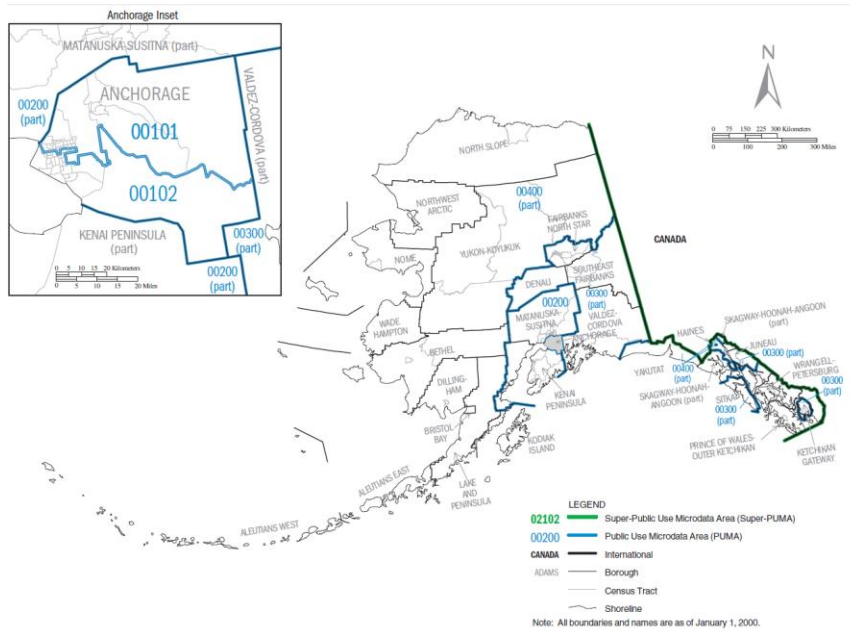

Analysis of American Community Survey Energy Cost Estimates

Two sources of available data for energy costs were used by this assessment. The American Community Survey (ACS) collects data on residents' costs for mortgages, rents, taxes, fees, utilities and fuels and reports that data as a combined total housing cost for both the owner and renter populations. The ARIS database contains estimated home energy costs from more than 80,000 AkWarm energy ratings across Alaska. Since home energy costs are a subset of total housing costs, total housing costs were expected to be substantially larger than home energy costs. In several areas in rural Alaska, ACS housing cost estimates were very low while AkWarm estimates showed energy costs alone to be quite high. For example, the average annual energy cost from AkWarm records for the Wade Hampton Census Area is approximately \$5,958, which corresponds to roughly 15% of the annual area median income of \$39,583. On the other hand, ACS data estimates that 70% of housing units in Wade Hampton spend less than 20% of income on total housing costs. While these numbers are not directly comparable it suggests that the ACS energy cost estimates are low. The American Community Survey provides the only current housing cost data available for all communities in Alaska, gathered in a documented, statistically robust, and consistent manner, and several data products from the survey are commonly used demographic metrics. For that reason, ACS data is used in this Housing Assessment to provide baseline data on housing costs, but it should be understood that actual costs in some regions of Alaska may be substantially higher than those returned by ACS.

ACS reports data for housing costs only in aggregate at the community, census area, ANCSA region, and statewide levels. In order to analyze the ACS energy cost data separately from all ACS housing cost data, the U.S. Census Bureau's Public Use Microdata Sample (PUMS) data was used. The PUMS data contain the individual household responses to the ACS survey but no individual locations are associated with the responses. Unlike the ACS aggregate data, all of the individual survey responses in the PUMS data for the state of Alaska are divided into five Public Use Microdata Areas (PUMA), shown in Figure 1 below. The five areas are defined as follows: 1) North Anchorage, 2) South Anchorage, 3) the Matanuska-Susitna and Kenai Boroughs, 4) urban areas connected to road, rail, or marine highway, and 5) rural off-road areas.

Figure 1: Public Use Microdata Areas of Alaska



After regrouping the AKWarm energy cost data into the PUMA geographic groupings, it is possible to compare the ACS energy cost data to the AKWarm energy cost data. The ACS energy costs in Anchorage were comparable to the AkWarm estimates but the two data sources for energy costs differed significantly in other areas (Figure 2).

Figure 2: Annual Energy Cost Estimates - ACS vs. AkWarm

PUMA #	PUMA Description	Housing Units	ACS - Avg total annual energy cost	AkWarm - Avg. total annual energy cost
103	Statewide	304,373	\$2,337	\$4,681
101	North Anchorage	50,348	\$1,978	\$2,786
102	South Anchorage	62,456	\$2,475	\$2,786
200	Mat-Su / Kenai Peninsula	70,343	\$2,184	\$4,009
300	FNSB, Urban Southeast, on road system / marine hwy	77,543	\$2,535	\$7,296
400	Rural off road system	43,683	\$2,453	\$6,224

From the “Alaska Fuel Price Report” produced by the Alaska Division of Community and Regional Affairs, it is apparent that fuel prices in rural Alaska are significantly higher than those found in Southcentral

Alaska.¹ However, the ACS energy cost estimates are lower in rural areas of Alaska than in the South Anchorage PUMA. For example, Enstar Natural Gas Company provides natural gas at a cost of \$7.39 per million BTUs² in the Southcentral areas of Alaska that it serves. In comparison, the costs of one million BTUs of #1 Heating Fuel³ in the Western, Northwestern, and Southwestern regions average \$49.19, \$45.96, and \$43.60 respectively, which is a factor of six to seven times the energy costs in Anchorage.⁴ This price difference suggests that the ACS estimates for areas outside Anchorage are low.

In this analysis, CCHRC has identified two potential sources for the apparent underestimation of rural energy costs by ACS: respondents' knowledge of fuel costs and ACS methodology for treating missing or invalid responses. The ACS, like every survey, is dependent upon the knowledge of survey participants and the accuracy of the data they provide. The ACS survey asks for electric and natural gas costs during the previous month and other fuel costs (such as oil, coal, kerosene, wood, etc.) for the previous year.⁵ Metered fuels such as natural gas and electricity are typically billed on a monthly basis, and yearly statistics are often provided by the supplier. Other fuels are often purchased intermittently and yearly statistics are rarely listed by providers. Thus, accurate cost information for non-metered fuels may not be readily available to survey participants. Since non-metered fuels predominate in rural areas, respondent accuracy on fuel costs in these areas may be lower. Additionally, the ACS uses imputation methods to determine acceptable values to substitute for missing or invalid answers on questionnaires.⁶ Missing values occur when a respondent does not answer a question and an invalid value is a response which falls outside a pre-established range for that quantity. For annual fuel oil costs in the rural off-road area of PUMA 400, substitution for missing or invalid answers occurred for questionnaires representing approximately 11% of housing units. One potential source for the high rate of substitution is that fuel costs in excess of \$9,999 per year are considered invalid by the U.S. Census. Average home energy costs in many rural regions of Alaska approach that upper limit, and so the authors expect that many respondents' answers may be rejected as invalid even though they fairly represent the home's fuel costs. Additional research is needed to further clarify the cause of the underestimation of energy costs by ACS in rural Alaska.

¹ Alaska Fuel Price Report: Current Community Conditions, January 2013. Alaska Department of Commerce, Community, and Economic Development; Division of Community and Regional Affairs. Available at http://commerce.alaska.gov/dcra/pub/Fuel_Report_2013_January.pdf.

² "Rates and Regulatory." ENSTAR Natural Gas Company. <http://enstarnaturalgas.com/ratesregulatory.aspx>. Date Accessed: 8/5/2013

³ Assuming 136,000 BTUs per gallon of #1 Heating Fuel

⁴ Prices obtained from "Alaska Fuel Price Report: Current Community Conditions. January 2013." Department of Commerce, Community, and Economic Development.

http://commerce.alaska.gov/dca/pub/Fuel_Report_2013_January.pdf. Date Accessed: 8/5/2013

⁵ "The 2011 American Community Survey Questionnaire". U.S. Census Bureau.

<http://www.census.gov/acs/www/Downloads/questionnaires/2011/Quest11.pdf>. Date Accessed: 8/5/2013

⁶ https://www.census.gov/acs/www/methodology/item_allocation_rates_definitions/