Reading Between the Lines: Data-Driven Perspectives on Rural and Urban Dynamics in the Northwest

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ABSTRACT

As energy efficiency programs design for greater reach where benefits are accessible to those who have the most to gain, evaluators need better methods to measure and guide program progress. This is particularly true for market transformation programs, which attempt to measure effects across entire markets, unbound by zip codes, service territories or other perimeters. This paper looks at an alternative framework for geographical classification that supports more granular sampling, enabling program evaluators to zoom in on markets to uncover meaningful differences that programs could adapt to address. The tendency to treat rural and urban as dichotomous, consistent with more common geographic classifications like the U.S. Census Bureau's Urban Areas (UA), might overlook detailed perspectives within these two categories. The National Center for Education Statistics (NCES) has defined a classification framework that categorizes land as city, suburb, town, or rural. Each locale is further delineated based on size for city and suburb, and remoteness for town and rural. This paper contrasts results from a 2024 Northwest Energy Efficiency Alliance (NEEA) population study of residential consumers which used the NCES framework with results stratified according to the dichotomous rural/urban UA framework. Using three demographic attributes, the paper demonstrates how the multiple category NCES system can help evaluators tell the stories of market actors in different locales with more nuance and accuracy. This information is critical to designing targeted interventions that narrow gaps and increase access in communities that are often left behind.

Introduction

Twelve percent of households in the Northwest[1] are energy burdened, spending more than six percent of their income on energy costs. Taking a closer look at the data, a more interesting storyline develops. For households located in remote rural areas of the Northwest the proportion that are energy burdened jumps to nearly a quarter - a rate more than twice that of urban and nearly three times that of suburban households (NEEA 2025). A recent population study sponsored by the Northwest Energy Efficiency Alliance (NEEA) and conducted in partnership with LD Consulting, Dragonfly Consulting, Unrooz Solutions, and Beech Hill Research ("the Team"), analyzed publicly available household data to uncover gaps and potential barriers to the delivery of energy efficiency program benefits. The Team hypothesized that residential consumers in rural areas encounter different types of barriers to receiving energy efficiency program benefits compared to those in urban areas, so as a starting point, NEEA's study considered potential disparities attributable to geographic locale. With more insight into the realities of rural markets, market transformation programs should be better equipped to design and deploy targeted strategies to leverage opportunities and overcome challenges unique to rural markets.

[1] Northwest includes the states of Idaho, Montana, Oregon, and Washington.

Overview of NEEA's Northwest Market Characterization Study: Objectives, Methods, and Designing the Analysis

NEEA's study utilized a mixed-methods approach, combining secondary research, data analysis, and primary research to address the following objective: *Contrast and compare characteristics of rural, suburban, and urban residential markets to identify market transformation strategies that will accelerate the delivery of program benefits to rural markets.* The research was completed in two parts. The purpose of Part 1 was to establish a definition of rural, suburban, and urban, and to identify the opportunities and disparities that influence the adoption of energy-efficiency benefits through a comparative analysis of secondary data. Part 2 used primary data collection, including participatory methods, to build upon the analysis from Part 1 and to gain deeper insights into the specific challenges affecting rural communities.

Important Selection Criteria for Geographic Classification Frameworks: Making Tradeoffs to Better See the Fine Print

A framework that uses binary classification, such as the Census UA data set (U.S. Census Bureau 2023), may conceal nuanced insights present in the data, which are more readily observable when employing a framework with more classifications, such as the NCES Locale data set (Geverdt and Maselli 2024). While binary groupings can be useful for simplifying analysis, they risk flattening complex relationships and masking variability within and between groups. In contrast, a framework with more categories may capture greater granularity, allowing for a more accurate and informative interpretation of patterns, trends, and potential outliers.

That said, binary classification can be appropriate when resources are limited, as it often requires less complex analysis and computational power. It may also be necessary when data is sparse overall or in a specific category, making it difficult to maintain statistical significance across more granular categories.

Another critical consideration when selecting a rural/urban framework is the geographic unit at which the classification is applied—such as census tracts, blocks, ZIP codes, or counties. The choice of geographic unit can significantly influence the resolution, accuracy, and interpretability of findings. Finer units like census tracts or blocks allow for greater spatial precision and are better suited for detecting nuanced patterns across the rural-urban continuum. However, these small units can also pose challenges due to limited data availability or increased statistical variability, especially in sparsely populated rural regions. Conversely, coarser units such as counties offer more stable and widely available data and often align more closely with administrative and policy jurisdictions. Yet they risk obscuring intra-county variability and nuanced findings. Therefore, the analytical precision of smaller units should be weighed against the practical and policy relevance of larger ones.

Ultimately, the most appropriate rural/urban framework for a given project depends on a combination of factors: the desired level of analytical precision, the availability and granularity of relevant data, and the practical need for alignment with policy or administrative boundaries. Researchers should weigh these considerations carefully to ensure the chosen framework aligns with both the methodological rigor and real-world applicability of their work.

Comparing Alternative Geographical Classification Frameworks and Making the Case for NCES

Before conducting the data analysis covered in Part 1 of NEEA's study, the Team examined different methods to define and segment data by locale. Various data sets were considered as options for defining rural, suburban, and urban areas, including:

- U.S. Census Urban Areas (UA) classifications
- U.S. Department of Agriculture (USDA) Rural-Urban Commuting Areas (RUCA)
- USDA Rural-Urban Continuum Codes (RUCC)
- U.S. Department of Housing and Urban Development (HUD) Urbanization Perceptions Small Area Index (UPSAI)
- Food and Nutrition Service (FNS) Rural Designation
- National Center for Education Statistics (NCES) Locales

The sections below describe several of these data sets that the Team considered for NEEA's study.

US Census Urban Areas (UA). The U.S. Census Bureau's Urban Areas (UA) classification is one of the most widely used rural/urban frameworks, applied at the census block level. This framework distinguishes only two categories, urban and rural, based on criteria such as housing unit density, population thresholds, and proximity to urban cores (U.S. Census Bureau 2023a). Specifically, urban areas are defined as densely developed territory encompassing residential, commercial, and other non-residential land uses, with urban cores consisting of contiguous blocks that meet a minimum housing unit density. The 2020 update to the methodology introduced key changes, including replacing the previous population-based threshold (2,500 people) with a more nuanced approach that allows areas to qualify as urban if they have at least 5,000 people or 2,000 housing units.

Although the Census UA framework is generally regarded as accurate and objective, it is limited by its binary classification. All territory not designated as urban is automatically labeled as rural, encompassing a wide range of geographies—from remote, sparsely populated areas to suburban fringes adjacent to metropolitan cores. Additionally, unlike other frameworks, the Census UA system places less emphasis on distance from metropolitan centers or functional relationships like commuting patterns.

Rural-Urban Commuting Area (RUCA). The Rural-Urban Commuting Area (RUCA) codes (USDA 2025a) offer a more nuanced alternative to binary classification systems like the Census UA framework. Developed by the U.S. Department of Agriculture, RUCA codes are assigned at the census tract level and incorporate multiple factors, including population density, urbanization, and commuting patterns, both in terms of direction and intensity. The primary classification includes ten major categories, while twenty-one secondary codes capture additional commuting flows, making RUCA well-suited for identifying transitional zones and functionally suburban communities.

RUCA's commuting-based approach allows for a finer-grained understanding of how people interact with urban centers, distinguishing between areas that may be geographically rural but functionally integrated with metropolitan regions. For example, small towns that the Census may classify as urban based on density alone might be identified as rural or semi-rural under RUCA due to limited commuter linkage to large employment hubs. Additionally, several RUCA categories align with what might typically be considered suburban, offering valuable flexibility for researchers interested in the rural–suburban–urban spectrum.

Other Frameworks. Beyond Census and RUCA classifications, other rural/urban frameworks offer alternative approaches that reflect different theoretical and practical considerations. The Urbanization Perceptions Small Area Index (UPSAI) was developed using machine-learning techniques to build a model that predicts how the average household in a specific area would describe their neighborhood given regional and neighborhood characteristics. This model was applied to American Community Survey data to label each census tract as urban, suburban or rural (Bucholtz and Molfino 2020).

In contrast, the USDA's Rural-Urban Continuum Codes (RUCC) is a county-level classification system with nine categories, based on metro status, population size, and adjacency to metro areas (USDA 2025b). RUCC codes are especially useful for national- or state-level policy analysis, as they align with

administrative boundaries and provide more granularity than a simple metro/non-metro split. However, because RUCC operates at the county level, it may mask important intra-county variation, especially in large or mixed counties.

The Food and Nutrition Service (FNS) Rural Designation, used by the USDA for program eligibility, is a ZIP Code-level classification that defines rural areas based on a combination of population size and density, aligning with specific policy and funding priorities rather than general spatial analysis (USDA 2024).

NCES and the Case for Its Use in NEEA's Study

The Team researched how each data set was developed, how other entities have used these data sets, reviewed the frequency of update efforts for each data set, overlaid the various data sets with regional maps, experimented with combining data sets, and compared results to other regional data work. After review and discussion around the strengths and weaknesses of the data sets, the Team decided to use the NCES Locale classification data set to define the locales for the NEEA study.

The National Center for Education Statistics (NCES) Locale data set relies on Census UA data and the Office of Management and Budget (OMB) Principal City data to classify communities into four primary locales – city, suburb, town, and rural (Geverdt and Maselli 2024). Each locale is further described by three subtypes. For city and suburb locales, the subtypes are based on population (small, midsize, and large). For town locales, the subtypes are based on proximity to an urbanized area. For rural locales, the subtypes are based on proximity to either an urbanized area or an urban cluster. The town and rural subtypes are fringe, distant and remote.

The inclusion of four locale types, as opposed to the more common binary classification of rural and urban, may result in more distinct market transformation characteristics and outcomes. The additional classification of locales by subtype could be leveraged to provide additional granular analysis as appropriate. This data set leverages the commonly referenced U.S. Census Urban Area data set, thereby enabling easy alignment with other future data efforts.

For the NEEA study, the most significant weakness of the NCES Locale data set is that the NCES Locale data is provided at the census block level, which necessitated additional geographic relationship files and analysis to align with most data sets in this study, which are available at the census tract level. To address this, the Team developed a rule to define Locale of each census tract in the region based on the Locale type with the largest population as calculated using NCES census block data.

Targeted Universalism as a Guiding Principle: NCES's Multiple Category Classification Lights the Way

Targeted universalism involves establishing universal goals that address shared needs while implementing targeted strategies that consider the unique circumstances of specific groups and places. The Team initially structured the NEEA study according to the principles of targeted universalism to ensure that program strategies recommended through the research were adapting solutions to the realities of specific geographic communities while maintaining a commitment to broader, universal outcomes for all locales. Using a more granular classification framework supports and enables a targeted universalism approach to move the entire population towards a universal goal (e.g., increased adoption of energy efficiency products and practices and realizing the benefits of energy efficiency programs). This acknowledges that rural, town, suburban, and urban populations experience distinct structural, cultural, and geographic challenges that may require tailored interventions to achieve established universal goals. Without more granular classification, the data analysis may result in overly generalized results leading to

solutions that may not support reaching universal goals and can possibly delay or even prohibit increasing adoption and awareness.

In the second part of NEEA's study, the Team took a deep dive into rural communities' challenges with energy efficiency. Interviewing and hosting focus groups with community groups, residential consumers, and market actors (installers), the Team heard themes of strong sense of self-reliance and local trust but also heard from all the groups that there are significant hurdles in rural communities: high costs, outdated older homes, and a lack of available contractors. Many residents talked about turning to DIY fixes to save money, which can lead to costly mistakes. Interviewees stated they trusted local recommendations (neighbors, trusted advisors, family members) over outside messaging, and installers stated they struggled with labor shortages and lack of interest from youth to enter the industry (NEEA 2025).

Results of the Comparative Analysis: Three Demographic Characteristics Interpreted Through NCES Locales and the Census Bureau's UAs

To illustrate the potential impact of using different frameworks, the sections below highlight three attributes analyzed in the NEEA study that would have resulted in significantly different results had the binary Census UA data set been used in lieu of the NCES Locale data set.

Attribute #1: Mean Household Income

To illustrate the impact of using the NCES data, the 2022 mean household income in the Northwest (US DOE 2024) is shown in **Error! Reference source not found.** by U.S. Census Bureau's urban and rural definition, and in Figure 1 by NCES Locale. Using the binary urban-rural definition, the difference between urban and rural mean household incomes is $10,242; or the mean household income of urban areas is 10% higher than rural areas. But, using the NCES Locale definition, it is apparent that the actual disparities are more nuanced. While the difference between city and rural mean household incomes remain roughly equivalent, $10,724, the income disparities of suburbs and towns are significant – a difference of $41,388. When the remote subtypes for rural and town are also included, it shows an even more significant disparity – $47,928 between suburb and remote town locales. In other words, the mean household income in suburb locales is 60% higher than the mean household income in remote town locales.

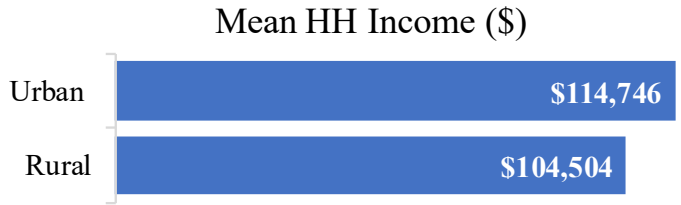

Figure 1. Mean household income using U.S. Census Bureau's urban and rural definitions

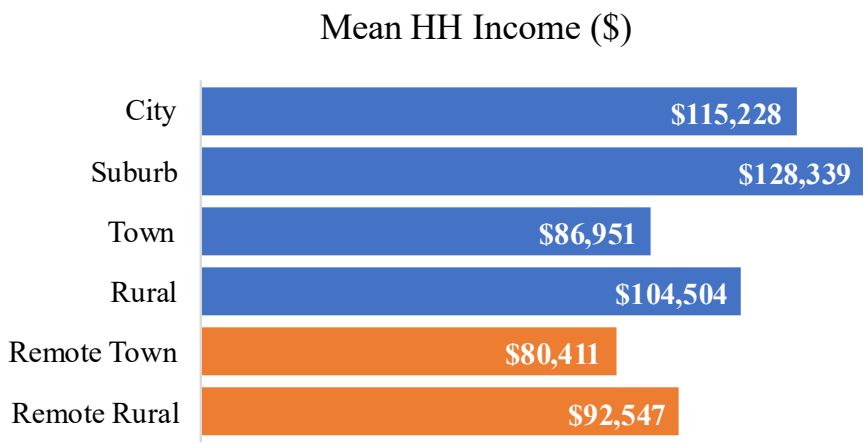

Figure 2. Mean household (HH) income using NCES Locale Classifications

Attribute #2: Median Household Net Worth

A second example of how using the NCES Locale data provides more information than using the binary Census Bureau's urban-rural data is the median household net worth in the Northwest (Esri 2024). Looking at the binary data set, reflected in Figure 3, the difference between urban and rural median household net worth is $48,255; or the median net worth of rural households is 20% higher than urban households. But, using the NCES Locale data set, we see in Figure 4 that suburb households actually have significantly higher median net worth than rural households ($69,887, or 25% higher). Additionally, the NCES Locale data set, reflected in Figure 4, shows that the median household net worth in both City ($173,836) and Town ($167,893) are significantly lower than what is shown by the Census UA data set ($236,594) in Figure 3.

Additionally, the value of using the more nuanced NCES Locale data is seen when comparing the mean household income data (Figures 1 and 2) to the median net worth data[2] (Figures 3 and 4). If these attributes had only been analyzed using the urban/rural categories, it would have shown a mildly interesting result that urban households have slightly higher (10%) incomes but slightly lower (20%) median net worth compared to rural households. But, by using the NCES Locale categories, the data shows that while the suburb, town and rural households have relatively similar income and net worth values (suburb with the highest, town with the lowest, and rural in between), the city locale is an outlier - with reasonably high incomes but very low net worth. This discrepancy would be vital if one was studying the economic stability or resilience of households in different areas and would have been missed if solely using the binary urban/rural categories.

[2] Comparisons of mean to median do not typically represent best practice in statistical analysis. The team acknowledges this limitation, related to the data sources available through the study, but judged the results of the comparison for the purposes of the secondary analysis described here as justifiable given their ability to demonstrate meaningful differences in results between the Census UA and NCES data sets.

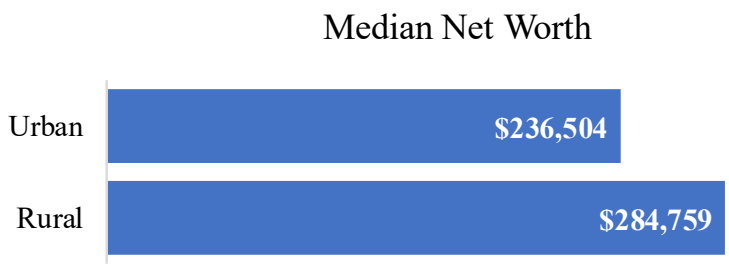

Figure 3. Median Net Worth, by household, using U.S. Census Bureau's urban and rural definitions

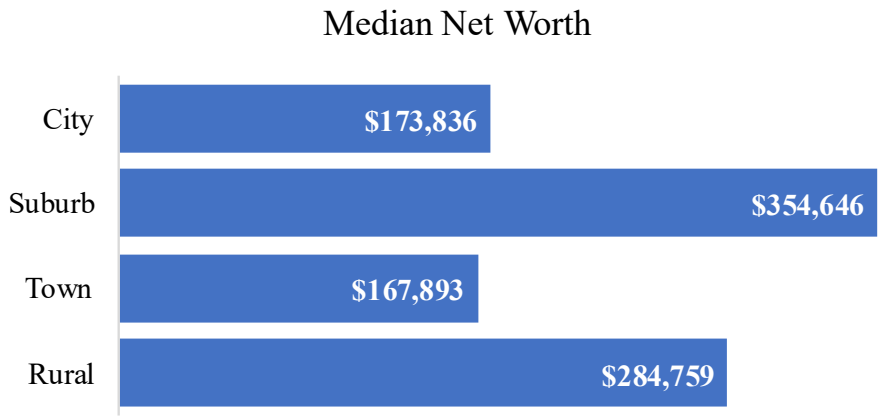

Figure 4. Median Net Worth, by household, using NCES Locale Classifications

Attribute #3: Percent of the population who identify as Native

A third example of how using the NCES Locale results in more nuanced results than using the Census Bureau's binary urban/rural data is the percent of the population who identify as Native American in the Northwest (U.S. Census Bureau 2020). By solely using the rural and urban categories from the Census Bureau, the data displayed in Figure 5 shows that there is a higher percent of the population that identify as Native American in Rural (2.5%) than urban (1.0%) areas. However, by looking at the four NCES Locale categories, Figure 6 shows that there is a significant percent of people who identify as Native Americans in Towns (2.0%) that is not reflected in the Census Bureau data. Additionally, by adding the subtypes of remote rural and remote town, the NCES Locale data highlights the much higher percentage of people who identify as Native Americans in Remote Towns (3.2%) and Remote Rural (6.8%) locales. This additional information could prove crucial if, say, this data was used to inform outreach to Native populations. By just looking at the Census data, outreach efforts might focus solely on rural areas. But, by leveraging the NCES Locale data, the outreach could be expanded to include towns, with extra focus on remote towns and remote rural areas, and thereby better reach these communities.

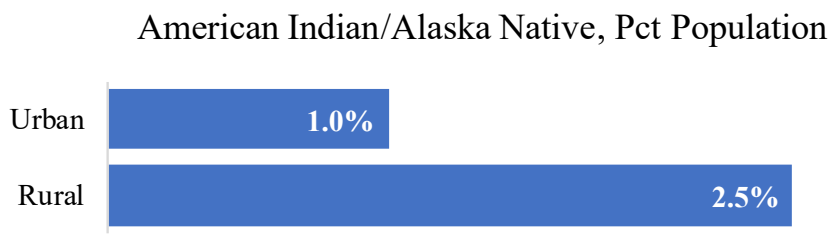

Figure 5. Percent of American Indian / Alaska Native population using U.S. Census Bureau's urban and rural definitions

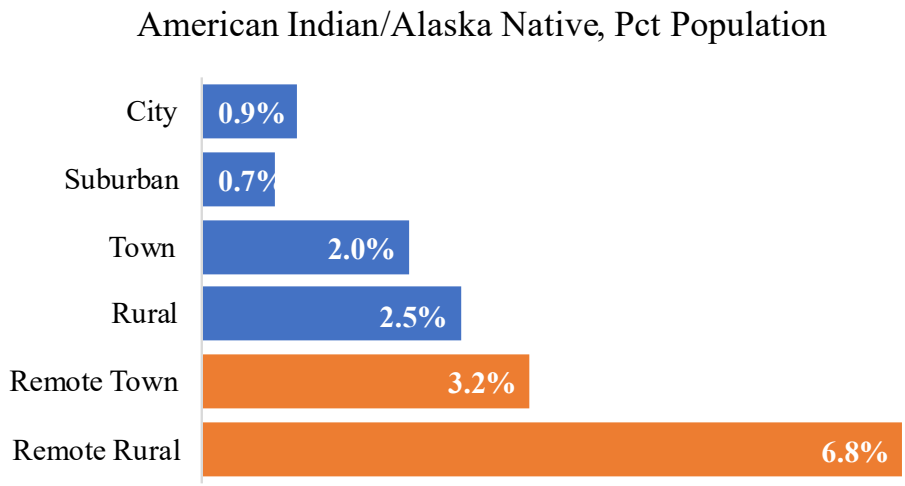

Figure 6. Percent of American Indian / Alaska Native population using NCES Locale Classifications

Conclusions

In the Northwest region of the U.S., where there are a diversity of locales – from dense urban centers to vast remote lands – energy efficiency programs can benefit from more granular analyses of population statistics and other data. Binary approaches that classify consumers and other market actors as either this or that may oversimplify or overlook nuanced perspectives that exist within the two categories. This paper demonstrates how the NCES Locales data set enabled a more nuanced view of three important household and statistics – mean income, median net worth, and percentage of the population identifying as Native American. These results have meaningful implications for how programs target their efforts. Furthermore, they may upend or refine assumptions programs and evaluators have about how resources are distributed across our increasingly complex communities. NEEA's study gathered similar insights pertaining to consumers across the Northwest's geographic locales. With rapid growth in suburban areas, increasing demographic representation in rural areas, and other significant changes, communities in the Northwest and elsewhere are growing and becoming more complex. In response, evaluators are finding and adapting powerful methods to support program participants in telling their stories. As we continue to strike a balance between limited resources for evaluation, the functional need to define a sample based on measurable criteria, and an imperative to acknowledge and include nuanced

perspectives in our sample design, tools such as the NCES Locales data set will help us read between the lines to learn and understand more about our program participants and their unique needs.

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