Redrawing Our mental maps of Income-Eligible Customers

Addressing inequality requires that we test our own assumptions. What pictures of our customers are no longer serving us?

As energy utilities have become highly adept at gathering and analyzing data, their ability to understand low-income communities to inform program design is vastly improving. With terabytes of customer data and powerful software at hand, utilities have an opportunity to rethink what they know (and don't know) about income-eligible customers.

Technologies like Geographic Information Systems (GIS) can help utilities uncover nuances that can lead to better engagement in low-income communities. By making sense of patterns and clusters of information through maps, analysts can use GIS to inform program participation and deliver insight that can reduce adoption barriers.

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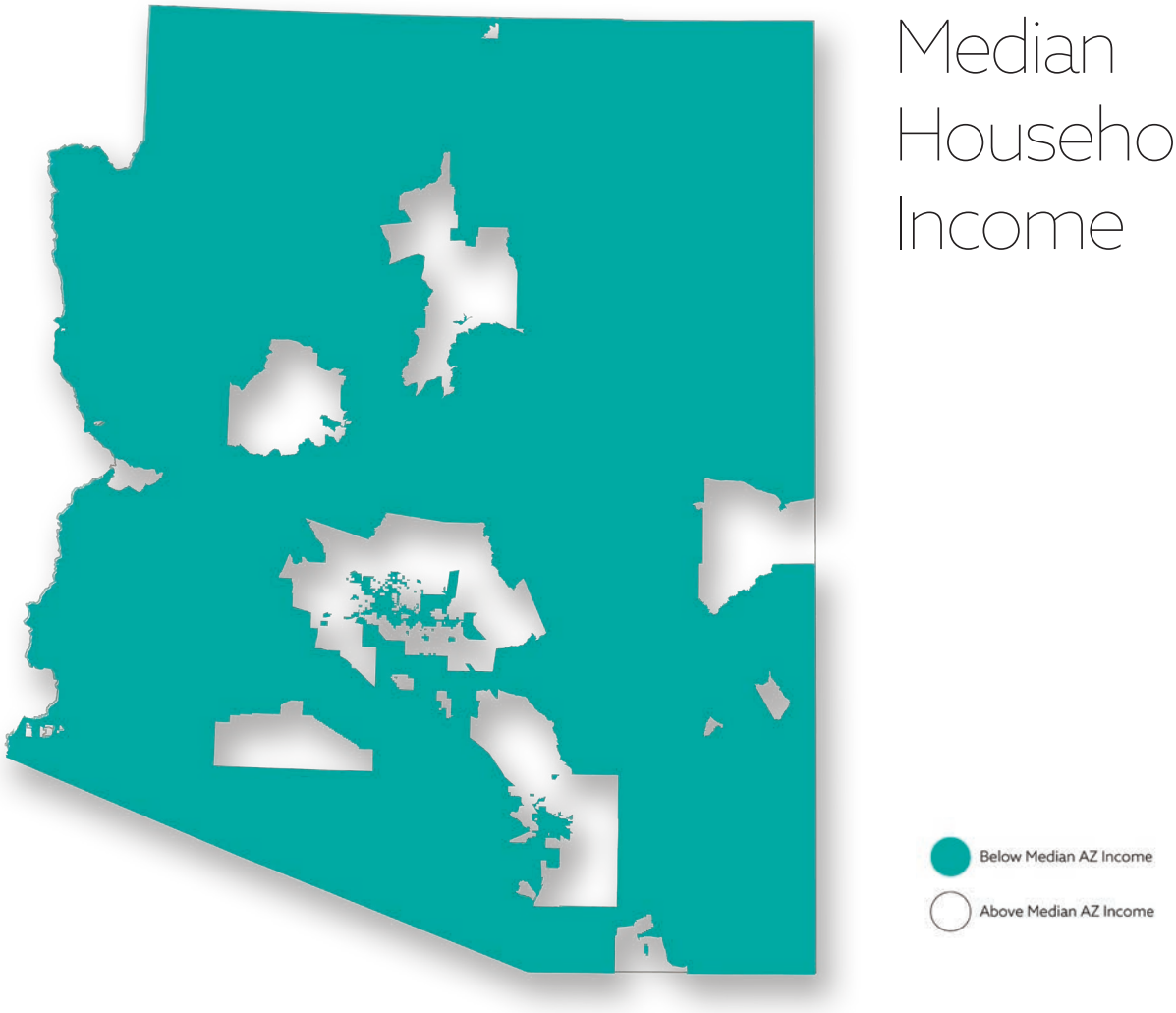
Looking at income data in the absence of geographic context can lead to miscalculations in estimating household energy burden. GIS information in the form of county assessor data can help utilities pull information, like age of home, to uncover hidden energy costs from inefficiencies like single pane windows, poor insulation, and energy-hogs like outdated appliances. Using GIS can help us take a second look at gaps in knowledge and start to redraw what we thought were fixed maps.

ILLUME has used GIS to explore the experiences of income-qualified customers through a number of projects. Through these efforts, we have discovered energy efficiency deserts—a similar concept to food deserts—based on the distance between homes and retailers offering energy efficient products. We have also created dashboards to illustrate the ways that different equity indicators cluster across regions to support our clients in their planning and outreach strategies.

We mapped income-eligible customers in Arizona, home to one of our ILLUME offices, to illustrate the value of mapping in challenging our assumptions about income-eligible communities.

Median Household Income



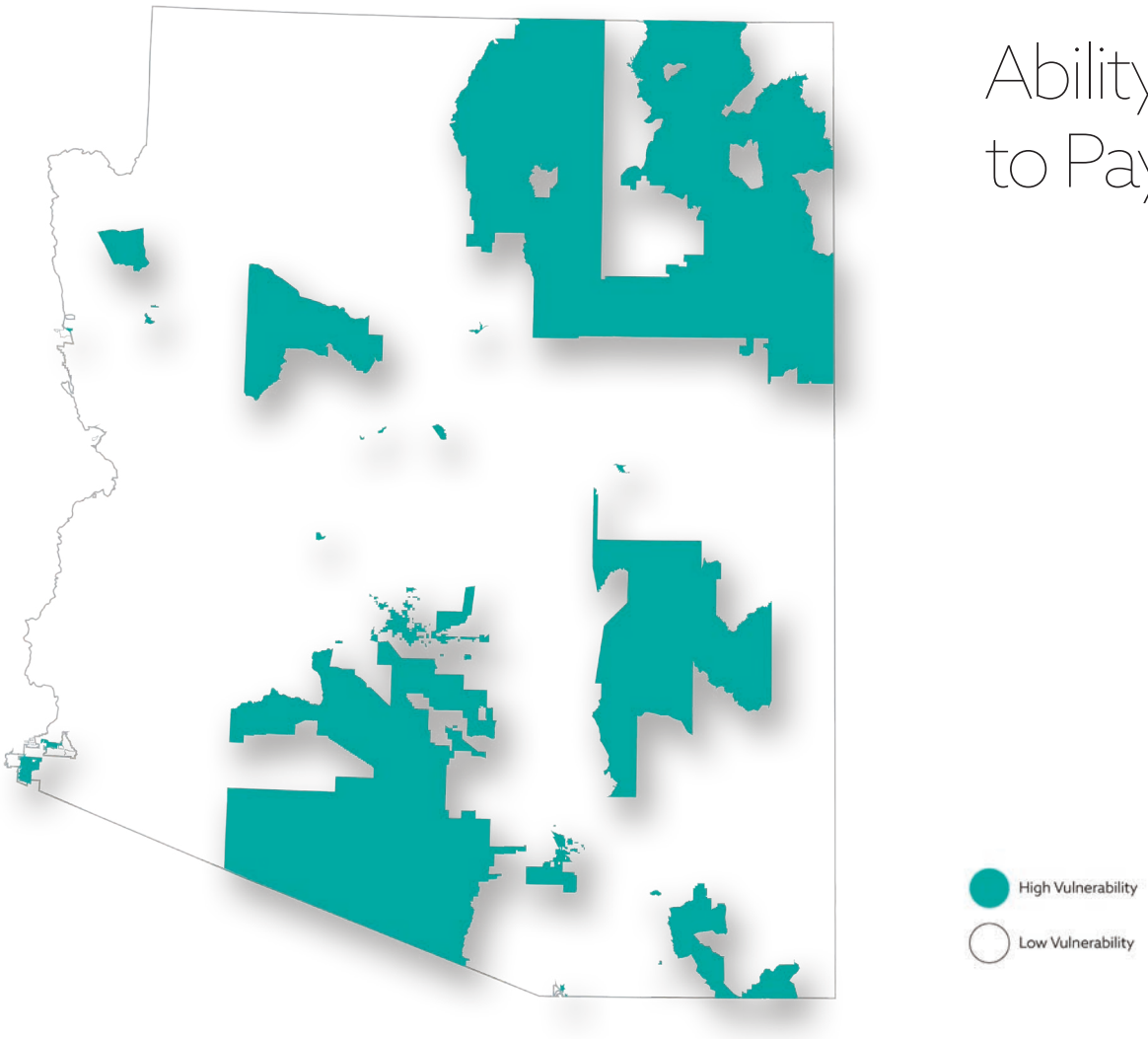
Income-eligible customers are, of course, defined by their income levels. The map above illustrates Census tracts that fall below the Arizona median household income of $56,581 (in 2017). We can see here that Phoenix and Tucson, the state's two largest cities, have clusters of tracts below median income. The map also highlights the prevalence of rural tracts with median incomes that fall well below the state median income.

Stereotypically, many people think of income-eligible customers as living in dense urban areas. And, while many do, this bias overlooks diverse, income-eligible customers living in rural areas. In fact, families that live outside of cities face the highest energy burden in the U.S. — almost three times greater than families of similar household income who live in cities. In 2017, the rural poverty rate in the U.S. was higher than metro areas, 16% compared to 13%.[1]

Level of Income Inequality*

In addition to mapping income eligibility, mapping income inequality provides us with a deeper understanding of broad societal dynamics that may be at play in these communities. The map above highlights that high levels of income inequality exist not just in urban areas in Arizona, but in rural areas as well. Importantly, we can see that the areas of high income inequality don't perfectly align with low-income areas. Customers who are income-qualified yet live in areas of high inequality may have a more difficult time accessing affordable goods and services. Thus, if reducing inequity or energy burden is a goal, income levels alone are not a sufficient metric to target these populations.

* These maps reference income inequality using the Gini coefficient, a common measure used by economists to study the distribution of wealth across a nation's residents. The Gini coefficient ranges from 0, indicating perfect equality (where everyone receives an equal share) to 1, indicating perfect inequality (where only one recipient or group of recipients receives all the income).



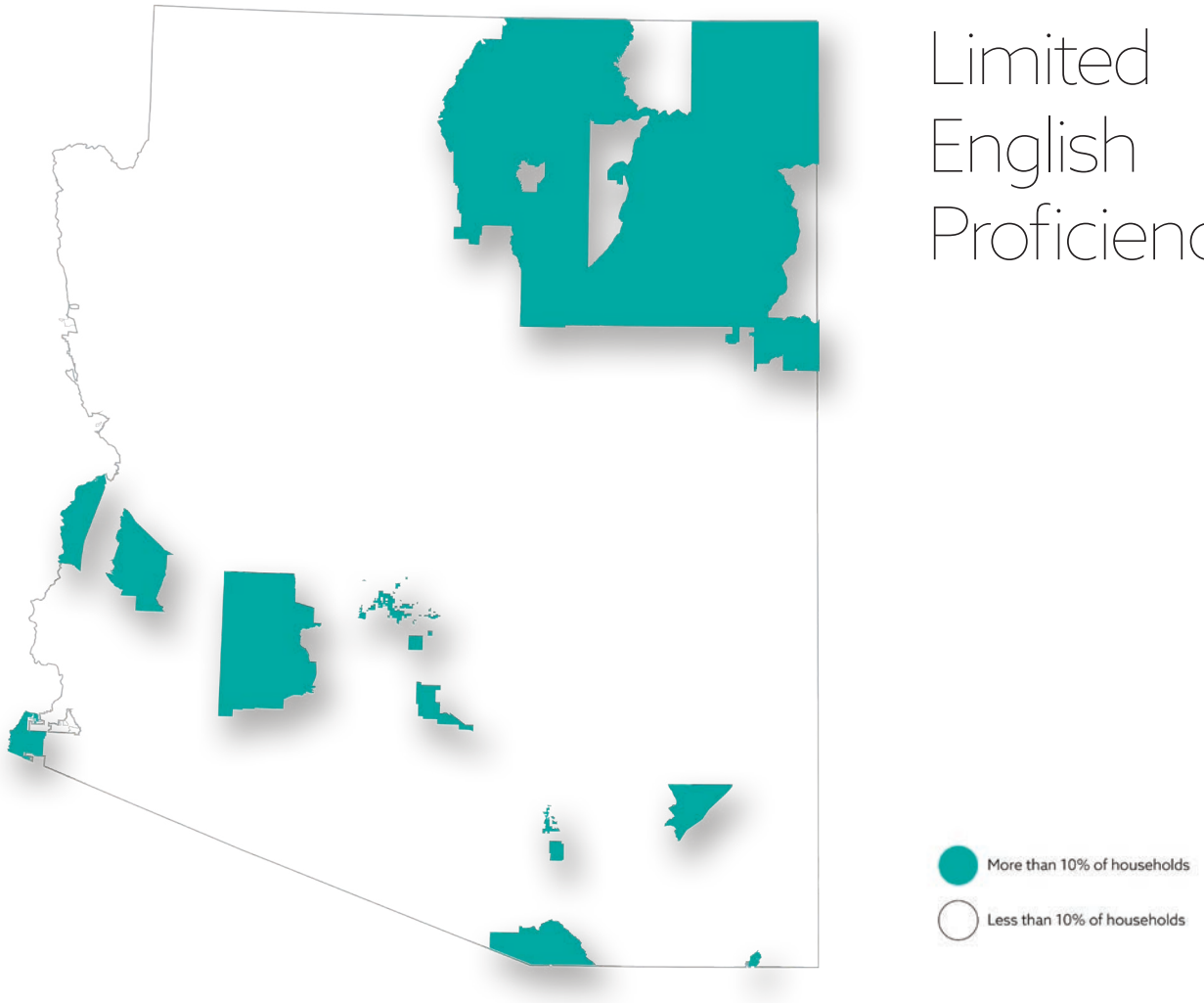
Ability to Pay†

Now that we have a better understanding of income and inequality in Arizona, we can narrow our focus to customers who may have difficulty paying their bills. Mapping a customer's ability to pay their bills (above) provides more detail on the challenges customers may face day-to-day. Ability to pay vulnerability is a proxy for a customer's available household budget (income minus housing costs). Again, we see similar patterns as income and inequality distributions in that Phoenix and Tucson both have concentrated populations that are more vulnerable, and this persists in some rural areas as well.

We have now targeted a population of interest: economically vulnerable, income-eligible populations. Probing further, we can map limited English proficiency households to understand if messaging strategies need to be customized for these populations.

† ILLUME used NREL's Solar for All data to generate this map. Ability to Pay is calculated through an Analytical Hierarchical Process which serves as a proxy for a consumer's available household budget (income minus housing costs). This weighting method reconciles the relative importance of income versus housing costs, where income is a first order factor and housing is a second order factor.[2]

Limited English Proficiency‡



The map above reveals a large concentration of households in the northeast corner of the state, in the Navajo Nation, where English proficiency is lower. The prior maps pointed out lower levels of income, greater income inequality, and higher rates of economic vulnerability (ability to pay their bills) in this area relative to the rest of the state. Because this population likely faces different barriers to participation in energy efficiency programs relative to other income-eligible populations, outreach materials will need to be customized so that they are both culturally relevant and overcome language barriers. A simple translation won't be enough.

Mapping helps identify patterns, reveals gaps in our knowledge, and identifies interesting or unexpected patterns. With these data in hand, we can use customized messaging strategies in targeted communities that really resonate.

‡ The U.S. Census Bureau defines a "limited English speaking household" as one in which all household members (over 14-years-old) have at least some difficulty with English.

1. United States Department of Agriculture, Economic Research Service. *Rural Poverty & Well-Being*. Accessed September 30, 2019, https://ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/.

2. Lin, Jessica. "Affordability and Access in Focus: Metrics and Tools of Relative Energy Vulnerability." *The Electricity Journal* 31 (2018): https://www.sciencedirect.com/journal/the-electricity-journal/vol/31/issue/6.