Electric Use and Energy Efficiency
Evaluating Sense Article
EXECUTIVE SUMMARY

OVERVIEW

Sense is a company that monitors in-home energy consumption through machine learning applications. An April 29, 2019, Sense article was referenced during an interview on Texas Public Radio (TPR) stating San Antonio is number two in the United States in highest energy use per customer. The same statistic has recently been used by environmental stakeholders in other public forums.

The Sense article is incorrect. It is not a balanced or valid comparison of energy usage data for cities across the nation. The article uses 4,000 Sense customers and extrapolates that limited sample as being representative nationally. Further inaccuracies in the article include:

- San Antonio does not have the second highest residential electric usage per customer.
    - According to the Energy Information Administration (EIA), San Antonio ranks near the median nationally for kWh use per residential customer.
- Electric usage and energy usage, which for us includes gas, are erroneously used interchangeably in the article.
- Weather is the most impactful driver of electric use and the article does not account for weather and fuel type utilized for heating or cooling.
    - Hot / humid climates like San Antonio tend to utilize electricity for cooling and have higher electric usage all year.
    - Cooler climates tend to use natural gas, propane or oil for heating and have lower electric usage all year.
- The article implies there is a strong relationship between usage and utility pricing (EIA data indicates otherwise), and the article incorrectly uses annual electric cost and electricity rate/price interchangeably.

OUR ENERGY EFFICIENCY

CPS Energy has a very strong and effective energy conservation program:
- Fourth highest spend among other utilities that serve cities compared in the article.
- Effective programs with the highest kW savings per customer compared to utilities mentioned in the article.
- Our low-income programs have the second-best savings per residential customer.

TEAM

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- ❖ Link to Sense Article: https://www.prnewswire.com/news-releases/the-cities-and-states-using-the-most-and-least-residential-electricity-300835369.html

WHITE PAPER

PURPOSE

> **The article is based on 4,000 Sense customers but incorrectly extrapolates the results as a comparison across the nation.**

On April 22, 2019, Sense published an article which appeared on Cision PR Newswire. Sense is a company that offers a $299 device that provides consumers disaggregated energy efficiency data through its machine learning technology. Their device provides real-time insights on consumption, such as determining if appliances are running.

On August 26, 2020, during an interview on Texas Public Radio (TPR) Darby Riley, a lawyer and longtime member of the Alamo Sierra Club, stated San Antonio performs poorly in energy efficiency and referenced the Sense article that we ranked second in the United States in energy use per customer.

The article ranked selected cities based on what they defined as the cities that are most and least efficient.

	Least Electricity Usage		Most Electricity Usage
1	Burlington, VT	1	Phoenix, AZ
2	Concord, CA	2	San Antonio, TX
3	San Jose, CA	3	Dallas-Fort Worth, TX
4	Sacramento, CA	4	Tampa, FL
5	San Francisco-Oakland, CA	5	Austin, TX
6	Madison, WI	6	Palm Bay--Melbourne, FL
7	San Diego, CA	7	Houston, TX
8	Seattle, WA	8	Miami, FL
9	Portland, OR	9	Pittsburgh, PA
10	Providence, RI	10	Columbus, OH
11	Denver-Aurora, CA	11	Kansas City, KS
12	Los Angeles--Long Beach--Anaheim, CA	12	Atlanta, GA
13	Boston, MA	13	Orlando, FL

Figure 1: Selected Cities Electricity Usage Ranking
Source: Sense Article, April 22, 2019, Cision PR Newswire

SCOPE

This whitepaper will review the information included in the article, provide comparisons of various attributes of the cities included in the article, and describe San Antonio's energy efficiency performance.

This paper will examine how to compare electric usage versus energy usage on an equivalent basis. It also addresses inadequacies in the approach of comparisons and statements in the Sense article and examines CPS Energy's successes in promoting energy efficiency.

The Sense article utilizes data from a sample of 4,000 Sense customers to rank CPS Energy as second highest in the most electric usage category. The chart below from the Energy Information Administration (EIA) data shows CPS Energy ranks in the middle of national companies for kWh sales per residential customer. In this sample of 1,930 utilities, San Antonio is just below the median with 745 utilities using more kWhs per customer.
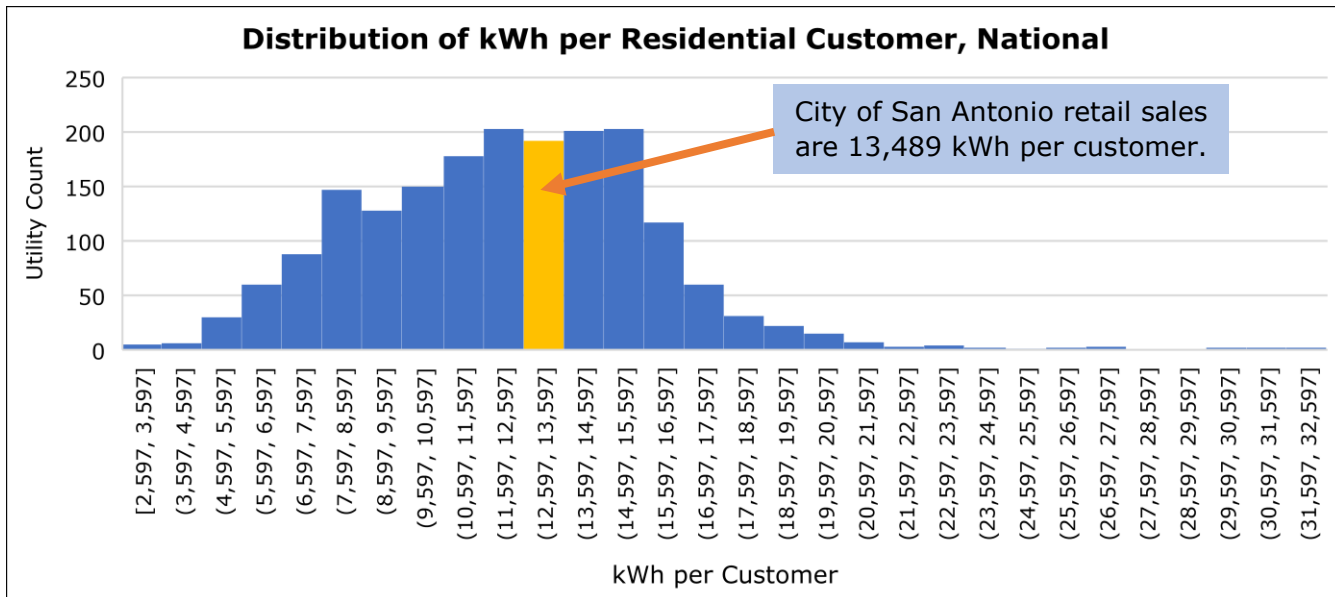

Figure 2: National Distribution of Residential Electricity Usage
Source: Based on 2018 Energy Information Administration Data, table T6 available at https://www.eia.gov/electricity/sales_revenue_price/.

CPS Energy is a leader in investing in effective energy efficiency programs that save energy and money for our customers.

OUR ENERGY CONSERVATION

CPS Energy has strong energy efficiency program, spending more than other Texas utilities on demand response, energy efficiency, solar and weatherization programs. It is important to note that the two next highest-spending utilities shown below serve 3-4 times as many customers as CPS Energy.
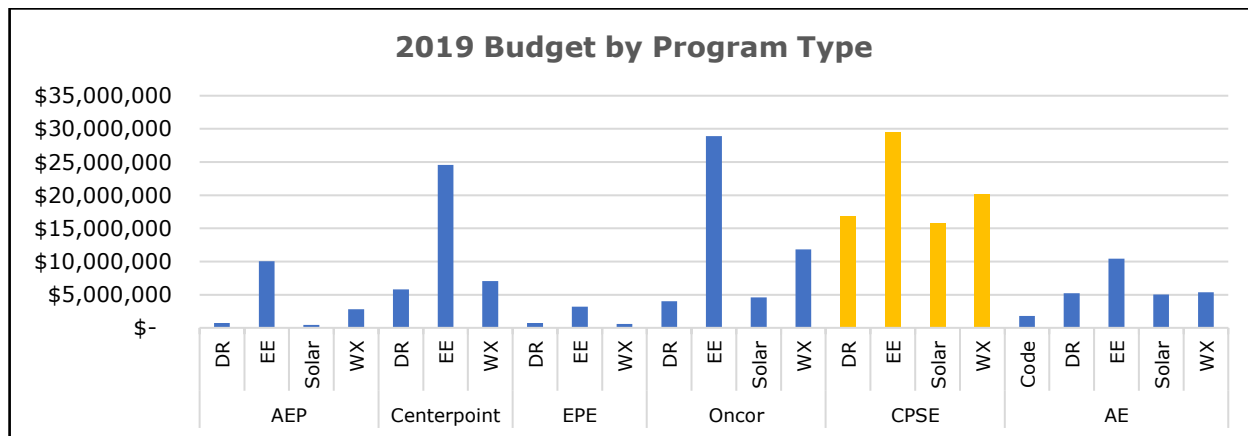

Figure 3: Energy Efficiency Program Budget Comparison
Source: Based on data from annual efficiency reporting (for CPS Energy and Austin Energy (AE)) and Energy Efficiency Plan & Report Filings (for IOUs).

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The charts below show that CPS Energy has a strong commitment to spending in support of our energy efficiency programs and these programs perform very effectively. The utilities included in these charts serve some of the cities that were included in the Sense article.
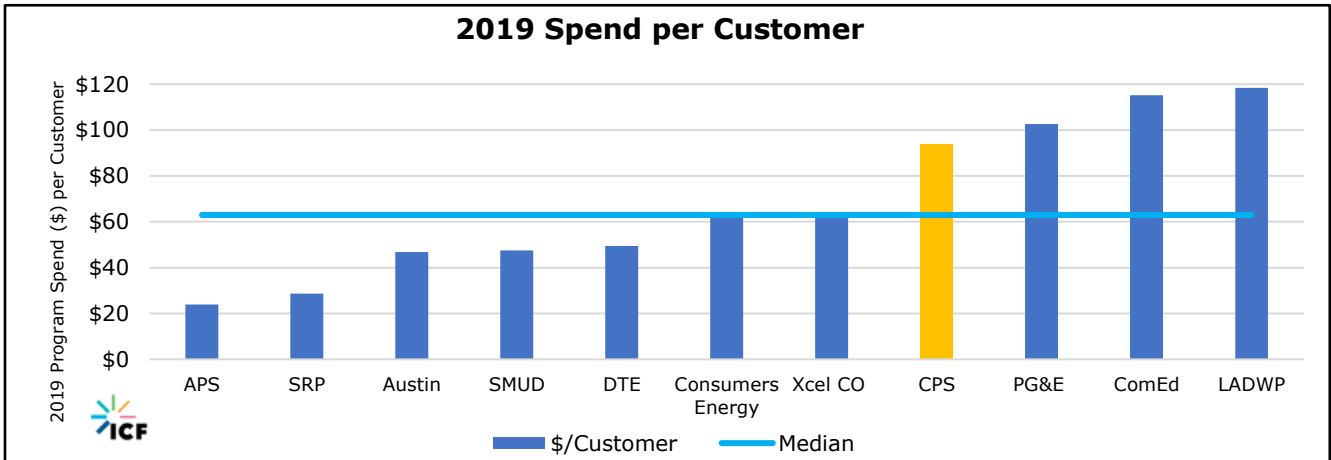
2019 Spend per Customer

Figure 4:   Energy Efficiency Program Spend per Customer
Source: ICF

- APS & SRP – Phoenix, AZ
- Austin – Austin, TX
- SMUD – Sacramento, CA

- Xcel CO – Denver-Aurora, CO
- CPS – San Antonio, TX
- LADWP – Los Angeles, CA

- PG&E – Concord, San Jose, Sacramento, San Francisco and Oakland CA

CPS Energy's programs perform much better for kW savings per customer than other cities named in this ICF report.
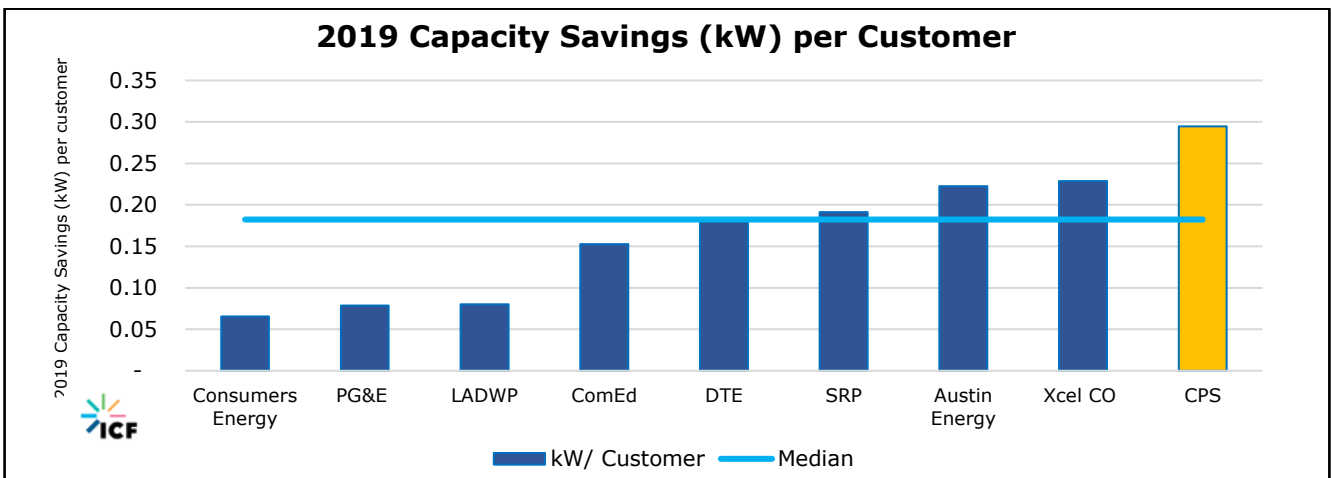
2019 Capacity Savings (kW) per Customer

Figure 5: 2019 Capacity Savings (kW) per Customer
Source: ICF

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Average Income and Energy Efficiency

San Antonio has the third lowest average income in the referenced group of cities (see Figure 7: Average Income below). The cost of electricity is very important to CPS Energy customers and CPS Energy works hard to deliver affordable, reliable and resilient energy while still providing excellent energy efficiency programs.

Income can be another contributing factor to energy usage. The chart below shows that lower income households tend to use more energy per square foot than higher income homes.
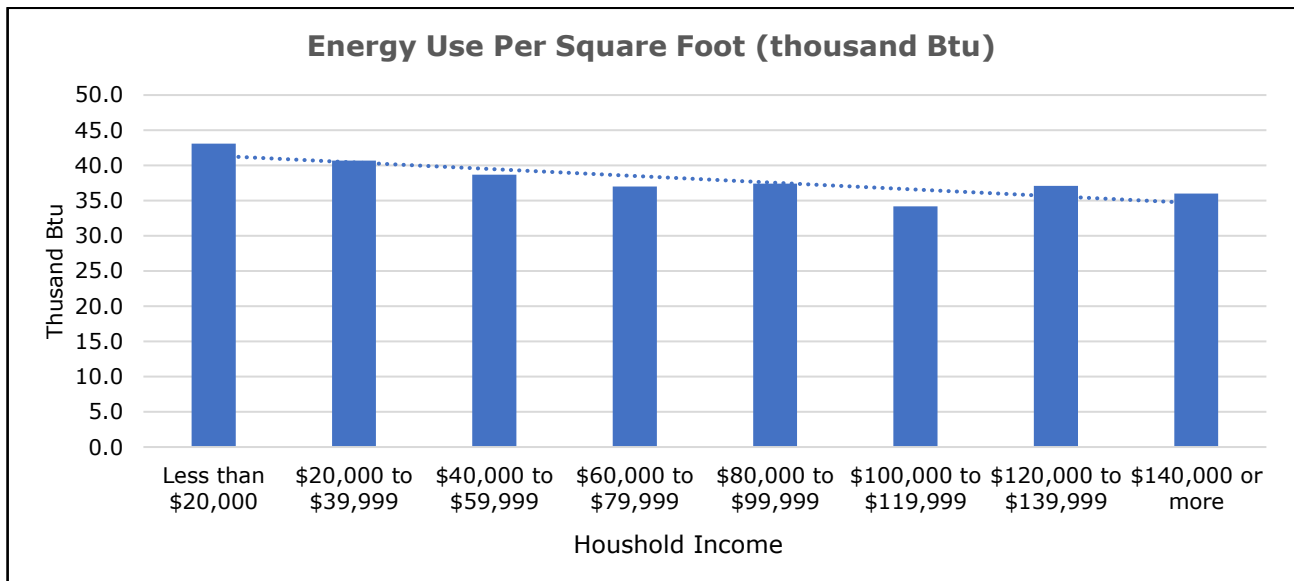

Figure 6: Energy Use Per Square Foot (thousand Btu)
Source: Based on 2015 Energy Information Administration Data, table CE1.1 Summary annual household site consumption and expenditures in the U.S. available at https://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce1.1.pdf.

CPS Energy performs very well on delivering low-income programs that are extremely effective for our community.

Figure 7: Average Income
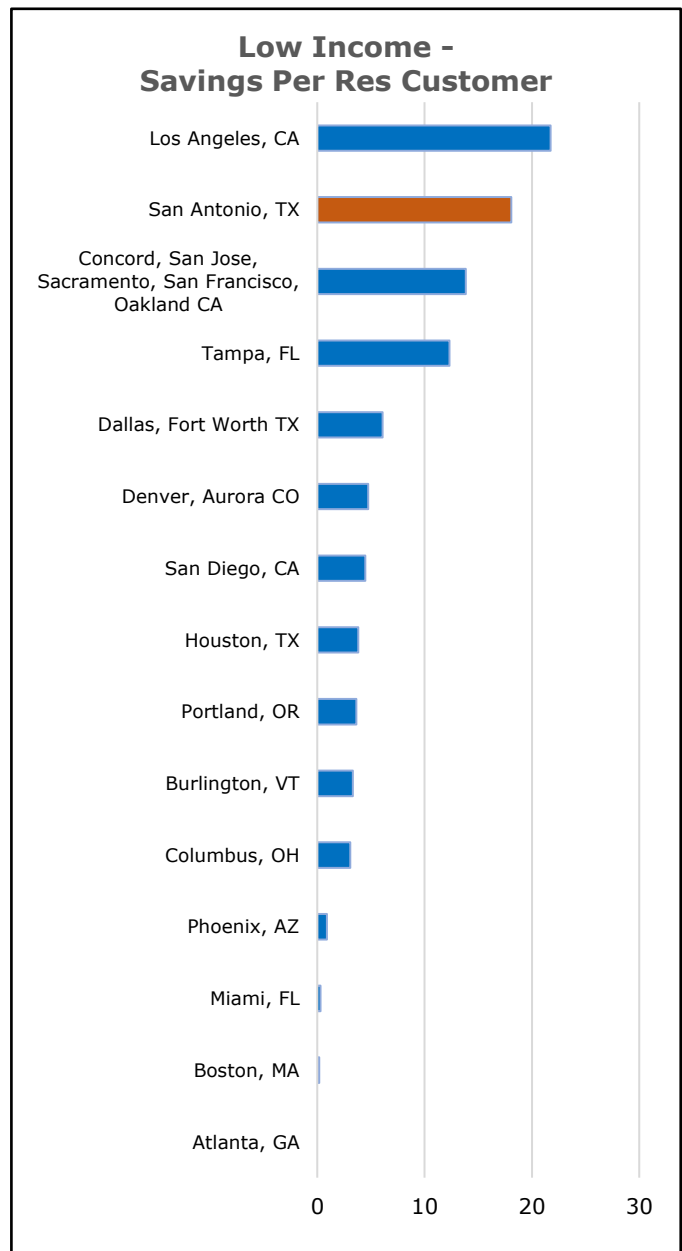Source: 2019 US Census Data

Figure 8: Low Income - Savings Per Res Customer
Source: American Council for an Energy Efficient Economy (ACEEE) 2020 Utility Energy Efficiency Scorecard

> **Weather and the type of fuel used for heating or cooling are major drivers of electric and energy usage.**

BEST PRACTICES

When comparing residential electric and/or energy usage, it is important to account for the most impactful drivers of that usage. It is also important to differentiate between electric usage and energy usage.

Residential Electricity Demand Drivers

Itron has identified the drivers of residential electricity usage per customer throughout the United States listed in order of their relative importance:

- Weather (Cooling Degree Days & Heating Degree Days)
- Customer Fuel Mix (All Electric / Dual Fuel split)
- Home Type Mix (Single / Multi Family split)
- Square Footage
- Behind the Meter Solar Capacity
- Electric Vehicles
- Energy Efficiency
- Electric Price
- Economics

Comparing Electric Usage versus Energy Usage

Residential *electric* usage may differ from residential *energy* usage in that a customer may use natural gas or a fuel other than electricity for their heating or cooling. The Sense article uses *electric* usage and *energy* usage interchangeably and the reference to the article during the TPR interview incorrectly stated residential *energy* usage rather than residential *electric* usage.

Weather has the most significant impact on driving electric usage. The Sense article compared electric usage for many cities in southern states that have hot, humid climates to cities with much milder climates. This is not a valid comparison without accounting for the potential weather differences.

For hot / humid climates, air conditioning is a major component of energy use. In these climates, electricity is the primary fuel used, resulting in higher residential electric usage.

This chart shows the difference in the average temperature of the cities that the article names as using the most versus the cities using the least electricity. The cities named as using the most electricity have a substantially higher average temperature than the cities represented in the least electric usage group, and the higher temperatures drive a higher need for air conditioning.
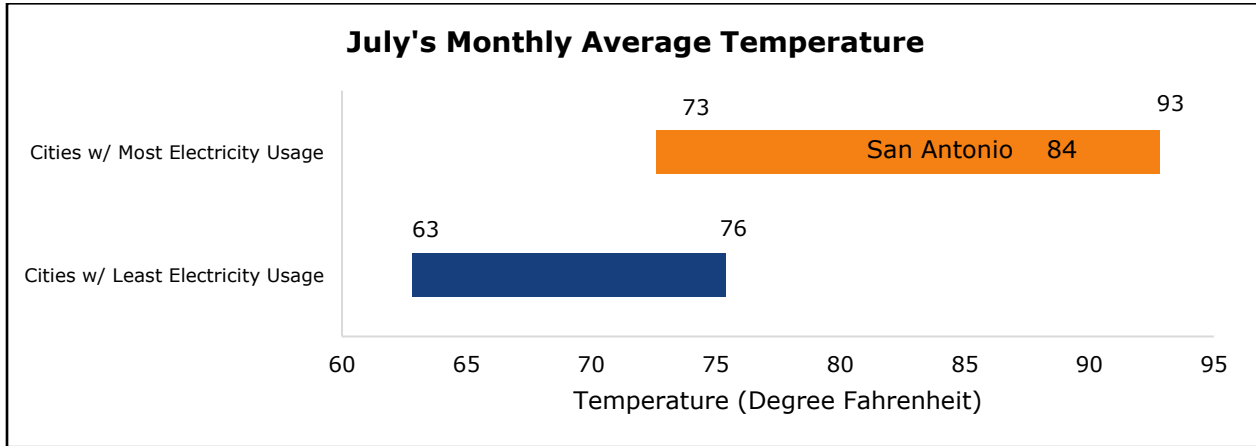

Figure 9: July's Monthly Average Temperature for Selected Cities Electric Usage Ranking
Source: Weather sourced from: https://www.infoplease.com/math-science/weather/climate-of-100-selected-us-cities

In addition, this graph demonstrates that cities listed with least electricity usage like Los Angeles and Seattle, are much less affected by hot weather. The cooling degree days (CDD) represented in blue greatly differ from cities listed with the most electricity usage like San Antonio and Austin.
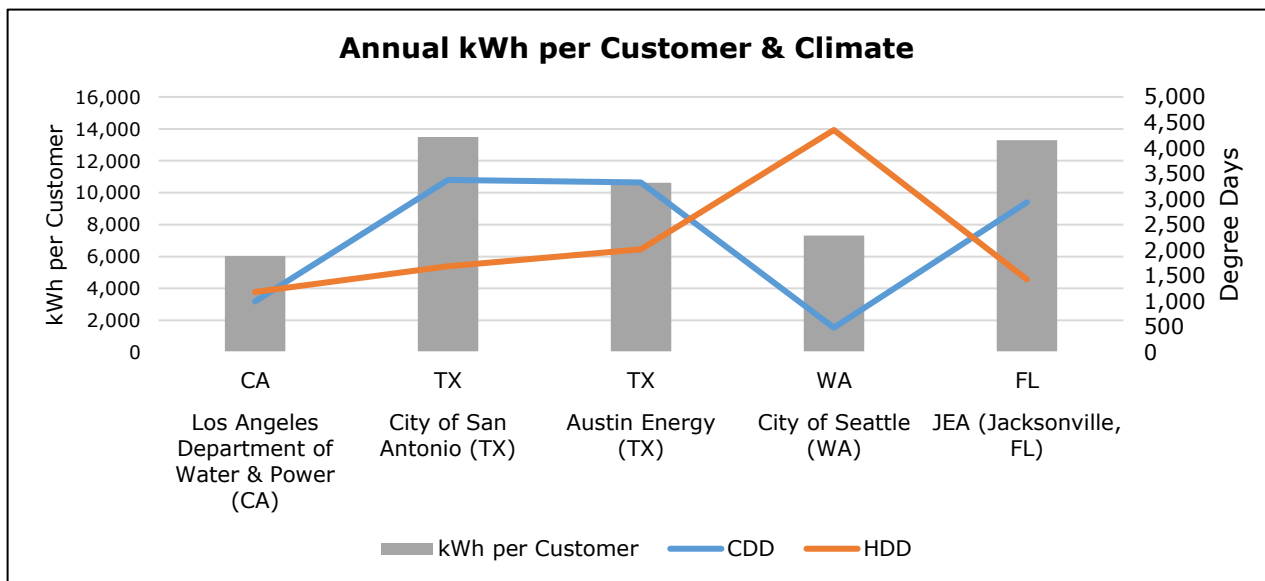

Figure 10: kWh per Customer & Climate
Source: Based on 2018 Energy Information Administration Data, table T6 available at https://www.eia.gov/electricity/sales_revenue_price/.
Degree Day source: https://www.degreedays.net/, Fahrenheit-based cooling degree days with a base temperature of 65°F, 2018 calendar year.

In cooler climates, heating is a major driver of energy use. In these climates, natural gas is used more often for heating, which adds to their overall *energy* use, but does not add to *electric* usage.

During the winter, the cities with the least electricity usage have a lower average temperature. However, the spread between the two groups is only 10 degrees. For example, per the chart below, the average high for cities with the most electricity usage is 68 degrees versus 58 degrees for the other group.
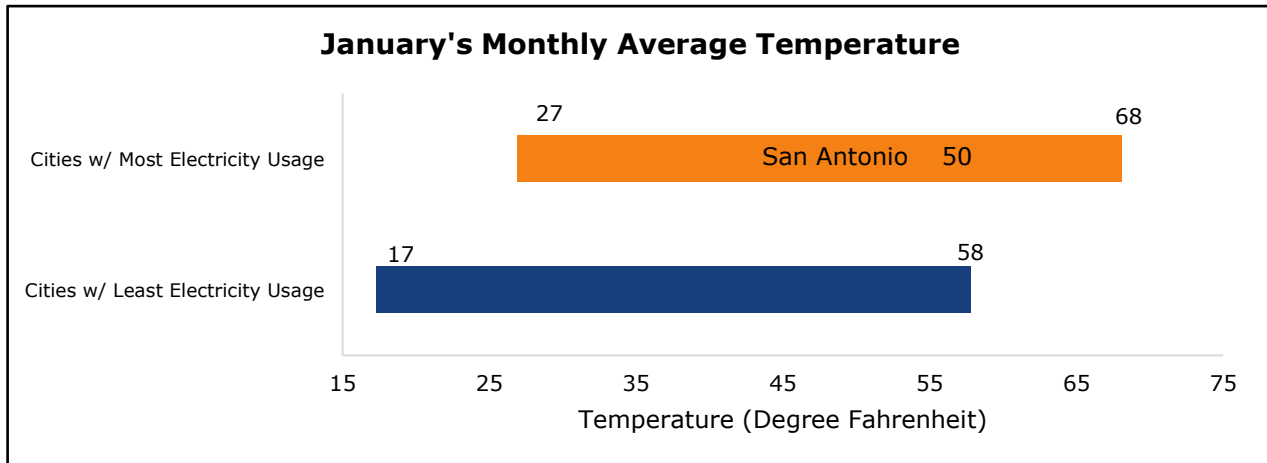
January's Monthly Average Temperature

Cities w/ Most Electricity Usage	27 — San Antonio 50 — 68
Cities w/ Least Electricity Usage	17 — 58

Temperature (Degree Fahrenheit): 15 25 35 45 55 65 75

Figure 11: January's Monthly Average Temperature for Selected Cities Electricity Usage Ranking
Source: Weather sourced from: https://www.infoplease.com/math-science/weather/climate-of-100-selected-us-cities

By contrast, in July, the average high temperature spread is larger between the two groups at 17 degrees.

The charts below support that cooler climates tend to utilize natural gas rather than electricity for heating, therefore giving people living in those climates a lower need for electricity. A valid comparison would be total *energy* use, which would consider all the fuels used to power their homes.
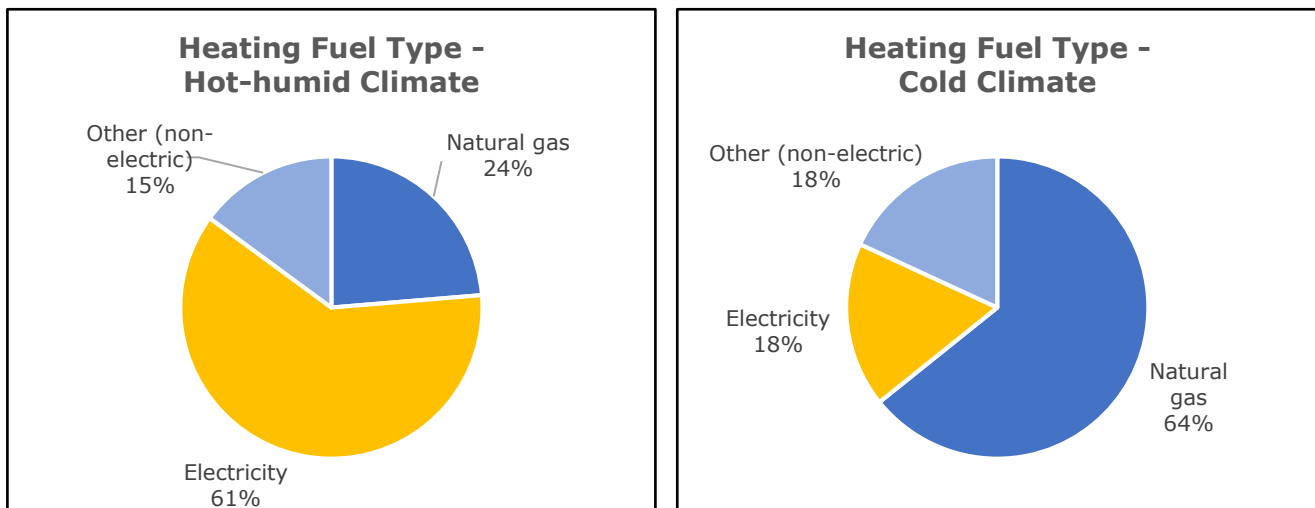
Heating Fuel Type – Hot-humid Climate
- Other (non-electric) 15%
- Natural gas 24%
- Electricity 61%

Heating Fuel Type – Cold Climate
- Other (non-electric) 18%
- Electricity 18%
- Natural gas 64%

Figure 12: Heating Fuel Type & Climate
Source: 2015 Energy Information Administration (EIA) Residential Energy Consumption Survey (RECS). See https://www.eia.gov/consumption/residential/data/2015/hc/php/hc6.6.php, RECS table HC6.6 Space Heating in U.S. homes by climate region.

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When comparing total energy use, colder climates tend to have
a higher annual household energy use.

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Since hotter and cooler climates utilize different fuels for cooling and heating, a better comparison would be total energy usage. British thermal units (BTU) are a measurement used to compare across energy sources. This chart shows that in general, colder climates use more overall energy than hotter climates. This further supports the need to compare overall *energy* usage rather than only looking at *electric* usage.
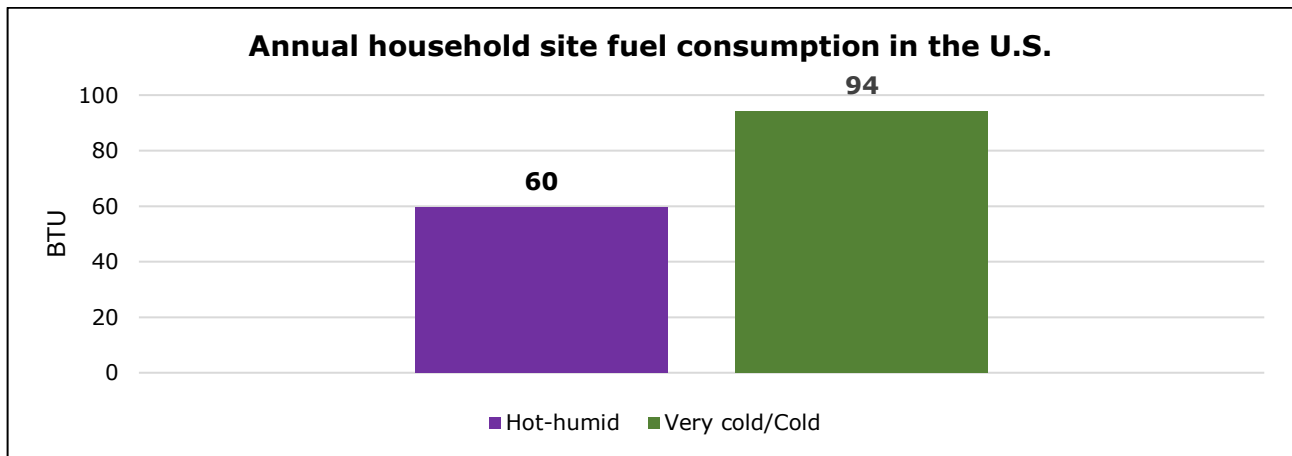

Figure 13: Annual Household fuel consumption in the U.S.
Source: 2015 Energy Information Administration (EIA) Residential Energy Consumption Survey (RECS). See https://www.eia.gov/consumption/residential/data/2015/index.php?view=consumption, RECS table CE2.1 Annual household site fuel consumption.

For more information about weather and science facts across the nation, see the following website: www.currentresults.com.

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Annual electric cost is driven by usage. The article incorrectly
inferred that high annual electric cost was due to high rates.

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Reference to Rates

The Sense article says, "The states where residents used the most electric power were not necessarily the ones with lower electricity rates." This is an accurate statement; however, the article incorrectly continues saying, "Residents in Arizona and Texas have some of the highest electricity costs in the nation, paying on average $3,072 annually in Arizona and $2,581 in Texas." This comparison is inaccurate in that it is equating electric rates and annual electricity cost without any recognition of the impacts of weather or total energy usage.

As weather has the most impact on residential electricity usage, higher annual bills are likely driven by higher usage related to weather and the need for air conditioning in these hotter climates.

The implication that low prices drive high usage and high prices drive low usage can be further disproven by analyzing utility data reported to the EIA. The chart below plots the price/usage relationship for 1,864 MOUs, IOUs, and CO-OPs operating in the United States. The chart shows a weak correlation between price and usage of -0.5.
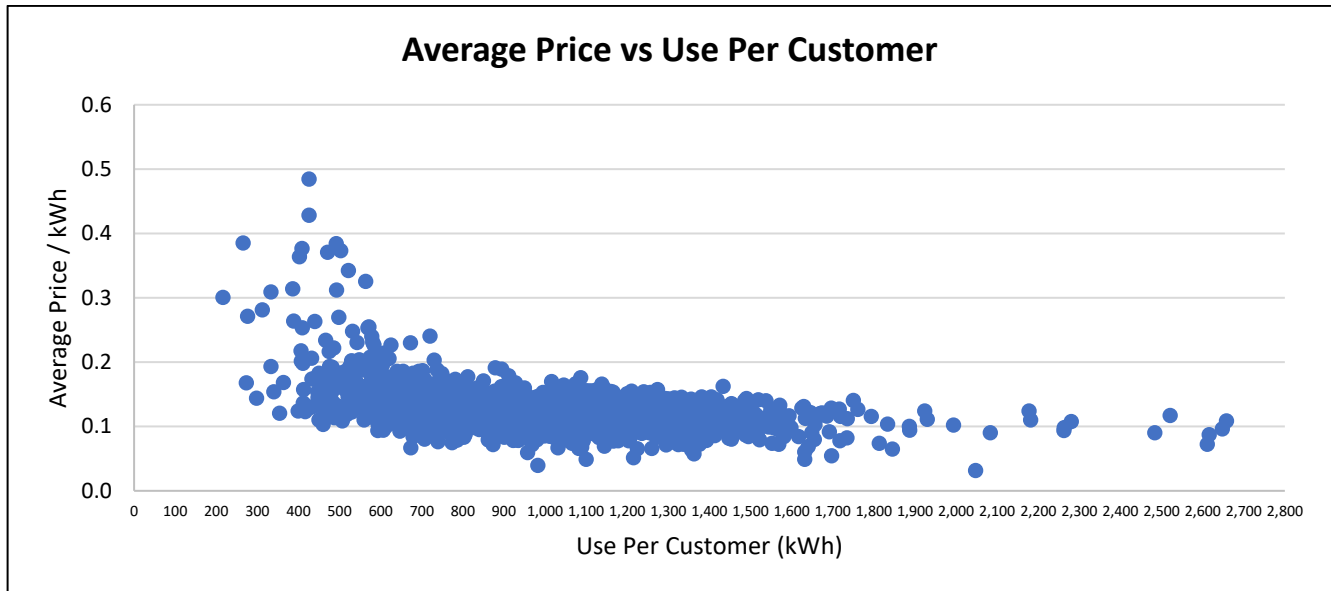

Figure 14: Average Price vs. Use Per Customer
Source: 2018 Energy Information Administration (EIA) Form-861 Data Submitting by Utilities

CONCLUSION

Not only is CPS Energy a recognized leader in energy efficiency investment, but we also lead in how effective our programs are. More so, we serve our community by providing a variety of effective low-income programs.

The Sense article is based upon a selective and sweeping generalization that neither provides a fair and equitable view of our national energy landscape, nor the drivers of San Antonio usage patterns. The article ignores regional temperature considerations and only uses 4,000 Sense customers and extrapolates that limited sample as being representative nationally. Clarified inaccuracies in the article include:

- Statement that San Antonio is the second highest residential electric usage per customer.
- Electric usage and energy usage are erroneously used interchangeably.
- Compares electric usage in cities with different climates without adjusting for weather and type of fuel used.
- Attributes annual electric cost in Texas to higher rates, instead of the hot / humid climate.

A more accurate picture for electric usage and energy usage relating to CPS Energy and San Antonio is:

- Nationally, our city ranks near the median for kWh use per residential customer.
- We have the fourth highest spend on conservation compared to other utilities mentioned in the Sense article.
- We have the highest kW savings per customer compared to the utilities mentioned in the Sense article.
- We have the second-best savings per residential customer for our low-income programs.