855	23.2%	-6.5%
Maryland	50,561	59,801	57,736	14.2%	-3.5%
Massachusetts	54,461	71,971	66,701	22.5%	-7.3%
Michigan	41,948	55,251	52,679	25.6%	-4.7%
Minnesota	49,860	62,468	60,785	21.9%	-2.7%
Mississippi	39,184	49,677	45,818	16.9%	-7.8%
Missouri	47,099	56,045	54,753	16.3%	-2.3%
Montana	42,420	58,704	58,297	37.4%	-0.7%
Nebraska	50,465	62,680	61,750	22.4%	-1.5%
Nevada	42,848	58,810	55,582	29.7%	-5.5%
New Hampshire	48,279	64,766	59,247	22.7%	-8.5%
New Jersey	53,849	64,046	61,250	13.7%	-4.4%
New Mexico	39,593	52,357	49,501	25.0%	-5.5%
New York	48,246	63,666	60,472	25.3%	-5.0%
North Carolina	45,877	55,605	53,226	16.0%	-4.3%
North Dakota	53,507	66,621	68,481	28.0%	2.8%
Ohio	44,451	56,903	54,516	22.6%	-4.2%
Oklahoma	49,104	56,420	54,724	11.4%	-3.0%
Oregon	42,239	54,976	50,448	19.4%	-8.2%
Pennsylvania	46,902	61,233	57,849	23.3%	-5.5%
Rhode Island	44,835	57,342	52,380	16.8%	-8.7%
South Carolina	40,425	51,875	49,456	22.3%	-4.7%
South Dakota	53,966	66,784	66,857	23.9%	0.1%
Tennessee	42,800	57,819	54,794	28.0%	-5.2%
Texas	46,111	56,565	55,382	20.1%	-2.1%
Utah	39,101	55,448	54,307	38.9%	-2.1%
Vermont	45,363	57,077	53,806	18.6%	-5.7%
Virginia	49,384	60,057	58,281	18.0%	-3.0%
Washington	47,357	62,680	59,175	25.0%	-5.6%
West Virginia	40,351	49,594	48,337	19.8%	-2.5%
Wisconsin	46,757	59,557	57,465	22.9%	-3.5%
Wyoming	58,234	70,876	68,772	18.1%	-3.0%
United States	**45,816**	**59,110**	**56,419**	**23.1%**	**-4.6%**

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Suppose you order all hundred and thirty-four million households according to their wealth. Then separate out the sixty-seven million households with the most wealth, from the households with the very greatest wealth, Elon Musk's perhaps, to the one right above the halfway point. This would leave you with the bottom half of American households in terms of their wealth. Well, that's exactly what the Federal Reserve Bank of St. Louis does, regularly, to track the financial situation of bottom half households.

And that is what is shown in Figure 29: Net Worth of Bottom Half Households. This Figure is a snapshot of the financial situation of the bottom half.

The net worth of bottom half households in aggregate is 3.6 trillion dollars. That sounds like a lot. But when you divide that sum by the number of bottom half households, you derive the average net worth of bottom half households. That average net worth is $55,117.

This Figure also shows a breakdown of the assets and liabilities of bottom half households. These numbers provide some insights about the bottom half. For one thing, the assets of bottom half households are predominantly real estate and consumer durables such as cars. In contrast, top half households generally have far greater financial assets, and oftentimes have substantial equity in private businesses.

For another thing, non-mortgage consumer credit is as much as forty-four percent of the liabilities of bottom half households. That amounts to around forty thousand dollars per household.

Figure 29: Net Worth of Bottom Half Households

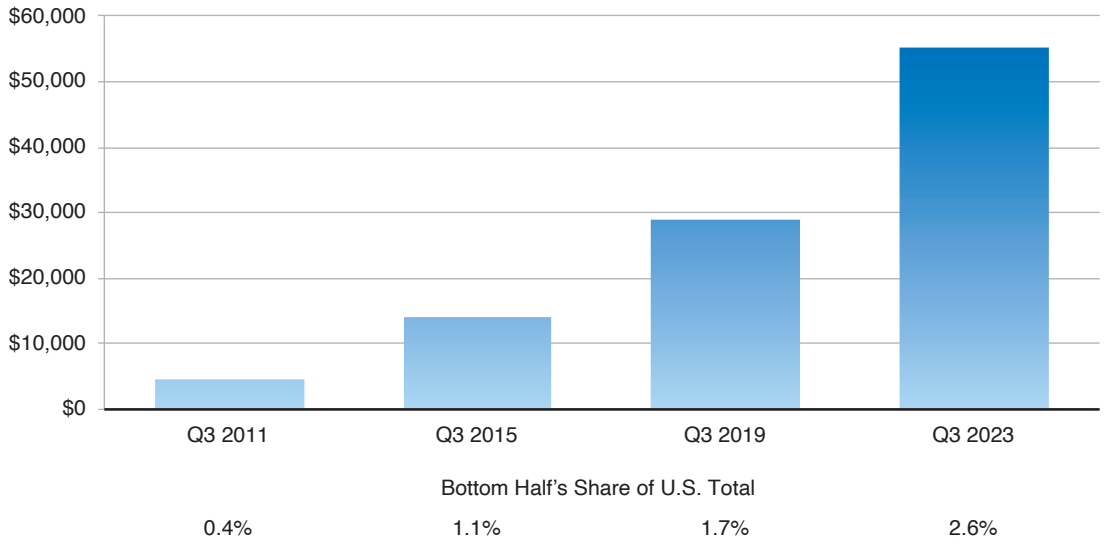
Assets	
Real Estate	$4.9 trillion
Consumer Durables	$1.8 trillion
Financial Assets	$2.8 trillion
Total Assets	$9.5 trillion
Liabilities	
Home Mortgages	$3.0 trillion
Consumer Credit	$2.6 trillion
Other	$0.3 trillion
Total Liabilities	$5.9 trillion
Net Worth	**$3.6 trillion**
Number of Households in Bottom Half in Wealth	66.1 million
Average Net Worth per Household	$55,117

Source: Federal Reserve Bank of St. Louis, Survey of Consumer Finances and Financial Accounts of the United States.

The good news for bottom half households is that their net worth, in aggregate at least, has grown significantly over the last dozen years. Their net worth averaged as little as $4,433 per household in the third quarter of 2011. Average net worth is now up to $55,117 per household, as of the third quarter of 2023. See Figure 30: Net Worth of Bottom Half Households Has Increased, Though Still Very Small Share of U.S. Total.

The not so good news for bottom half households is that even with this significant growth, their share of the net worth of all U.S. households, including the upper half households, remains extremely small. It was as low as 0.4 percent in the third quarter of 2011. It is now up to 2.6 percent, as of the third quarter of 2023.

Figure 30: Net Worth of Bottom Half Households Has Increased, Though Still Very Small Share of U.S. Total

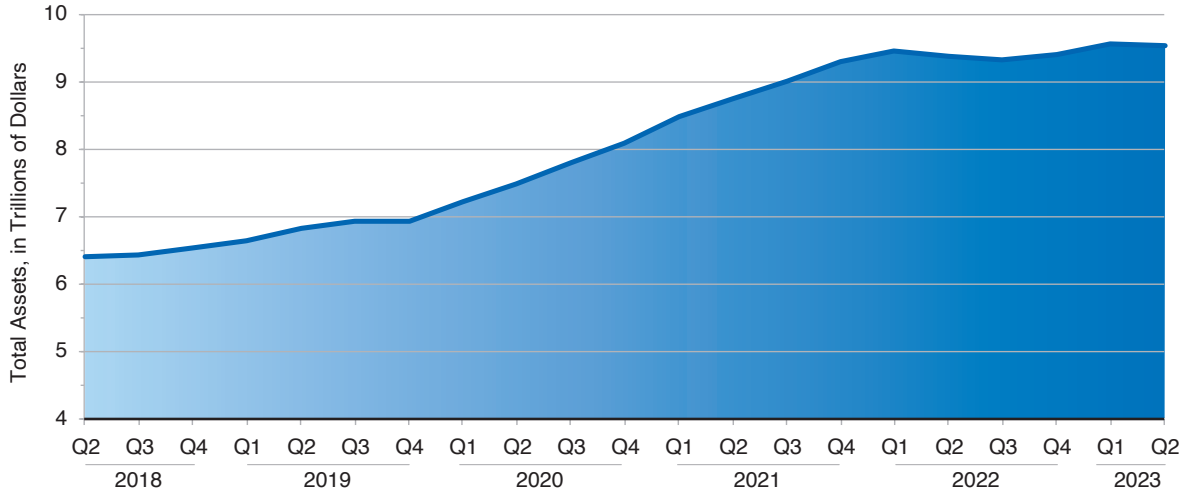


Source: Federal Reserve Bank of St. Louis, Survey of Consumer Finances and Financial Accounts of the United States.

It is the case for U.S. households generally, that their assets grew during the pandemic. This was predicted by few initially. But it was eventually acknowledged by all economists as consumers had fewer ways to spend money safely without risking the contracting of Covid.

Consumer credit was generally paid down, and savings accumulated. See Figure 31: Total Assets Held by Bottom Half of Households in Wealth Rose During Pandemic. Even for bottom half households, their assets rose in 2020 and 2021 especially. We are now past this phenomenon and bottom half assets in the aggregate have been fairly steady for the last seven quarters.

Figure 31: Total Assets Held by Bottom Half of Households in Wealth Rose During Pandemic

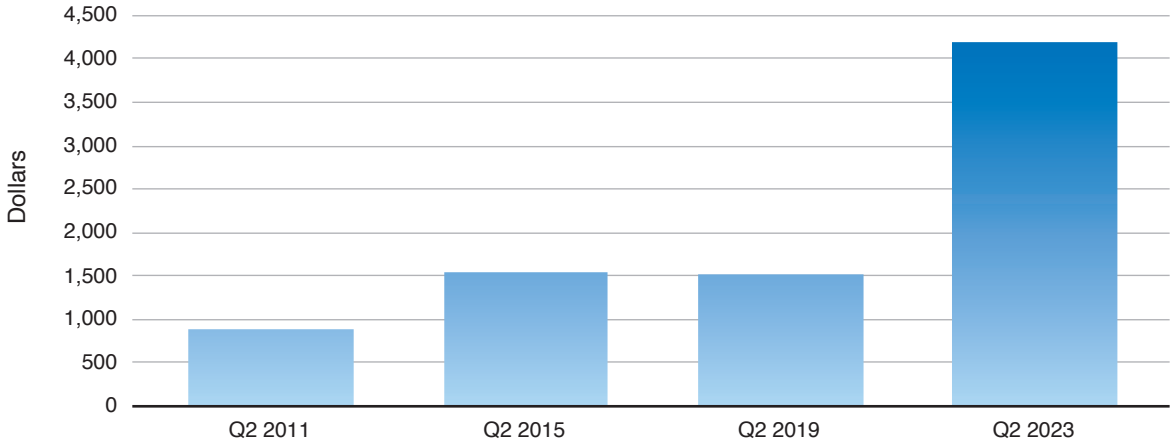


Source: Federal Reserve Bank of St. Louis.

As was the case for assets in general held by bottom half households, what the Federal Reserve Bank calls their "checkable deposits and currency" rose as well during the pandemic. Again, consumers had fewer ways to spend money safely without risking the contracting of Covid.

Additionally, the federal government made payments to the public to mitigate the effects of the pandemic, some of which undoubtedly helped to boost their assets. See Figure 32: Checkable Deposits and Currency of Bottom Half Households Has Increased, Though Still Very Low. Nevertheless, the current average of checkable deposits and currency held by bottom half households, $4,198, is modest at best in today's economy.

Figure 32: Checkable Deposits and Currency of Bottom Half Households Has Increased, Though Still Very Low



Average Checkable Deposits and Currency Held by Bottom Half Households

Source: Federal Reserve Bank of St. Louis, Survey of Consumer Finances and Financial Accounts of the United States.

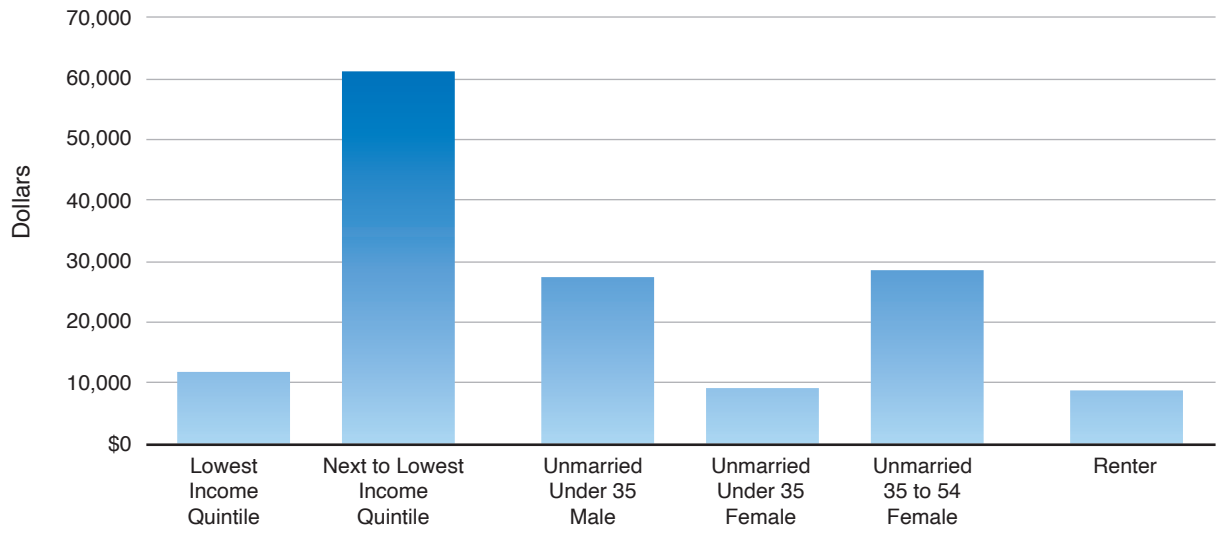
Across all hundred and thirty-four million American households, there are two economic groupings and four demographic groupings that generally have the least wealth on average. See Figure 33: Little Wealth of Low Income, Young, Unmarried, Renters. Not surprisingly, households in the lowest income quintile and households in the next to the lowest income quintile have little average wealth, $12,000 and $61,260, respectively.

As for the four demographic groupings, households in which what the U.S. Department of Labor/Bureau of Labor Statistics calls the "reference person" is an unmarried under age thirty-five male, an unmarried under age thirty-five female, an unmarried age thirty-five to fifty-four female, and renters of any age and sex, have little wealth too. $27,620, $9,390, $28,600, and $9,000, respectively.

So, if one is wondering which households have the most trouble meeting all their needs for goods and services, they are most likely in these low average wealth groupings. That is, households of young unmarried females, especially, with low incomes, especially, and renters, especially. If a household checks all these boxes, they would be expected to be the most likely to have their buying power fall short of their needs.

Certainly, there are undoubtedly many households of young unmarried females in rented homes that are thriving economically. Even a good number with low incomes as well. An example would be such households receiving some financial support from family. But there are apparently millions of households of unmarried females in rented homes that are not thriving, and are pressed to pay their bills, their electric bills included.

Figure 33: Little Wealth of Low Income, Young, Unmarried, Renters



Source: U.S. Department of Commerce, Census Bureau, "The Wealth of Households: 2021," June 2023.

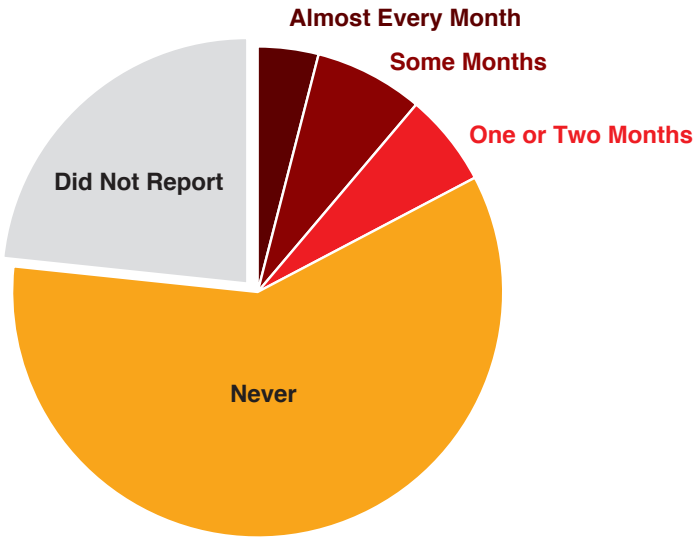
Chapter VI. Most Stressed Households

Among the questions in the extraordinary Household Pulse Survey, that has been conducted for a couple of weeks at a time since April 23 – May 5, 2020 by the U.S. Department of Commerce/Census Bureau, American adults have been asked if they don't pay their energy bills almost every month, some months, or one or two months over the past year. In the most recent Household Pulse Survey, conducted in October 18 – 30, 2023, four percent of adults say they have missed paying their energy bills almost every month, seven percent say they have missed paying their energy bills some months, and six percent say they have missed paying their energy bills once or twice over the past year. See Figure 34: Households Unable to Pay Energy Bills.

Only fifty-nine percent of adults report they have not missed paying an energy bill over the past year. However, twenty-three percent of the adults in the October 18 – 30, 2023 Survey did not reply to this question.

Nonetheless, seventeen percent have missed paying energy bills at least occasionally over the past year versus fifty-nine percent that have not. Put another way, more than a fifth of all those answering this question in the most recent Household Pulse Survey reported that they miss paying energy bills at least occasionally. Considering that there are a hundred and thirty-four million households nationally, one could suppose that twenty million or more households across the U.S. do miss paying one or more energy bills over the course of a year.

Figure 34: Households Unable to Pay Energy Bills



Source: U.S. Department of Commerce, Census Bureau, Household Pulse Survey, October 18-30, 2023.

Who are they? That is, what characterizes the households that miss paying energy bills from time to time? See Figure 35: Which Households Unable to Pay Energy Bills.

When one takes a close look at the Household Pulse Survey results, certain characteristics stand out as the most common among households missing paying their energy bills. For example, of those surveyed adults that said they miss energy bills almost every month, sixty-one percent were female, fifty-seven percent were unmarried, and fifty-two percent had children in their household. Additionally, over the past seven days, forty-two percent said they were not employed, and over the past seven days, forty-six percent used borrowings from friends or family.

Figure 35: Which Households Unable to Pay Energy Bills

Household Unable to Pay an Energy Bill or Unable to Pay Full Amount in Last Twelve Months

	Almost Every Month	Some Months	One or Two Months
Percent U.S. Adults	4%	7%	6%
Percent Female	61%	56%	52%
Percent Not Married	57%	53%	50%
Percent Children in Household	52%	49%	34%
Percent Loss of Employment Income Last Four Weeks	30%	24%	18%
Percent Not Employed Last Seven Days	42%	40%	36%
Percent Used Borrowings from Friends or Family Last Seven Days	46%	32%	31%
Percent Used Supplemental Nutrition Assistance Program (SNAP) Last Seven Days	25%	20%	15%
Percent Used School Meal Debit/EBT Cards Last Seven Days	17%	10%	8%

Source: U.S. Department of Commerce, Census Bureau, Household Pulse Survey, October 18-30, 2023.

Also, where are they? That is, where do the most economically stressed households live (with the greatest density of households having trouble paying their electric bills or for that matter all their bills)? One way at this question is to highlight the areas with the lowest income on average. See Figure 36: Ten Metro Areas with Lowest Income, Inflation-Adjusted and Per Capita.

While the average inflation-adjusted per capita income in the U.S. is $56,419, in the estimation of the U.S. Department of Commerce/Bureau of Economic Analysis, in 2017 constant dollars, it is only $49,654 in non-metro areas. No surprise there. It is widely understood that incomes and the cost-of-living are generally lower in rural areas of the country. Although, as we have demonstrated above in this Electric Affordability Factbook, electric bills tend to go against this trend and are generally higher in rural areas, in the rural South particularly.

This being said, the average inflation-adjusted per capita income in McAllen-Edinburg-Mission, Texas for example is just $33,315. There are undoubtedly many households in this area that have the unfortunate combination of low income, low buying power, and high electric bills. Two other of the ten lowest-income metro areas are in Texas, these being Brownsville-Harlingen and Laredo. Their average inflation-adjusted per capita income is $37,744 and $39,104, respectively. Five of the ten lowest-income metro areas are in California and the two remaining are in the Southeast.

Figure 36: Ten Metro Areas with Lowest Income, Inflation-Adjusted and Per Capita

Lowest Income Metro Areas	Lowest Income, Inflation-Adjusted and Per Capita, Constant 2017 Dollars
McAllen-Edinburg-Mission, Texas	$33,315
Hanford-Corcoran, California	$35,886
Hinesville, Georgia	$36,203
Bakersfield, California	$37,085
Brownsville-Harlingen, Texas	$37,744
Merced, California	$38,743
Lakeland-Winter Haven, Florida	$38,801
Madera, California	$38,888
El Centro, California	$38,983
Laredo, Texas	$39,104
United States, Total	**$56,419**
United States, Non-Metro Areas Only	**$49,654**

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Chapter VII. Role of Natural Gas Prices

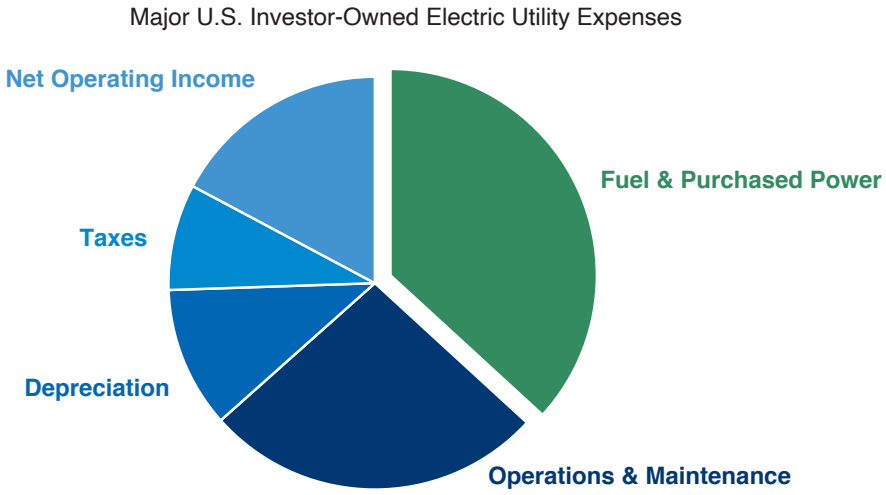
A good question to ask is, if an electric bill is unaffordable for a given household, what makes it so? Not just generally, but what makes it unaffordable that is within the power of the utility rendering that bill and the regulators setting the rates that, together with the household's usage of electricity, set that bill?

The answer could be said to be quite apparent and in several ways. If one, for instance, looks at today's largest single component of electric utility costs nationally, as well as the one that is the most volatile, it is related to the price of natural gas. Including natural gas' direct and indirect effects on the predominant charge in electric bills, that is, fuel and purchased power, however that is referred to in customer bills. See Figure 37: Natural Gas Prices Play Prominent Role in Electric Utility Expenses and Rates.

As absolutely critical as natural gas is, in its role in today's electric generation mix and the energy transformation going forward, there's no question that its central role can affect the affordability of electric bills for tens of millions of American households like no other factor in the industry and its economic regulation. The Figure shows that fuel and purchased power dwarfs the other expenses of investor-owned electric utilities on a percentage basis, at 36.8 percent. That's, for example, well over twice the magnitude of all their net operating income, or well over three times as much as all their depreciation of investments in capital, or nearly forty percent more than all their operations and maintenance expenses.

It is the case that not the entirety of their fuel and purchased power is driven by natural gas prices, directly or indirectly. There are other fuel costs such as from the purchase of coal for the still significant coal-fired power plant fleet. However, since natural gas-fired power plants are often the marginal resource in many power markets around the country, when gas prices spike, power market clearing prices spike too. This too is why gas prices play a leading role in driving electric utility costs, and electric bills, through the bills' fuel and purchased power charges.

Figure 37: Natural Gas Prices Play Prominent Role in Electric Utility Expenses and Rates



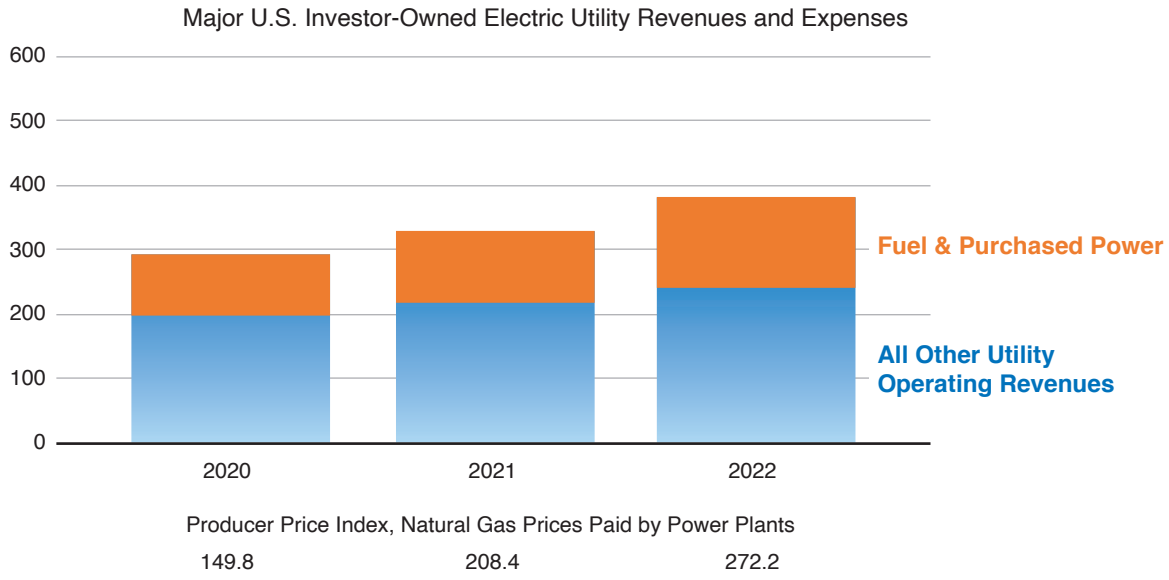
Natural gas prices heavily influence the amount of Fuel & Purchased Power and thus total electric utility expenses and rates.

Source: U.S. Department of Energy, Energy Information Administration, and Federal Energy Regulatory Commission, FERC Form 1.

It hasn't always been so. As is well known to the readers of this Electric Affordability Factbook, natural gas has been taking on a greater responsibility for generating the nation's electricity in recent years. And with that greater responsibility, gas has been increasingly determining the ups and downs too of electric utility expenses, rates, and bills. See Figure 38: Natural Gas Prices Now Playing a More Prominent Role in Electric Utility Expenses and Rates.

In just the past three years, the share of fuel and purchased power expenses has risen dramatically, relative to overall electric utility operating revenues (which electric customers reimburse utilities for, more or less in full). At the same time, the price of the natural gas that is purchased by power plants, according to the U.S. Department of Labor/Bureau of Labor Statistics' Producer Price Index, has gone from 149.4 to 208.4 to 272.2. One needs no more evidence than this stat to appreciate how gas prices, more than anything else, are setting electric bill levels. Of all electric utility customers, including residential customers, and most relevant in this Factbook, including the electric bills of households that are finding it difficult to pay their bills for everything, including the bills sent to them by their local electric utility.

Figure 38: Natural Gas Prices Now Playing a More Prominent Role in Electric Utility Expenses and Rates



Source: U.S. Department of Labor, Bureau of Labor Statistics, Producer Price Index.

Natural gas prices go up and electric rates and bills inevitably go up too. Natural gas prices go down and yes, electric rates and bills then go down in their seemingly synchronous dance.

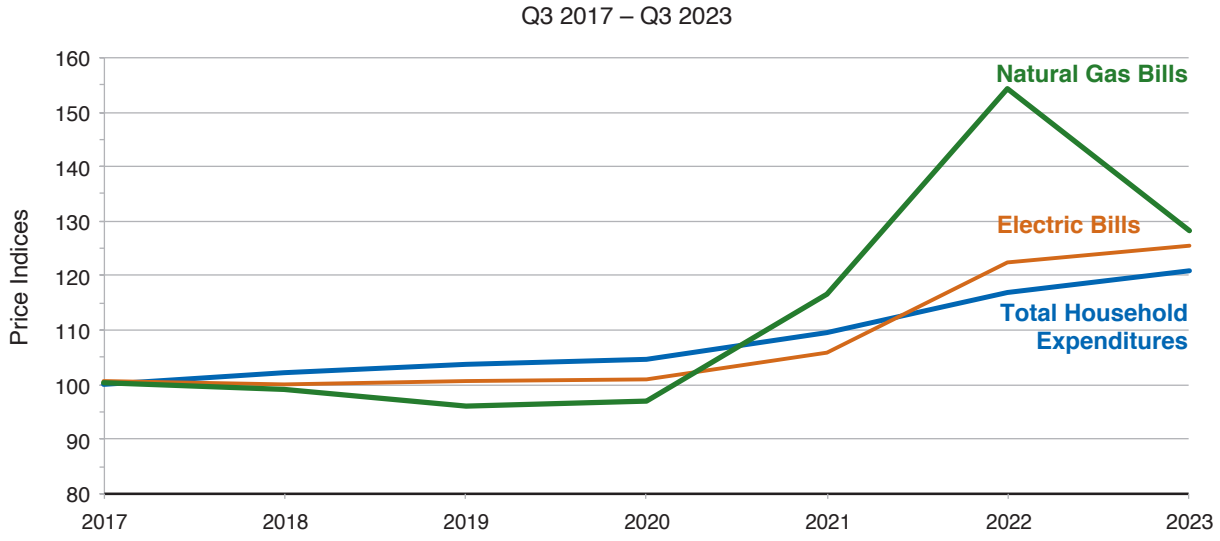
One can demonstrate this in several ways. Here's one, where we show side-by-side the price indices for the residential bills of electric utilities and gas utilities. See Figure 39: Electric Rates Move with Natural Gas Rate Rises and Falls.

Note for example that both residential electric and gas bills jumped up in the third quarter of 2021, and then really jumped up higher in the third quarter of 2022 following Russia's invasion of Ukraine. By the third quarter of 2023, the price indices of both electric and gas bills settled back down.

Indeed, in the Figure, one can see that the price index for electric bills in the third quarter of 2017, the beginning of the period depicted in the Figure, was 100.7. The price index for gas bills was a nearly identical 100.5. That the two indices are so close is no accident. Again, the two track each other closely over time periods short, medium, and long.

Then, look at the end of the period depicted in the Figure, the third quarter of 2023. The price index for electric bills was 125.5. The price index for gas bills was slightly higher 128.4, by around two percent. Six years later, with wars, a worldwide pandemic, inflation not seen for decades, etc., electric and gas bills continued to track each other closely.

Figure 39: Electric Rates Move with Natural Gas Rate Rises and Falls



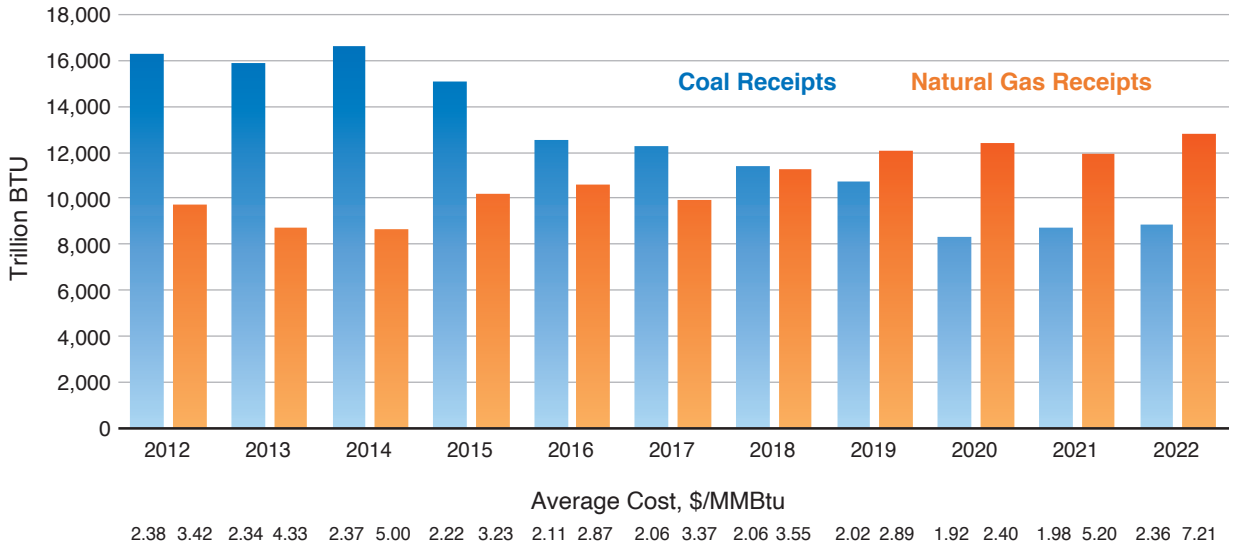
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

This tracking of residential electric bills and natural gas bills matters so much, when discussing electric bill affordability, because gas prices are fundamentally volatile. They go up and they go down, frequently, and sometimes quite substantially. All sorts of external disruptions can cause this, as we witnessed after Hurricane Katrina, and after Russia's invasion of Ukraine. It only takes tensions to rise in the Persian Gulf or in the Strait of Malacca to drive up Henry Hub prices for natural gas.

As shown in Figure 40: Natural Gas Surge Increasing Power Plant Cost Volatility, the vulnerability of electric utility costs, rates, and bills is increasing with the electric grid's greater dependence on the natural gas supply chain. At the beginning of the period covered by the Figure, the year 2012, power plant receipts of coal were above those of natural gas by forty percent, in BTU. At the end of the period, the year 2022, receipts of coal were below those of gas by forty-five percent.

And during the eleven-year period, the price of coal per BTU was remarkably steady. But the price of natural gas per BTU was most certainly not steady. So as the grid has decreased coal-fired generating capacity and increased gas-fired generating capacity, electric utility costs, rates, and bills have become even more in sync with the price of gas. There can be no worse news for the affordability of electric bills for households barely able to make ends meet than to hear that the price of natural gas is going up.

Figure 40: Natural Gas Surge Increasing Power Plant Cost Volatility



Source: U.S. Department of Energy, Energy Information Administration, Forms EIA-923 and EIA-423.

Chapter VIII. Affordability Approaches

It helps little the households having the most difficulty paying bills of every kind, including for their usage of electricity, if we in the utilities industry and in utility regulation cannot effectively do something about the problem. Is there anything in our operations, policy, and regulatory toolbox that can really make a difference?

The tool most reached for these days has been to restrain the increase in electric utility revenue requirements in the decisions and orders of base rate cases. In Figure 41: Revenue Requirement Increase's Effect on Illustrative Renter's Electric Bills Versus Energy Efficiency, we show how a representative revenue requirements decision impacts the financial situation of a typical urban renting household.

The hypothetical regulatory decision increases the electric utility's revenue requirements by three hundred million dollars, or six percent. The household's electric bill, averaged monthly, accordingly increases six percent from $90 to $95.40 (assuming no consequential changes in cost allocation and rate design). Paying for electricity has gone up for this utility customer from 3.6 percent of household total expenditures to 3.7 percent, adjusting for general inflation of three percent per annum. The household now has $5.40 less to devote to paying for other goods and services each month after paying for electricity.

Imagine for a moment that the revenue requirements increase was further restrained, by half the above amount. In that case, the household would have $2.70 less to devote to paying for other goods and services each month rather than $5.40. The household would be better off by $2.70 monthly which, while not nothing, is nevertheless not much of a difference maker for the financial situation of most lowest income quintile households.

In the second year of the increase in utility revenue requirements, and again adjusting for general inflation, paying for electricity has gone back down to its initial level of 3.6 percent of household total expenditures. This snapback to the initial level illustrates the effect of an increase in utility revenue requirements taking place every few years but general inflation taking place every year.

Now, factor in an energy efficiency program. Assume, somewhat modestly, that the program has the effect of reducing the household's electric bill by fifteen percent. Since electric bills are very heavily dependent on per kilowatt-hour usage in most jurisdictions of utility regulation, this result from efficiency improvements is often achievable.

Then, in the second year of the increase in utility revenue requirements, and again adjusting for general inflation, paying for electricity has gone all the way down to 3.1 percent of household total expenditures. The household now has $14.31 more to devote to paying for other goods and services after paying for electricity.

Compare that $14.31 monthly savings for the household in this example to the $2.70 monthly savings by restraining utility revenue requirements, cutting a regulatory increase in half. The math of this example illustrates the power of energy efficiency to be a difference maker for the financial situation of lowest income quintile households.

Figure 41: Revenue Requirement Increase's Effect on Illustrative Renter's Electric Bills Versus Energy Efficiency

	Year Before New Rates	First Year with New Rates	Second Year with New Rates	Second Year with New Rates & 15% Energy Efficiency
Utility Revenue Requirements, in $ Millions	$5.0 billion	$5.3 billion	$5.3 billion	$5.3 billion
Illustrative Renter's Total Expenditures, in $/Month	$2,500	$2,575	$2,652	$2,652
Illustrative Renter's Electric Bill, in $/Month	$90.00	$95.40	$95.40	$81.09
Renter's Electric Bill Percent of Total Expenditures	3.6%	3.7%	3.6%	3.1%
Renter's Non-Electric Bill Expenditures	$2,410	$2,480	$2,557	$2,571

So, we ask again, that question that has come up again and again as a continuing theme in this Factbook. What are the most effective tools in the toolbox of electric utilities and utility regulation to lessen the burden on households that find it difficult to make ends meet (that is, to pay for all the things they need including the electric service to their home)?

The reader, after going through all the data and all the analysis above, might conclude as we have concluded, that a few tools in that toolbox stand out. They appear to be the most practical and promising to make a real difference in the lives of those with lesser economic means in the communities we serve.

See Figure 42: Practical Approaches to Improve Electric Bill Affordability. There we list three of the tools that can be difference makers. These are approaches that are available to electric utility decisionmakers and regulators, and do have a good chance to help an appreciable number of the residential customers struggling with their spending on necessities.

Two caveats before we go on. We do not maintain that this list cannot be added to. We only assert that these three approaches are practical and have promise to make a difference. And we do not maintain that it is any less important than it has always been to ensure that electric utility service is affordable as well as reliable, safe, and clean for utility customers as a whole no matter their financial means.

Ok, now that we have those caveats out of the way, let us proceed to the list of effective tools that can be difference makers. First up, we can increase our ongoing efforts to improve customers' energy efficiency.

Especially for households that meet two conditions. Condition one: such households live in large single-family detached houses. They are the homes that have the highest electric bills for a simple reason. They have the greatest volumes of interior space to cool (and heat if they heat electrically as is common in the South).

The data is hands-down on this. For instance, in 2022, the average monthly electric bill of homeowners nationally was a hundred and sixty-one dollars and the average for renters was a hundred and one dollars, per the U.S. Department of Labor/Bureau of Labor Statistics' Consumer Expenditure Survey. Surely there is some proportion of homeowners that own their home in a multi-family dwelling or an attached single-family house. Similarly, there is some proportion of renters that rent their home in a single-family detached house or an attached single-family house. Though the largest proportion of homeowners are in single-family detached houses, with the highest electric bills, and the largest proportion of renters are in multi-family dwellings, with the lowest electric bills.

For instance, in 2022, of the hundred and thirty million occupied homes nationally, eighty-one million are single-family detached houses, per the U.S. Department of Commerce/Census Bureau's American Community Survey. Of those, seventy million were occupied by the homeowner and just eleven million were rented. And eighteen million of the occupied homes nationally are in multi-family dwellings of ten or more units. Of those, sixteen million were rented and just two million were occupied by the homeowner.

Condition two: such households purchase goods and

services considerably less than the national and regional averages. This is generally because their incomes are also considerably less than the national and regional averages. Or for many of them, their incomes are near or at zero (being unemployed or retired).

Per the U.S. Department of Labor/Bureau of Labor Statistics' Consumer Expenditure Survey, for 2022, the lowest income quintile averages 0.4 earners per household out of 1.6 people, the next to the lowest income quintile averages 0.9 earners out of 2.1 people, the middle income quintile averages 1.3 earners out of 2.4 people, the next to the highest income quintile averages 1.8 earners out of 2.9 people, and the highest income quintile averages 2.1 earners out of 3.2 people. Their average incomes before taxes were $14,191, $37,441, $65,659, $108,730, and $244,025, respectively. Their average electric bills as a percentage of average household total expenditures were 3.7 percent, 3.2 percent, 2.7 percent, 2.2 percent, and 1.6 percent, respectively.

When a household's electric bills as a percentage of its total expenditures falls below three percent – as is the case for a majority of American households, as is the case for the large majority of households outside the South Census region, as is the case for the very large majority of households in the big cities outside the South – operational, policy, and regulatory changes we can implement to constrain electric utility costs, rates, and bills will have a modest effect at best on the household's ability to buy what it needs and wants. This can be shown arithmetically in another example.

Suppose the electric bills of a household amount to three percent of all its expenditures. Suppose further that there's a proposal to raise electric rates by as much as ten percent. Ratemaking proposals rarely recommend raising rates by that much. Anyway, all other things being held equal, allowance of the entire proposal would drive up the household's electric bills to three and three tenths of a percent of expenditures, driving down its expenditures on all other goods and services from ninety-seven percent to ninety-six and seven tenths' percent. If its monthly bill averaged a hundred dollars before, rather than have $3,233 monthly to spend on all other goods and services, it would have $3,223 monthly.

Now suppose half the proposal to raise rates is allowed instead of the entire amount. This would be a common regulatory result. For this hypothetical household, that had $3,233 monthly to spend on other goods and services prior to the regulatory allowance of half the proposal to raise rates, it would have $3,228 monthly post regulatory allowance of half the proposal.

Note that this is if the electric bills of a household amount to three percent of all its expenditures. For very many households outside the South, particularly for those in big cities with many living in multi-family dwellings and fewer living in large single-family houses, their electric bill percentage is usually considerably less than three percent. If for example a household's electric bill percentage is one and a half percent, the impact of that regulatory allowance of half the proposal to raise rates would have been half again as much. One can conclude that for sixty percent of all households nationally in the middle income quintile, next to the highest income quintile, and highest income quintile, especially if they live in cities in the Northeast, Midwest, and West Census regions, that decisions and orders regarding revenue requirements can have but a modest effect on their home budgets.

It comes as no surprise that the data shows, as income and total expenditures increase, from the lowest income quintile to the highest, discretionary spending becomes a greater share of expenditures. For example, in 2022 again, spending on telephone services averaged sixty-eight percent of electric bills for the lowest income quintile, seventy-six percent for the next to the lowest income quintile, eighty-five percent for the middle income quintile, ninety-five percent for the next to the highest income quintile, and ninety-three percent for the highest income quintile.

Second on the list of effective tools that can be difference makers, we can further mitigate the effects on electric bills when natural gas prices spike up. Especially for those same households with lesser economic means relative to their spending on necessities.

Aside from energy efficiency improvements for them, all kinds of demand-side programs – service territory-wide – can lessen gas price impacts. The same is true for natural gas hedging and gas storage strategies.

Natural gas-fired generation clearly has many invaluable qualities for the grid. That being said, the same

is true for further investment in non-gas-fired generation capacity. Renewable, nuclear, and hydro generation capacity – and new complementary technologies like energy storage and hydrogen – can also reduce the role of gas price volatility in electric bills.

Third, completing the list of effective tools that can be difference makers, we can up our game in installing community solar capacity. Especially for communities that are predominantly made up of lowest income quintile households.

Electric utilities are already doing some of this with the support of utility regulation. But substantially accelerating community solar development could have a significant effect on electric affordability among the households that would benefit most. Savings of twenty, thirty or forty dollars monthly, making available that money to help cover the other necessities of life. As in the case of the first two approaches, this third one directly drives down electric bills' kilowatt-hour usage based charges. Which for some households can be a significant three or more percent of their total expenditures on all goods and services.

Figure 42: Practical Approaches to Improve Electric Bill Affordability

1. Increase Energy Efficiency Improvements for Low Income Households Especially
2. Decrease Natural Gas Price Effects on Electric Bills Systemwide
3. Accelerate Installation of Community Solar for Low Income Households Especially

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About the Author

Steve Mitnick is executive editor of *Public Utilities Fortnightly* and principal owner and president of its parent company Lines Up, Inc., based in Arlington, Virginia. He also authors the weekly digital magazine *PUF's Where's Energy*.

In his career, he was on the leadership teams of energy consulting practices at McKinsey & Co., Marsh & McLennan/Oliver Wyman, Bates White Economic Consulting, and PHB/Hagler Bailly. He was also president of the transmission development company Conjunction LLC, and chief energy advisor to the Governor of New York.

His book, *Lines Down: How We Pay, Use, Value Grid Electricity Amid the Storm*, was published in June 2013. His book, *Lewis Latimer, The First Hidden Figure*, was published in November 2020. His book, *Women Leading Utilities, the Pioneers and Path to Today and Tomorrow*, was published in May 2021. His book, *Front Lines to Power Lines*, co-authored with Rachel Moore, was published in November 2021. His book, *Heroes of the Storms, How Electricity's Value is Built and Maintained*, again co-authored with Rachel Moore, was published in December 2022.

He has testified before utility regulatory commissions of six states, the District of Columbia, the Federal Energy Regulatory Commission, and in Canada. Early in his career, he was a member of the faculty of Georgetown University where he taught microeconomics, macroeconomics, and statistics. He has an M.B.A. from the Wharton School, University of Pennsylvania, and two B.S. degrees from Rensselaer Polytechnic Institute, in physics, and in history/political science. He received the 2021 Leadership Award from the Keystone Policy Center, and 2022 Champion Award from the Women's Council on Energy and the Environment.