July 2016

# Northwest Residential Electric Bills

## A report on residential electricity use, annual bills, income, and poverty by utility type and service area characteristics

### Introduction

At the March 2016 Power Committee meeting staff presented an analysis of recent trends in gross state product and employment as indicators of the overall condition of the regional economy. Staff also presented data on both actual and weather-normalized regional electricity sales/loads, utility revenues, and average prices over the past several years. During the presentation, Council members asked staff to provide additional information on trends in average residential electricity use and bills, particularly focusing on the differences between the residential bills for the region's investor owned utilities (IOUs) and publicly owned utilities. This report is a follow-up to that presentation using sales and revenue data for 133 utilities in the Council's footprint.

### Summary of Findings

This paper investigates the relationship between average residential customer electric bills, average use per customer, and average revenue per kilowatt-hour for investor-owned and publicly owned utilities in the region. This analysis found that after normalizing for year-to-year variations in weather and adjusting for inflation:

- Over the past decade the average annual residential customer in the region paid just over $1,000 per year for electricity.
- Despite the fact that the average annual use of electricity for customers served by public utilities is nearly 15 percent greater than those served by investor-owned utilities, customers of public utilities paid about 5 percent less or about $60 per year for electricity than those served by investor-owned utilities. Residential customers of publicly owned utilities paid on average about $997 annually for electricity over the

past 10 years while residential customers of investor-owned utilities paid on average about $1,060 annually for electricity.

- The primary source of the difference in average annual electricity consumption per household between publicly owned and investor-owned utilities is that a much larger share of public utility customers use electricity for space and water heating than do customers of investor-owned utilities. The higher penetration of electric space and water heating in public utility service areas is due to more limited access to natural gas and the historic lower cost of electricity in their service areas.
- There are minor variations between residential customers served by publicly owned utilities and those served by investor-owned utilities with respect to the technologies used for space heating, the vintage and mix of housing stock, and personal income. However, none of these factors appears to produce significant differences in annual electricity use.
- There appears to be a strong correlation between the trends in energy efficiency achievements, annual average use per residential customer, and average annual bills. As a group, those utilities whose share of regional residential conservation achievements aligned closely with their share of regional residential retail sales (or customers) experience slower growth in both average annual electricity use per customer and smaller increases in average annual bills per customer.
- While in 2014 the share of people at or below the poverty level was higher in areas served by public utilities than in areas served by investor-owned utilities (16 percent vs. 14 percent), the absolute number of people with incomes at or below the poverty level is nearly double in areas served by investor-owned utilities, which generally have many more customers than publicly owned utilities.
- This report focuses solely on the costs paid by residential customers for electricity. That is, it does not reflect the total energy bill *because* the annual cost of other non-electric usage (natural gas, oil, propane, and wood) is not incorporated in this analysis. Because there are significant differences in the share of natural gas used for space and water heating, particularly between utilities serving urban and rural areas, the total *average energy* bill is different from utility to utility.

## Report Organization

This report is organized in three sections.

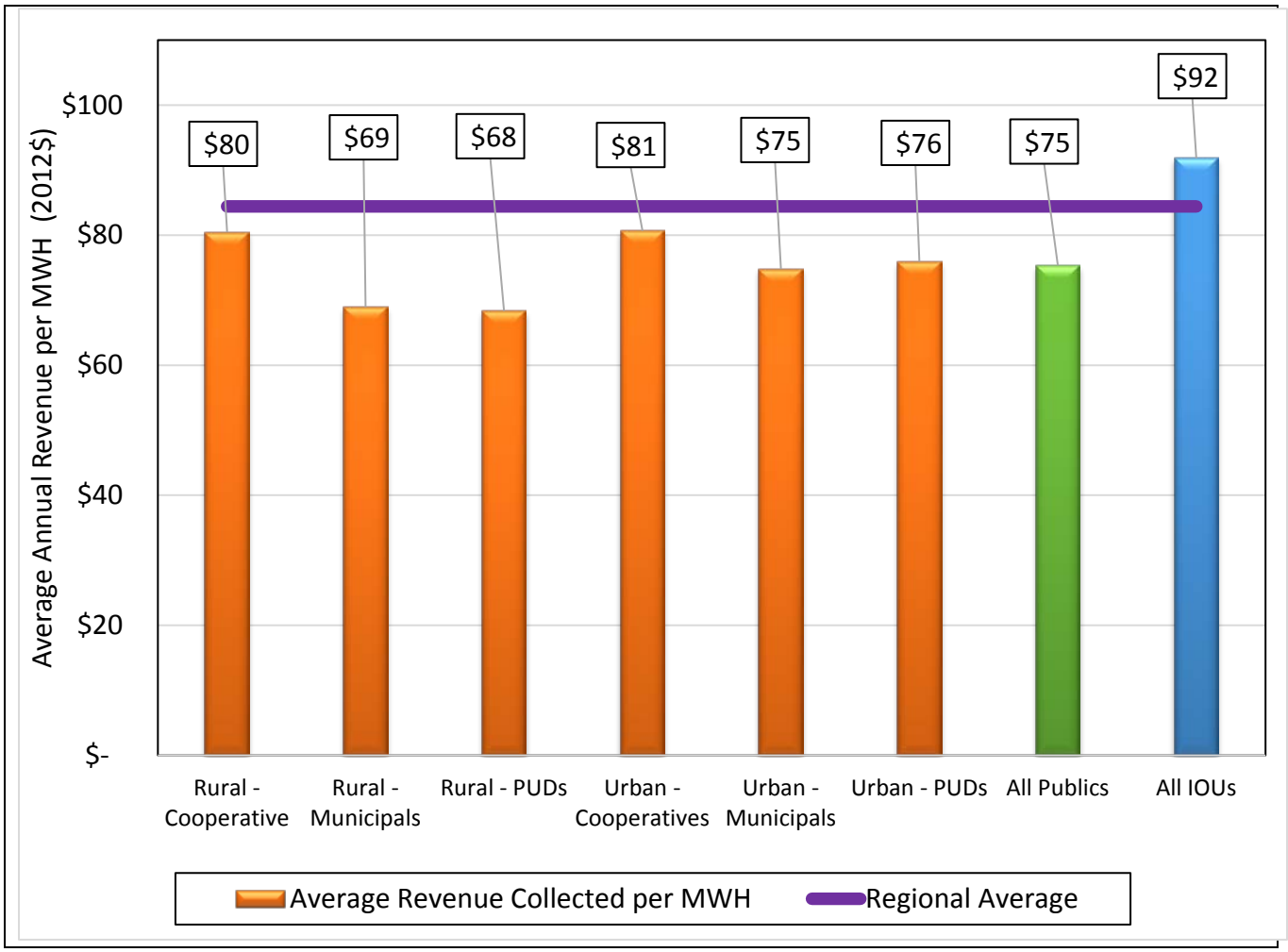
- Section 1 discusses recent trends in the factors that directly affect average residential electricity bills (i.e., annual electricity consumption and average cost per megawatt-hour of electricity).
- Section 2 provides a detailed comparison of average annual use (demand) for electricity, average retail revenue per megawatt-hour and major factors contributing to the difference in demand for electricity
- The appendix provides economic data and information about the utilities in each ownership category.

## Key Factors Affecting Average Residential Electricity Bills

The average residential electric bill consists of two components, average revenue per unit of electricity sales and annual electricity consumption. Figure 1 shows the inflation- and weather-adjusted average revenue per megawatt-hour across utility ownership types. The regional average retail revenue per megawatt-hour was $84 dollars (2012$) for the years 2005 - 2014. At $92 per megawatt-hour, the average revenue for IOUs was higher than the regional average while the $75 average revenue per megawatt-hour for public utilities was about 12 percent lower than the regional average.

Figure 1 – Average Revenue Collected per Megawatt-Hour of Retail Sales

(Adjusted for Inflation)



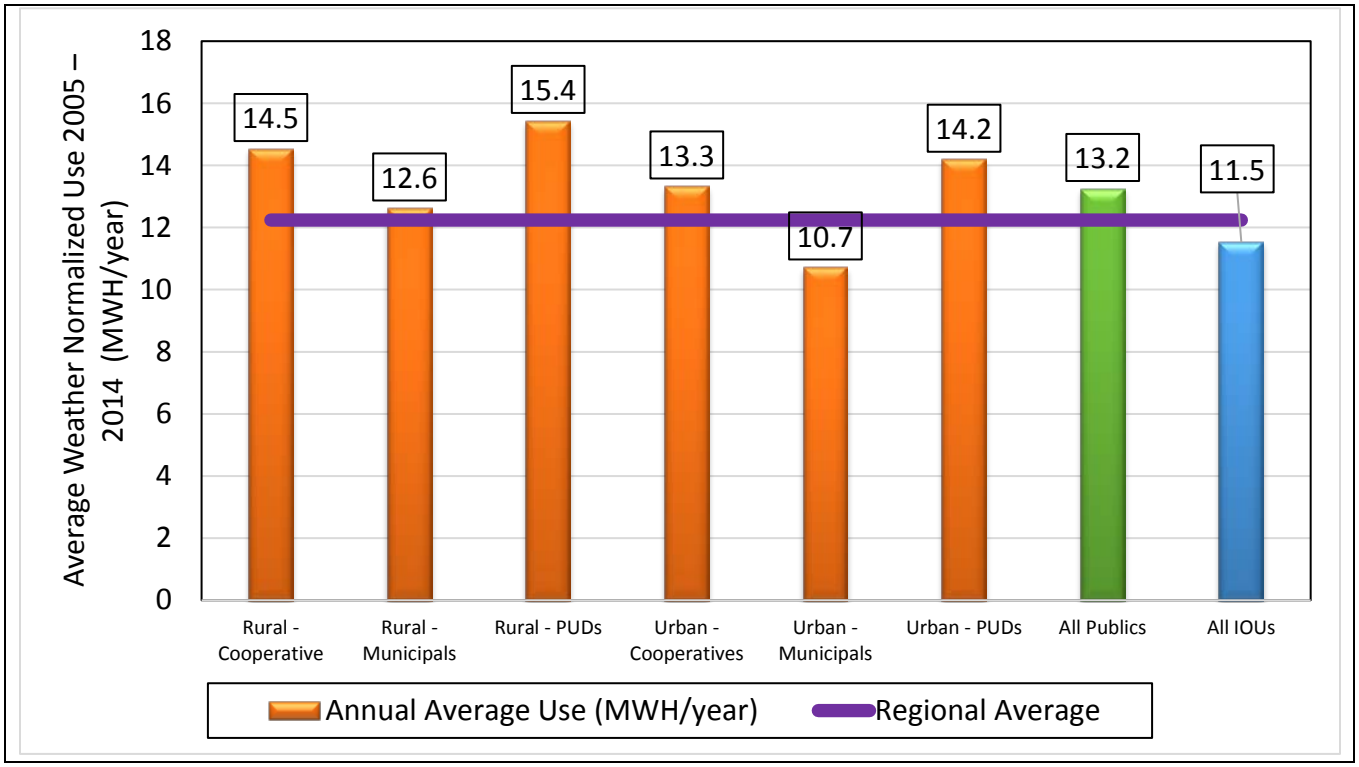

From Figure 1 it can also be seen that there is significant variance in the average revenue per megawatt-hour collected by different types of public utilities and service area composition. For example, PUDs serving rural areas had the lowest average cost per megawatt-hour ($68/MWh) while cooperatives serving urban areas had the highest average cost ($81/MWh) over the 10-year period from 2005 through2014.

The second factor that directly impacts the average residential consumer's electric bill is average annual electricity consumption. Figure 2 shows the weather-normalized average annual electricity use per household for 2005 through 2014 for various utility types.

On a regional basis, average weather-normalized annual use was 12.2 megawatt-hours per household over the past 10 years. Residential customers of IOUs used, on average, 11.5 megawatt-hours per year while residential customers of publicly owned utilities used, on average, 13.2 megawatt-hours per year or about 15 percent more. Figure 2 also shows that there is greater variation across the different types of publicly owned utilities than there is between the average IOU customer and the average public utility customer. Residential customers of Public utility districts serving rural areas used 15.4 megawatt-hours per year whereas residential customers of municipal utilities serving urban areas used 10.7 megawatt-hours per household per year.

Figure 2 – Annual Average Use per Residential Customer

(Weather Normalized) [1]



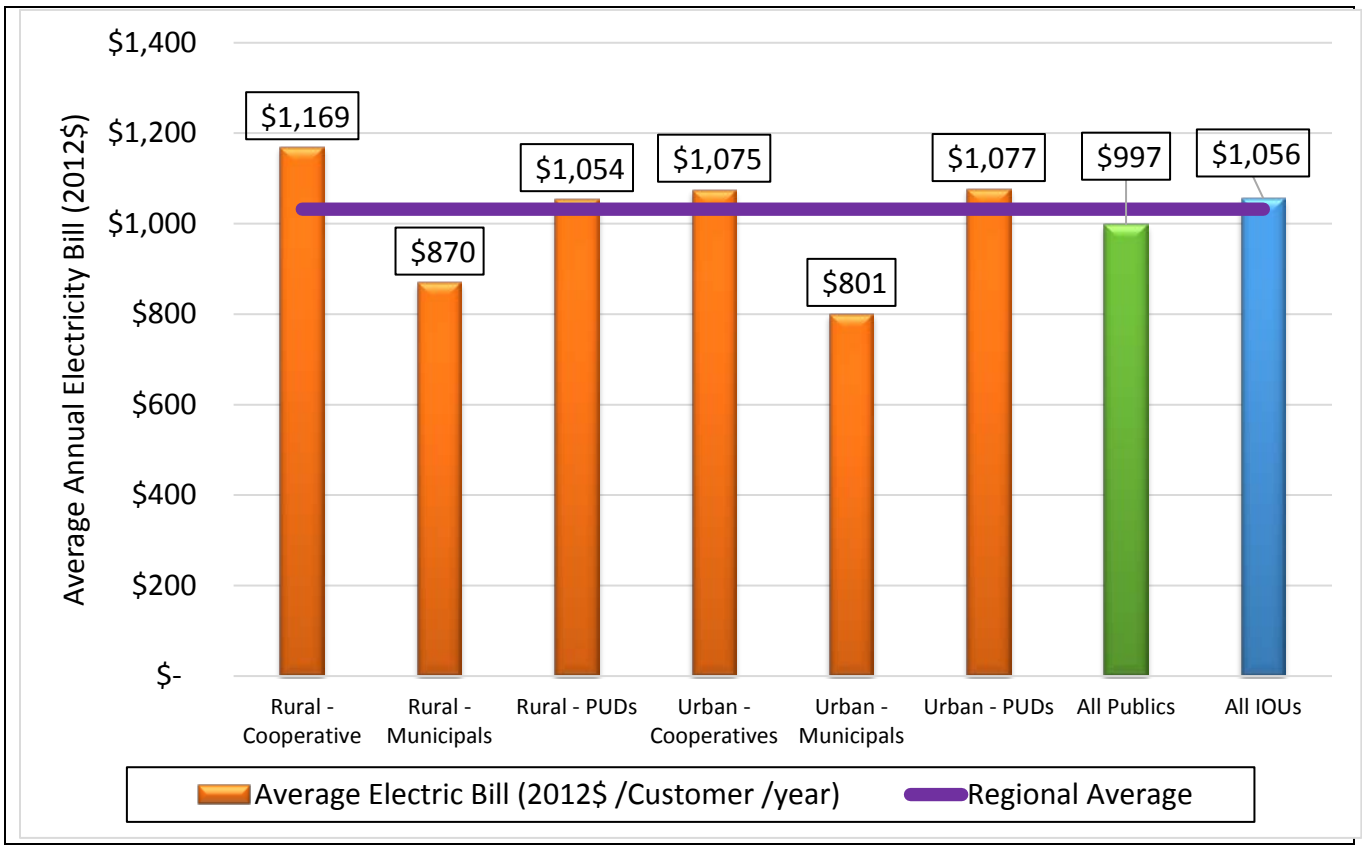

[1] Annual electricity use data used to compute average electricity bills has be normalized for year-to-year variations in weather by applying the regional average temperature-to-load relationship to each utility. This likely both overstates and understates the year-to-year impact on electricity sales, depending upon the saturation of electric heating in a utility's service area. For those utilities that have greater than the regional average saturation of electric heating, this adjustment will understate the year-to-year variation in average electricity bills due to weather, and for utilities that have less than the regional average saturation of electric heating it will overstate this variation. This fact should be considered when comparing the trend in annual electricity bills of utilities serving rural areas, which tend to have higher saturation of electric heat, with utilities serving urban areas, which tend to have lower electric heat saturation.

A customer's annual electric bill is a function of both the annual average cost per megawatt-hour and the customer's annual electricity use. To derive the average annual electricity bill, the Council multiplied the average annual revenue per megawatt-hour for each utility by the average electricity use per residential customer.

Figure 3 shows that on average over the last 10 years, the average residential electricity bill was about $1,000 per year. Residential customers of IOUs paid slightly more than the regional average and public utility customers paid slightly less. The difference between IOU and publicly owned utilities was about $60 per year, or about $5 per month. Figure 3 also reveals that the difference in average bills among residential customers of publicly owned utilities was greater than the difference in average bills among investor-owned utilities.

Figure 3 – Average Annual Residential Electric Bills

(Weather-Normalized and Inflation-Adjusted)



## Trends in Key Factors Affecting Average Residential Electricity Bills

Figure 4 shows the inflation-adjusted average annual revenue per megawatt-hour collected from residential retail sales in the region from 2005 through 2014. As can be seen, over the past decade residential customers paid on average about $84 per megawatt-hour. Over this period, the average cost per megawatt-hour increased from around $77 to $91, or by about 18 percent.

Figure 4 – Average Revenue per Megawatt-Hour of Residential Retail Sales 2005 – 2014 (Inflation-Adjusted)

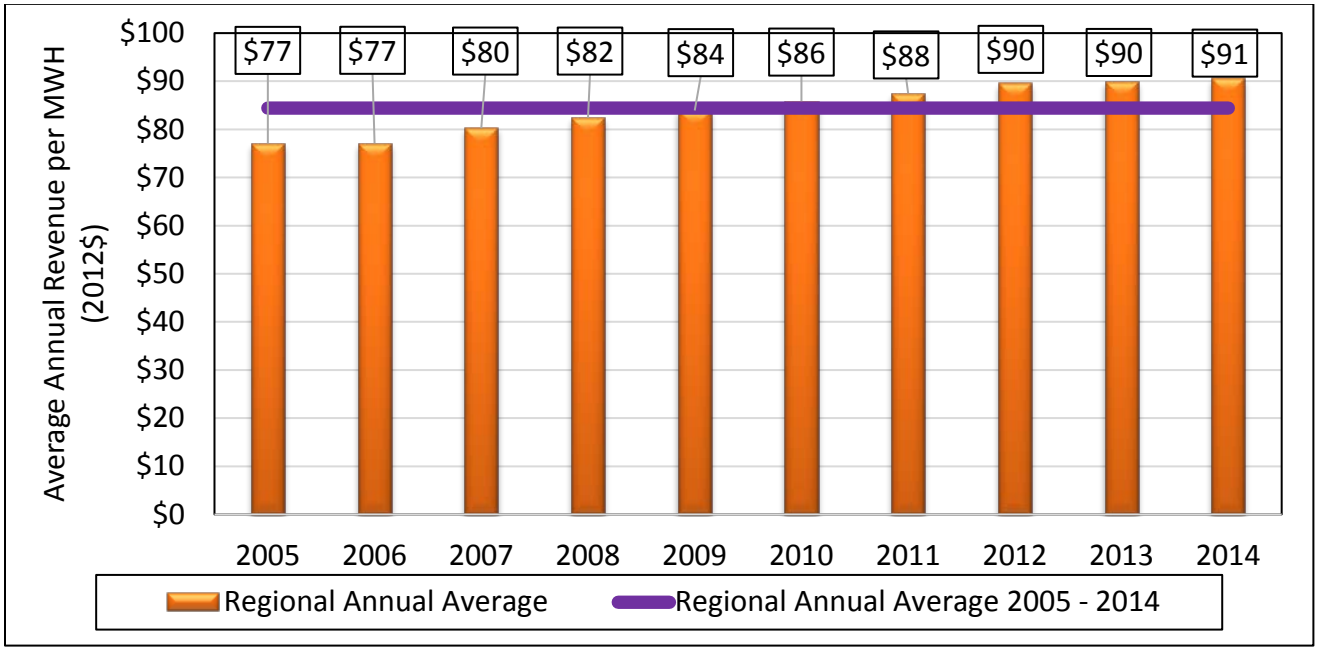



Figure 5 shows the weather-normalized average annual electricity use per residential customer from 2005 through 2014. This figure shows that over the past decade the average residential customer in the region used 12.2 megawatt-hours of electricity annually. However, Figure 5 also shows that the average annual electricity use per residential customer decreased from 12.8 megawatt-hours per year in 2005 to 11.7 megawatt-hours per year in 2014. This equates to a decline of over one megawatt-hour per year per household or nearly 10 percent.

Figure 5 – Weather-Normalized Regional Average Annual Electricity Use per Residential Customer from 2005 Through 2014

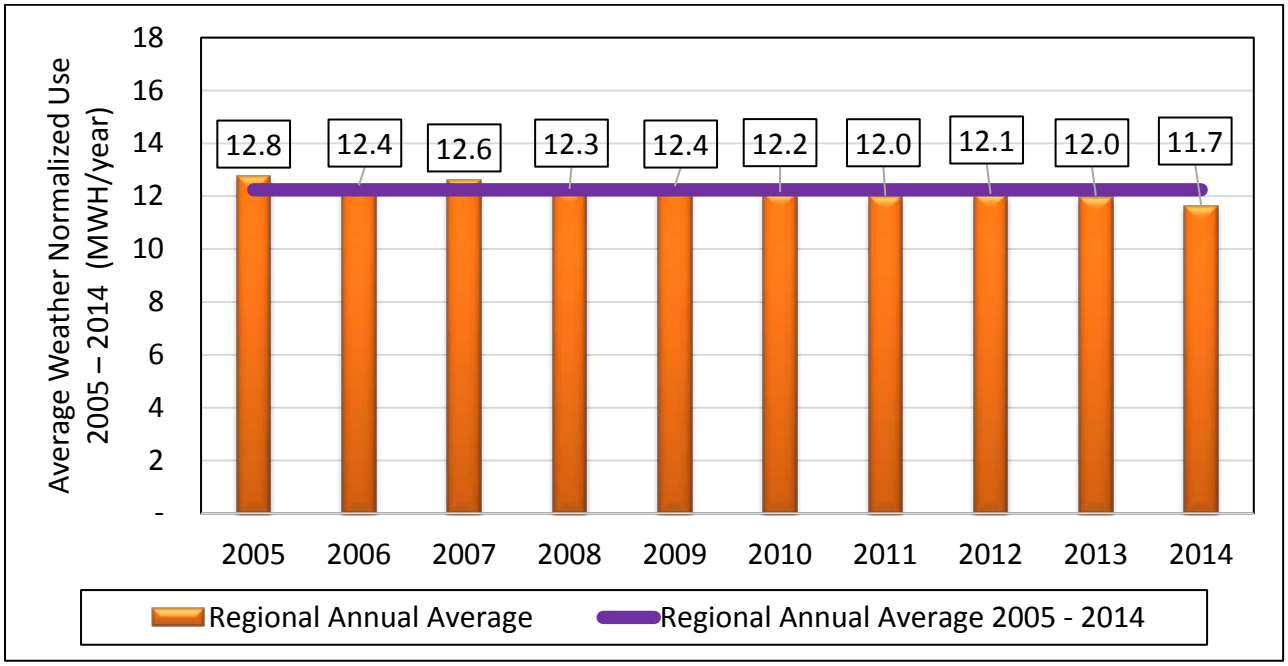
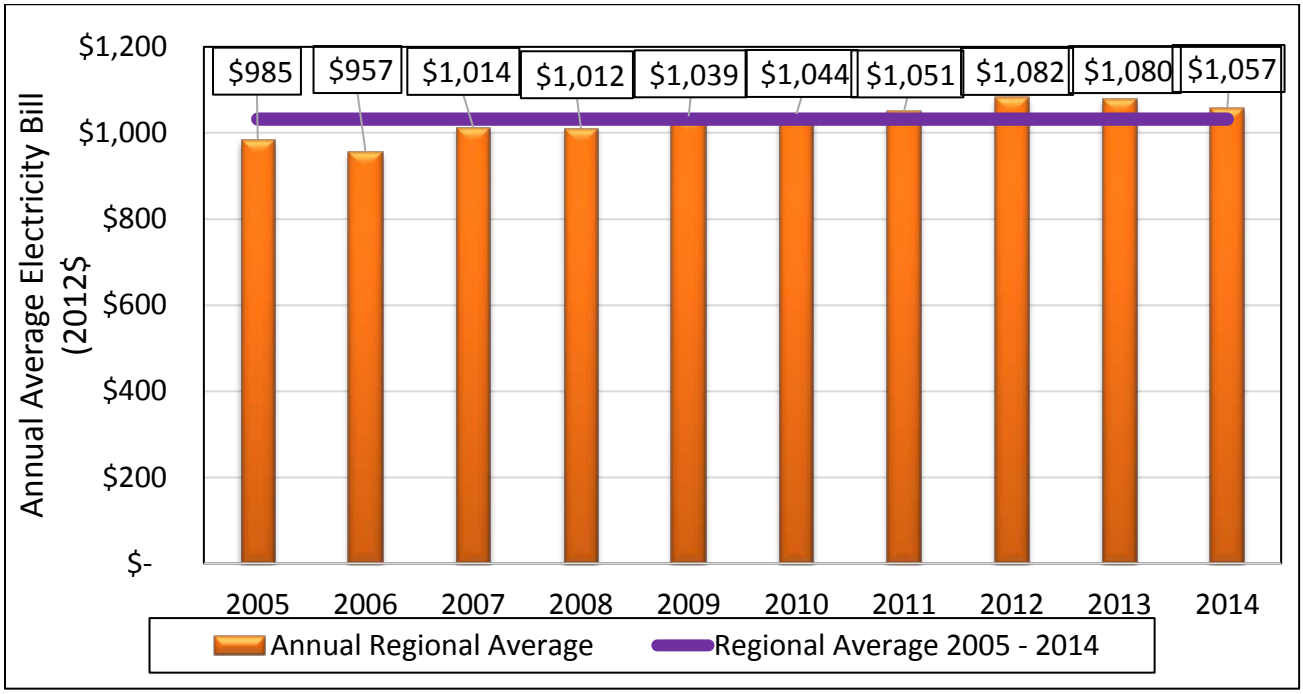



Figure 6 shows the trend in regional average annual residential electricity bills from 2005 through 2014. As can be seen from this figure, after adjusting for inflation the regional annual average residential electricity bill increased from $985 in 2005 to $1,057 in 2014. This 7-percent bill increase is less than the 18 percent increase in the average cost per megawatt-hour of electricity over this timeframe because the bill increase was partially offset by a nearly 10-percent decrease in the average annual use per customer.

Figure 6 - Average Annual Residential Electricity Bill from 2005 through 2014.

(Weather-Normalized and Adjusted for Inflation)




## Variations in Trends in Key Factors Affecting Average Residential Electricity Bills by Utility Ownership and Service Area Characteristics

Figure 7 shows the annual weather-normalized electricity use per residential customer from 2005 through 2014 for publicly owned and investor owned utilities as well as the regional average. As was stated previously, on a regional average basis the average use per residential customer declined from 12.8 MWh per year to 11.7 MWh per year or just over 1,100 kilowatt-hours per household between 2005 and 2014. The average residential customer use of electricity declined slightly in investor-owned service territories and on average across all public utility service areas. After adjusting for year-to-year variations in weather, the average annual electricity use of residential customers in public utility service areas declined from 13.6 MWh per year to 12.8 MWh per year, or by 730 kilowatt-hours per year between 2005 and 2014. The average annual electricity use of residential customers of investor owned utilities declined from 12.2 MWh per year to 10.9 MWh per year, a reduction of 1,375 kilowatt-hours per year.

Figure 7 – Average Annual Residential Electricity Use per Customer for Public and IOUs 2005 – 2014 (Weather Normalized)

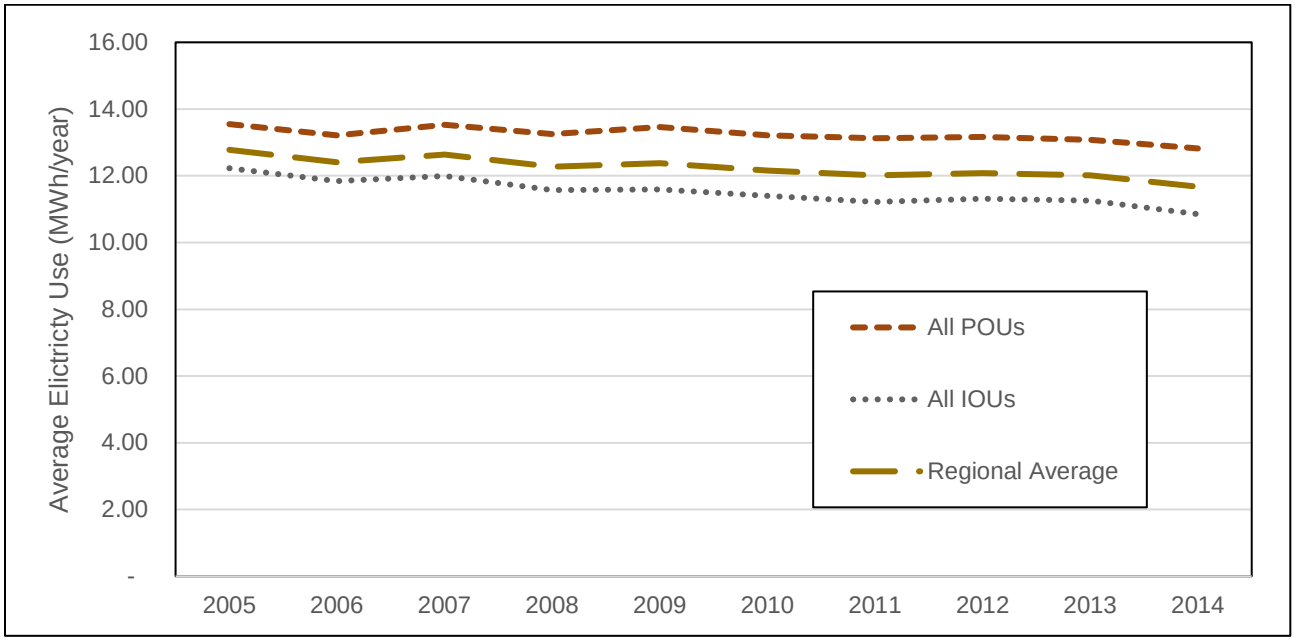



Figure 8 shows the annual weather normalized electricity use per residential customer from 2005 through 2014 by utility ownership type and service area characteristic. As was stated previously, on a regional average basis the average use per residential customer declined between 2005 and 2014 as did the average residential customer use of investor owned service territories and on average across all public utility service areas. However, the average annual electricity use per residential customer for public utilities serving rural areas either declined only slightly or actually increased.

Figure 8 – Average Annual Electricity Use per Residential Customer from 2005 through 2014 by Utility Ownership Type and Service Area Characteristic (Weather Normalized)

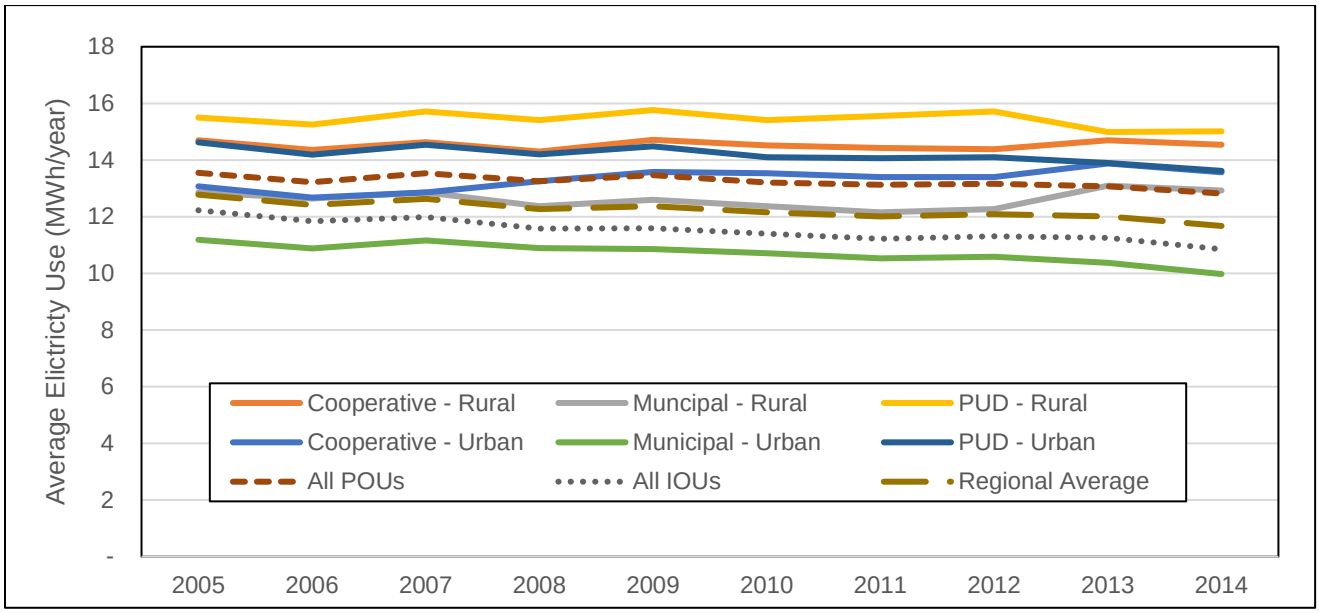


Figure 9 shows the trend in average revenue collected per megawatt-hour from 2005 through 2014 by utility ownership type and service area characteristic (i.e., urban vs. rural) after adjusting for inflation. From Figure 9 it is clear that the trend in average revenue collected per megawatt-hour differs across utility ownership and service area types. For example, between 2005 and 2014 the average residential customer of investor-owned utilities increased from less than $80 per megawatt-hour to almost $100 per megawatt-hour. In contrast, the average revenue collected per megawatt-hour for PUDs with rural service areas remained nearly constant throughout this period.

Figure 9 – Average Annual Revenue per Megawatt-hour from 2005 through 2014 by Utility Ownership Type and Service Area Characteristic

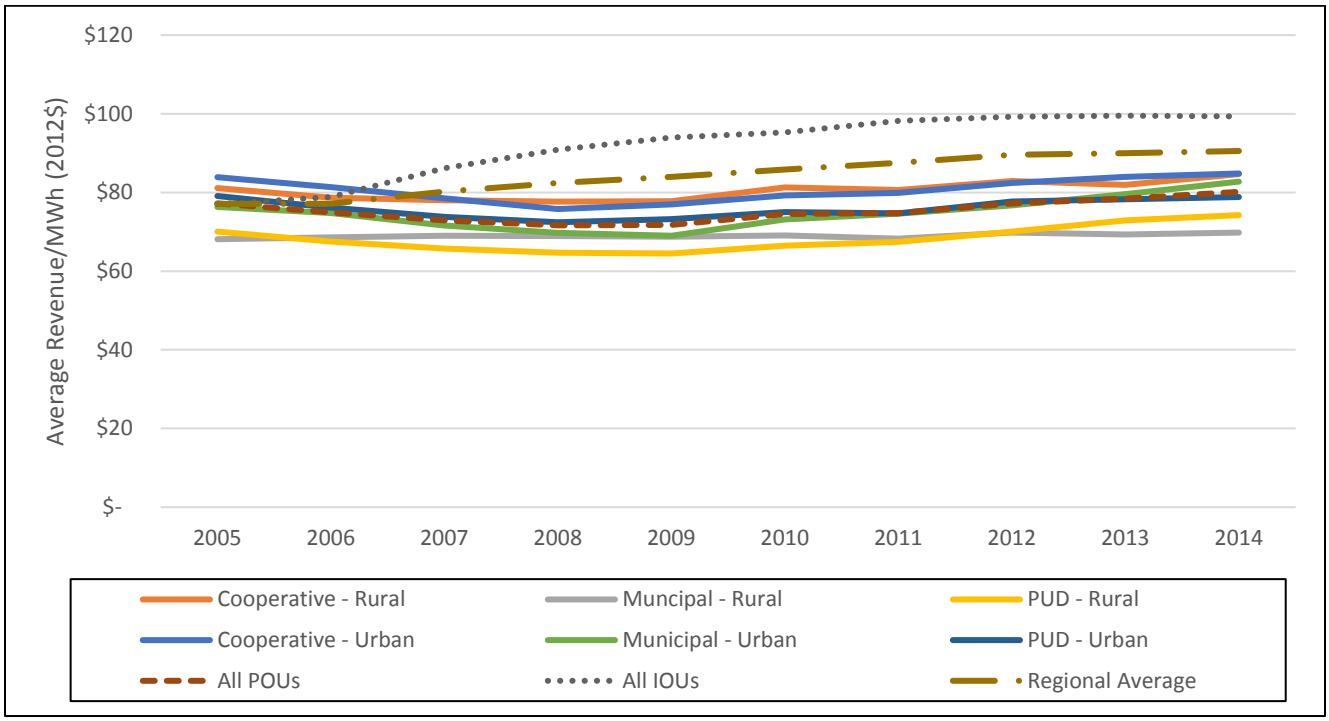
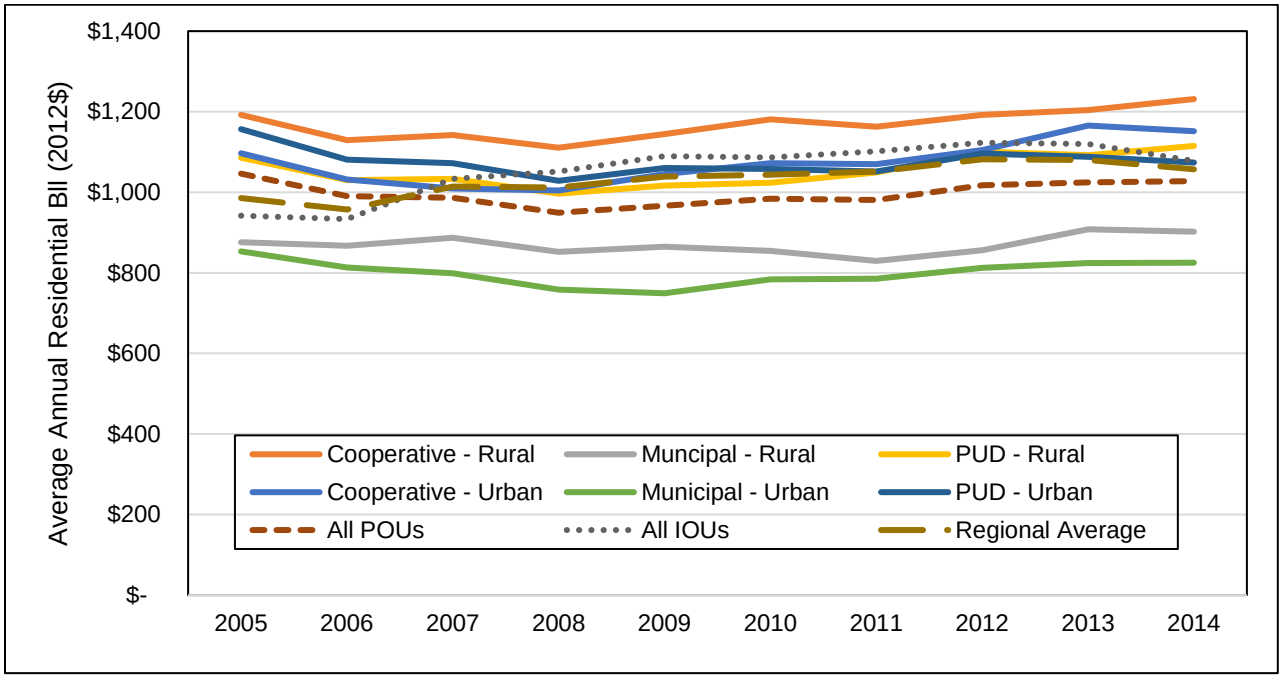



Figure 10 shows the trend in average annual residential electricity bills from 2005 through 2014 by utility ownership type and service area characteristic (i.e., urban vs. rural) after normalizing for weather and adjusting for inflation. The trends in average annual residential electricity bills differs across utility ownership and service area types reflect the underlying trends in average annual use and average annual revenue collected per megawatt-hour. For example, between 2005 and 2014 the bill for the average residential customer of investor-owned utilities increased from approximately $940 per year to $1,080 per year adjusted for inflation, an increase of around $140. This increase occurred even though the average use per residential customer of investor-owned utilities declined by over 10 percent, because the average revenue collected per megawatt-hour of sales increase by nearly 30 percent. In contrast, the customers of municipal utilities serving urban areas saw a drop in their average annual electricity bill, despite the fact that these utilities average revenue collected per megawatt-hour increased by around 8 percent, due to the decrease in their average annual use per residential customer.

Figure 10 – Average Residential Electricity Bill by Utility Ownership and Service Area Characteristic 2005 – 2014 (Weather Normalized and Adjusted for Inflation)




From the preceding discussion it is clear that the average residential electric bill varies widely across the region and is more dependent on the characteristics of the "average" residential consumer served by a utility, than whether the utility is a public or privately owned utility. Figure 11 shows the frequency distribution of average annual residential electricity bills of publicly owned and investor owned utilities in 2014. From this figure it can be observed that the bulk of residential customers in the region spend between $900 and $1500 per year for electricity.

Figure 11 - Frequency Distribution of Residential Electricity Bills for Publicly Owned and Investor Owned Utilities in 2014 (Nominal$, Not Weather Normalized)

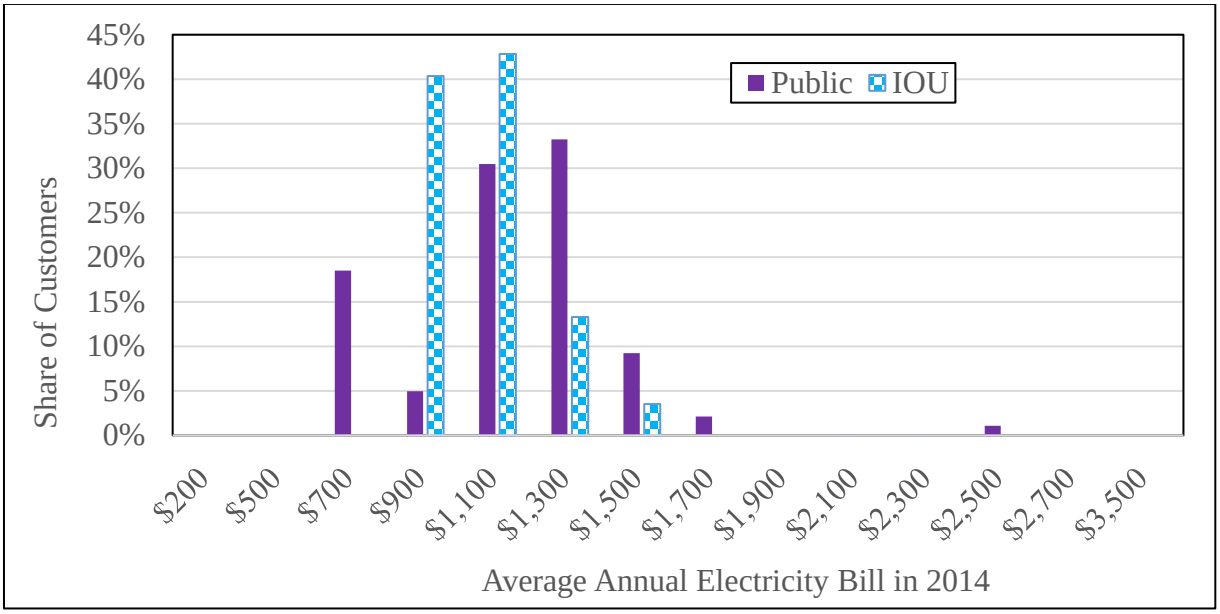
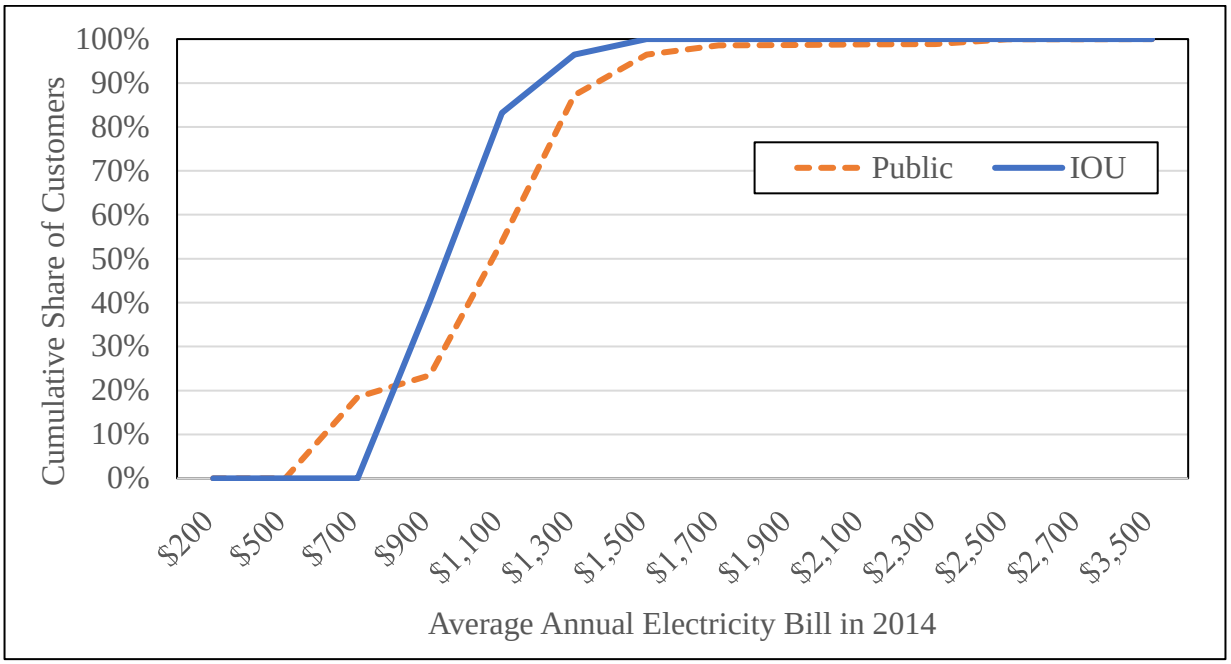



Figure 12 shows the cumulative frequency distribution of average annual electricity bills for residential customers of 133 utilities in the region. This figure shows that the average annual electricity bill for nearly 90 percent of customers of publicly owned utilities is less than $1300. Figure 12 also shows that the average annual electricity bill for around 95 percent of customers of investor owned utilities is less than $1300.

Figure 12 – Cumulative Frequency Distribution of Residential Electricity Bills for Publicly Owned and Investor Owned Utilities in 2014 (Nominal$)



## Sources of Variations in Average Residential Electricity Bills

This section of this report explores the potential causes for the variation in annual average electricity use, the variation in average annual electricity cost per megawatt-hour and the resultant average annual bill across utilities.

Table 1 shows the two variables that determine a residential consumers electric bills – price per unit of electricity (i.e., retail rates) and the amount of electricity consumed (i.e., electricity use) for the various types of utility ownerships and service area characteristics. Either higher rates or higher consumption, or a combination of the two can be the root cause of higher average bills.

Table 1 shows the average of annual consumption and average electric revenue per megawatt-hour for residential customers for the 2005-2014 period across utility ownership types and service territory composition. The average household in the region consumed about 12.2 MWH per year over the past 10 years. Residential customers of publically owned utilities consumed about 8% more electricity per year than the regional average or 13.2 MWH per year. The average residential customers of IOUs used about 11.5 MWH of electricity per year or about 6% below regional average. The average residential electricity use per customer in publicly owned utilities for this period was 15% above the investor owned utilities.

Table 1- Annual Average of Electricity Use, Rates and Bills by Utility Ownership and Service Area Type 2005-2014 (Bills adjusted for inflation, Weather Normalized Consumption)

| Utility Type | Annual Average Use (MWH/year) | Average Revenue Collected per MWH[2] | Average Electric Bill (2012$ /Customer /year) | Difference in Average Electricity Use from Regional Average Use (MWh/year) |
|---|---|---|---|---|
| Publics | | | | |
| Rural - Cooperative | 14.53 | $ 80 | $ 1,169 | 2.3 |
| Rural - Municipals | 12.61 | $ 69 | $ 870 | 0.4 |
| Rural – PUDs | 15.43 | $ 68 | $ 1,054 | 3.2 |
| | | | | |
| Urban - Cooperatives | 13.32 | $ 81 | $ 1,075 | 1.1 |
| Urban - Municipals | 10.72 | $ 75 | $ 801 | (1.5) |
| Urban – PUDs | 14.18 | $ 76 | $ 1,077 | 1.9 |
| | | | | |
| All Publics | 13.24 | $ 75 | $ 997 | 1.0 |
| IOUS (All Urban) | 11.53 | $ 92 | $ 1,056 | (0.7) |
| Regional Average | 12.24 | $ 84 | $ 1,032 | - |

As can also be seen from Table 1 there is significant variation in the average annual use per residential customer across public utilities. This variation is largest between those serving urban areas and those serving rural areas. Residential customers of publically owned, municipal utilities serving urban areas have the lowest residential consumptions per year while investor-owned utilities have the second lowest annual use per customer of all utility types. For example, for cooperatives and PUDs serving rural areas the average use per residential customer were 2.3 and 3.2 MWh/year above the regional average annual use. In contrast the average annual use of residential customers of IOUs and municipal utilities serving urban areas is 0.7 to 1.5 MWh/year lower than the regional average use per residential customer.

Table 1 also shows the average revenue per megawatt-hour of retail sales for the residential sector over the period from 2005 through 2014. As can be seen, the average revenue collected per megawatt hour of retail sales is lower than the regional average for all public utilities and higher than the regional average for investor owned utilities. Across all public utilities the average revenue collected per megawatt hour of retail sales is 11% below the regional average while for investor owned utilities it is 9% above the regional average.

An inspection of the data shown in Table 1 reveals the need to consider both annual use and retail electricity cost per megawatt-hour when comparing the total annual cost of electricity

[2] The "average revenue per megawatt-hour should not be viewed as the retail rate per megawatt-hour paid by customers. Since it is calculated by dividing total annual revenues by total annual retail sales it includes all customer charges, including monthly fixed charges, demand charges, and charges per unit of electricity consumed.

service across utilities. That is, without knowing both the average annual electricity use and the average cost per megawatt-hour hour of consumption, it is not possible to determine whether the average annual total cost of electricity for customers served by one utility is lower or higher than customers served by another utility.

This is best illustrated by comparing the customer bills of cooperatives serving urban areas with those of PUDs serving rural areas. PUDs serving rural areas collected an average of $68 in revenues per megawatt-hour of retail sales while cooperatives serving urban areas collected $81 in revenues per megawatt-hour of retail sales, or nearly 20 percent more than PUD serving rural areas. However, the annual electricity bills of these two groups differs by less $60 annually ($1,115 vs. $1,151 per year), or just three percent due to difference in the average annual electricity use per customer.

Table 2 shows the average annual residential electricity bill as well as the lowest and highest bills paid by residential customers by utility type for just the year 2014.[3] From Table 2 it can be seen that on average residential customers in the region paid about $1,098 dollars for electricity in 2014. The lowest observed average annual residential electricity bills were for customers of a municipal utility with a rural service area. The residential customers of that utility paid, on average, $123 dollars per year for their electricity. The highest average annual electricity bill was paid by the residential customers of a cooperative serving a rural area. This utility's average residential customer paid $3,477 dollars per year for electricity.

Table 2 - Variance in Average Residential Electricity Bills in 2014

(Nominal$, Not Weather Normalized)

| | Lowest Annual Electricity Bill/Residential Customer | Average Annual Electricity Bill/Residential Customer | Highest Annual Electricity Bill/Residential Customer | Difference in Average Electricity Bill from Regional Average Bill |
|---|---|---|---|---|
| Public Utilities | | | | |
| Rural - Cooperatives | $444 | $1280 | $3,477 | $181 |
| Rural – Municipals | $123 | $937 | $2,309 | $(161) |
| Rural - PUDs | $823 | $1159 | $1,988 | $60 |
| | | | | |
| Urban - Cooperatives | $938 | $1196 | $1,346 | $98 |
| Urban - Municipals | $700 | $858 | $1,248 | ($240) |
| Urban - PUDs | $683 | $1116 | $1,273 | 17 |
| | | | | |
| Public Utilities (All) | $123 | $1068 | $3,477 | (30) |
| Investor Owned Utilities | $909 | $1120 | $1,625 | 22 |
| | | | | |
| Regional Average | | $1098 | | |

It should be noted that this report has not investigated the reason/s behind the lowest and highest annual bills. These bills may represent cases with very low or high seasonal consumption

[3] Data in Table 3 are not weather normalized nor have the bills for this year been adjusted for inflation.

Table 4 mask the underlying relationship between the magnitude of a customer's annual average electricity bill and both their level of consumption and "average revenue" per unit of consumption. Table 5 shows not only the average annual bill for the utilities with the highest and lowest bills, but also the average annual electricity consumption per customer and the average revenue collected per megawatt-hour of residential sector retail electricity sales.

Table 5 shows that the average annual consumption of customers of the municipal utility with the lowest annual electricity bill was only 2 megawatt-hour per year. In contrast, the residential customers of the cooperative with the highest annual average electricity bills consumed 71 megawatt-hour per year – 35 times the average use of consumers with the lowest annual bills. This extreme variation in annual electricity consumption overwhelms the fact that the average revenue per megawatt-hour of use paid by customers of the utility that has the lowest average annual bills is 35% higher than the average revenue per megawatt-hour paid by the customers that have the highest average annual electricity bill ($67 vs. $49).

Table 5 – Range of Electric Bills, Consumption and Average Revenue per MWh in 2014[4]
(Nominal$, Not Weather Normalized)

| **Utility Ownership and Service Area Type in 2014** | **Rural - Lowest** | **Rural - Highest** | | **Urban - Lowest** | **Urban – Highest** |
|---|---|---|---|---|---|
| **Cooperative** | | | | | |
| Electric Bill $/year/customer | $ 444 | $ 3,477 | | $ 938 | $ 1,346 |
| Consumption MWH/Customer | 3 | 71 | | 11 | 15 |
| Calculated Average Revenue per MWh | $ 150 | $ 49 | | $ 85 | $ 89 |
| **Municipal** | | | | | |
| Electric Bill $/year/customer | $ 123 | $ 2,309 | | $ 700 | $ 1,248 |
| Consumption MWH/Customer | 2 | 39 | | 8 | 11 |
| Calculated Average Revenue per MWh | $67 | $60 | | $87 | $109 |
| **PUDs** | | | | | |
| Electric Bill $/year/customer | $ 823 | $ 1,988 | | $ 683 | $ 1,273 |
| Consumption MWH/Customer | 28 | 22 | | 21 | 13 |
| Calculated Average Revenue per MWh | $29 | $92 | | $32 | $96 |
| | | | | | |
| **Investor Owned*** | | | | | |
| Electric Bill $/year/customer | | | | $ 909 | $ 1,625 |
| Consumption MWH/Customer | | | | 8 | 19 |
| Calculated Average Revenue per MWh | | | | $ 107 | $ 88 |

[4] Service area of IOUs were all classified as "urban" even though some serve urban and rural areas on the assumption that the majority of their customers are in urban areas. For utilities that serve multiple states, each state's service area was considered separately, since their rates and customer characteristics may vary by

The preceding discussion clearly illustrates the need to consider both annual consumption and the cost per unit of electricity (i.e., rates) when assessing the affordability of electric service. The remainder of this paper attempts to identify some of the reasons why the average annual residential electricity use varies so significantly across utilities. Table 6 shows the factors we investigated and whether or not we find them contributing to difference in the difference between IOU and POU consumption levels. Of the six factors evaluated, we found access to natural gas and historical energy efficiency contributed to difference in consumption levels.

It should be noted that access to natural gas and urban vs rural designation are almost synonymous.

The other four factors, heating system efficiency, vintage of homes, housing type mix and household income and level of poverty seem to be very similar in IOU and POU service area.

Table 6 – Factors Affecting Average Annual Residential Electricity Bills

| Factor | Yes | No |
|---|---|---|
| Access to natural gas | X | |
| Historical energy efficiency | X | |
| Heating system efficiency | | X |
| Vintage (i.e., age) of homes | | X |
| Housing type mix (i.e., share of single family, multifamily and manufactured homes) | | X |
| Household Income and Level of Poverty | | X |

## Underlying Causes of Differences in the Average Use per Residential Customer

Five building stock and equipment factors as well as two socio-economic factors were investigated to determine their influence on the differences observed in the average annual electricity consumption across utilities and the changes in average annual use over time. The five building and equipment related factors were:

- Saturation of electric space and water heating
- Saturation of electric space heating technologies
- Differences in housing stock mix (e.g. share of single family, multi-family and manufactured housing
- Housing stock vintage

state. Thus, for example, Idaho Power's Idaho and Oregon's service areas were treated as two different "IOUs" even though both are served by the same utility in order to reflect different regulatory commission policies and cost structures.

- Energy efficiency investments

The findings regarding each of these factors are discussed below.

### Finding – The average annual electricity use per residential customer served by public utilities is higher because they have a higher saturation of electric space and water heating than those served by investor owned utilities

Space and water heating are two of the largest energy consuming end-uses in a typical household. Therefore, differences in the energy form used for these end uses could contribute to the differences observed in average annual use of electricity across utilities. Table 7 below shows the data derived from the Residential Building Stock Assessment (RBSA) on the heating system fuel types for investor-owned and publicly owned utilities. Table 6 shows that 43% of households served by public utilities are heated with electricity compared to only 22% of the households served IOUs. In contrast, in IOUs service areas 53% of households heat with natural gas while only 32% of the households served by public utilities used natural gas for space heating.

Table 7 – Space Heating Fuel Market Share by Utility Type

| Fuel Type | IOU | Publics | Region |
|---|---|---|---|
| Electric | 22% | 43% | 30% |
| Natural Gas | 53% | 32% | 45% |
| All others | 25% | 26% | 25% |

Table 8 below shows the data derived from the RBSA on the water heating system fuel types for investor owned and publicly owned utilities. Table 8 shows that 67% of households served by public utilities heat water with electricity compared to only 52% of the households served investor owned utilities. In contrast, 46% of households in investor owned utility service areas heat water with natural gas while 31% of the households served by public utilities use natural gas for water heating.

Table 8 – Water Heating Fuel Market Share by Utility Type

| Fuel Type | IOU | Public | Region |
|---|---|---|---|
| Electric | 52% | 67% | 59% |
| Natural Gas/propane | 46% | 31% | 40% |
| All others | 2% | 2% | 1% |

## Finding – The higher average annual electricity use of residential customer served by public utilities compared to those served by investor owned utilities is not due to differences in the mix of electric space heating technologies.[5]

Some electric space heating technologies are significantly more efficient than others. In particular electric heat pumps generally use less electricity to heat than do electric force-air furnaces. Homes that use electric baseboard also tend to use less electricity for space heating than do homes with electric forced-air furnaces because these systems do not have duct losses and enable consumers to set the temperature in some rooms lower than in others (i.e. "zone" their homes). Table 9 shows the RBSA data on electric space heating technology market shares by utility ownership type. From this table it can be observed that two electric space heating technologies, heat pumps and baseboard or zonal systems, are the most common systems used in both investor owned and publicly owned utility service areas. Publicly owned utilities have a higher share of heat pumps while investor owned utilities have a greater share of electric baseboard or zonal heating systems in their respective service areas. The higher market share of electric baseboard or zonal systems in investor owned utility service areas is likely due to the fact that these utilities serve largely urban areas where there are more multifamily dwellings where such systems dominate.

Since homes with heat pumps also use electricity for air conditioning and tend to be larger in size than those using electric baseboard or other zonal electric heating systems their annual use is similar. Therefore, it does not appear that the difference in the market share of specific electric space heating technologies between customers of publicly owned and investor owned utilities is a significant factor in the differences in average annual electricity consumption between these two groups.

Table 9 – Electric Space Heating Technology Market Shares by Utility Type

| | Marker Share of Electric Heat | | |
|---|---|---|---|
| Electric Heating System Technology | IOU | Public | Region |
| Ductless HP | 3% | 2% | 3% |
| Electric Baseboard/Zonal | 47% | 38% | 42% |
| FAF/electric | 19% | 19% | 19% |
| Heat Pump | 31% | 40% | 36% |
| Total Electric | 100% | 100% | 100% |

[5] This study's focus is limited to annual electricity bills. The *total* energy bill for households with access to natural gas may that use that fuel for space and water heating will is, therefore, not reflected in the "bill" comparisons reported in this paper.

### Finding – The higher average electricity use residential customer served by public utilities compared to those served by investor owned utilities is not due to differences in the composition of housing stock in their service areas.

Due to differences in size, heating system mix and overall building shell efficiency the mix of single family, multifamily and manufactured (i.e. mobile) homes could have a potential impact on the average energy use observed for customers of publicly owned and investor owned utilities. However, as is shown in Table 10 the market share of each of these housing times does not differ significantly between publicly owned and investor owned utility service areas. Across both types of utilities, about three-quarters of the residential building stock are in single family homes, roughly 16-17 percent are multifamily dwellings and around ten percent are manufactured homes.

Publicly owned utilities have a slightly larger percent of multi-family units. While this housing type is more likely to heat with electricity these dwelling units are also smaller and have fewer occupants so typically use less electricity than either single family or manufactured homes. All else equal this reduces the difference in average use per residential customer between publicly owned and investor owned utility service areas by lowering the average use per customer.

Table 10 - Market Share of Residential Units by Dwelling Type

| | IOU | POU | Total |
|---|---|---|---|
| Single Family | 77% | 74% | 76% |
| Multi family | 13% | 16% | 14% |
| Manufactured Housing | | | |
| Multi-section | 7% | 7% | 7% |
| Single section | 3% | 3% | 3% |

### Finding - The higher average electricity use residential customer served by public utilities compared to those served by investor owned utilities is not due to differences in the vintage of housing stock in their service areas.

Table 11 provides the RBSA data on the mix of vintages (i.e., year of construction) of residential dwellings in publicly owned and investor owned utility service areas. Across the four vintage categories reported there are only slight differences in market share. Therefore, it does not appear that differences in the average age of the residential building stock contributes to the observed differences in average annual publicly owned and investor owned utility customer electricity use.

Table 11 - Housing Stock Market Share by Vintage*

| | Pre 1980 | 1980-1992 | 1993-2006 | Post 2006 |
|---|---|---|---|---|
| Single Family -IOUs | 62% | 17% | 16% | 5% |
| Single Family - POU | 65% | 15% | 14% | 5% |
| Manufactured Housing -IOU | 35% | 32% | 27% | 3% |
| Manufactured Housing -POU | 35% | 34% | 27% | 3% |

*- similar information for multi-family units was not available.

Finding – The higher average electricity use residential customer served by public utilities compared to those served by investor owned utilities is not due to differences in historical levels of investment in energy efficiency. However, there appears to be a strong positive correlation between the long-term trends in average annual electricity use per residential customer and the level of conservation acquired by utilities.

The impact of investment in conservation accumulate over time. For example, investments made in the past to increase the thermal efficiency of homes continue to impact today's energy consumption. Thus, in order to assess the impact of conservation investments on the residential sector's electricity consumption, historical data on such investments is needed.

As shown in Table 12, based on the reported conservation achievements for the decade covering 2005 through 2014 total residential retail sales have been reduced by just over 800 average megawatts from utility residential sector programs, including low income programs and NEEA programs. Conservation acquired from 2005 through 2014 reduced investor owned utility 2014 retail sales by about 500 aMW or 1,425 kWh per year per customer in 2014. Conservation acquired from 2005 through 2014 reduced publicly owned utility 2014 retails sales by around 312 aMW or 1250 kWh per year per customer in 2014.

Table 12 – Annual and Cumulative Residential Conservation Acquisitions 2005-2014, Including NEEA and Low Income Weatherization

(Average Megawatts at Customer Site[6])

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2005-2014 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IOU | 38 | 31 | 42 | 57 | 59 | 38 | 56 | 58 | 56 | 64 | 499 |
| POU | 13 | 17 | 29 | 31 | 57 | 29 | 30 | 31 | 37 | 40 | 312 |
| Total | 51 | 48 | 71 | 87 | 116 | 67 | 85 | 89 | 93 | 104 | 811 |

It appears that customers of those utilities serving rural service areas acquired a lower share of energy efficiency savings than either their regional share of customers or retail sales. Table 13 shows that about three percent of the regional conservation resource acquisition that occurred between 2005 and 2014 was accomplished in publicly owned utilities serving rural areas. These utilities serve about 14 percent of the region's residential customers and

[6] Savings reported in this table do not include line losses. Residential sector savings including line losses (i.e., equivalent to generation offset for this period are 1,042 aMW)

represent about 17 percent of regional residential sales. In contrast, publicly owned utilities serving urban areas produced 36 percent of the regional residential savings while representing 27 percent of the region's customers and 28 percent of the region's residential load. The region's investor owned utilities serve about 58 percent of the region's residential customers and 55 percent of regional residential sales. Collectively, these utilities acquired about 61 percent of the residential sector savings between 2005 and 2014.

Table 13 - Market Share of Residential Customer Counts, Sales, and Conservation Acquisitions by Utility Ownership and Service Area Characteristics

| | Share of Residential Customers | Share of Residential Sector Retail Sales | Share of Regional Conservation Acquisitions | Average Annual Growth Rate in Electricity Use per Customer[7] |
|---|---|---|---|---|
| **Rural** | **14%** | **17%** | **3%** | |
| Cooperative | 7% | 9% | 0.6% | -0.12% |
| Municipal | 2% | 2% | 0.4% | 0.06% |
| PUDs | 5% | 7% | 2% | -0.35% |
| **Urban** | **27%** | **28%** | **36%** | |
| Cooperative | 2% | 2% | 2% | 0.42% |
| Municipal | 13% | 11% | 16% | -1.26% |
| PUDs | 13% | 15% | 18% | -0.79% |
| **All Publics** | **42%** | **45%** | **39%** | **-0.61%** |
| **Investor Owned** | **58%** | **55%** | **61%** | **-1.32%** |
| **Regional Average** | **100%** | **100%** | **100%** | **-1.00%** |

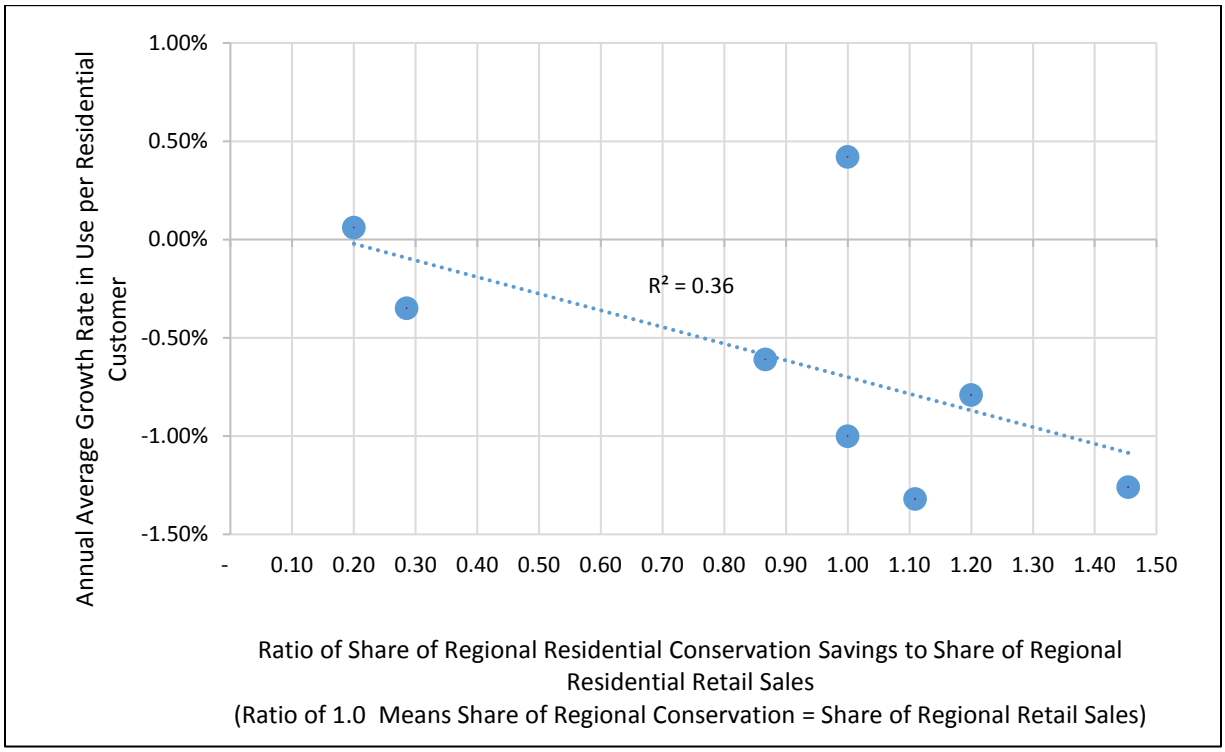
Table 13 shows the average annual rate of growth (or decline) between 2005 and 2014 in the average annual electricity use per customer by utility ownership type and service area characteristic. From Table 13 it can be observed that for those utilities which acquired significantly less conservation than they represent as a share of regional retail sales, experienced larger increases in the average use per customer over the period between 2005 and 2014 than those utilities whose share of regional conservation acquisition corresponded more closely with their share of regional retail sales.

For example, cooperatives serving urban service areas acquired around 0.4% of the regional residential conservation savings between 2005 and 2014, but these utilities represent 2 percent of regional retail sales. The average annual electricity use per residential customers served by these utilities grew by 0.42% per year between 2005 and 2014. In comparison, municipal utilities serving urban areas acquired 16 percent of the residential sector conservation between 2005 and 2014, but represent only 11 percent of the region's residential retail sales. The average annual electricity use per residential customers of these utilities declined by 1.26% per year between 2005 and 2014. Similarly, the region's investor owned utilities represent about 55% of regional retail sales, but acquired 61% of the regional residential conservation between 2005 and 2014. Over this period, the average weather adjusted retail sales per customer of the investor owned utilities declined by 1.32% per year.

[7] The average annual growth in average customer use does not mean that all individual utilities in these categories experience positive (or negative) growth in residential use per customer, nor should it be assumed that share of conservation achieved by individual utilities was similar to the group average share.

There appears to be a strong correlation between the degree to which a utility's share of regional conservation aligns with either its regional share of residential customers or its regional share of retail sales and the average annual rate of change in the average electricity use per customer. Figure 13 plots the relationship between the average annual rate of growth in average annual use per residential customer and a measure of how closely the share of utility energy efficiency savings correspond to their share of regional retail electricity sales. An inspection of Figure 13 shows that those utilities with the lower growth rates in electricity use per customer between 2005 and 2014 also had shares of the regional residential energy efficiency savings that were near or above their share of regional residential electricity sales.

Figure 13 – Relationship between Growth in Annual Average Residential Electricity Use per Customer and Energy Efficiency Savings




The relationship between conservation acquisitions and changes in the average annual electricity use per customer from 2005 to 2014 appears to have a significant impact on the direction and magnitude of the change in average annual customer bills. Table 13 shows the difference in average annual bills by utility ownership type and service area characteristic between 2005 and 2014. Differences are shown in both nominal and real (inflation adjusted) dollars.

A comparison of Table 13 with Table 14 reveals that among the public utilities the greatest increases in average annual residential electricity bills between 2005 and 2014 occurred among those utilities that also had the largest growth rates in average annual electricity use per residential customer. Moreover, as was noted above, these are the same public utilities that acquired significantly less residential conservation than either their regional share of retail sales or customers. In contrast, the average annual electricity bills of those public utilities that acquired a larger share of the region's residential conservation than their share

of either retail sales or customers saw the smallest increases in annual average bills or actual declines in annual average in real, inflation adjusted terms, between 2005 and 2014.

The decline in average annual electricity use per customers (i.e., negative growth/customer), served by investor owned utilities kept their customer bill increase to $140 between 2005 and 2014. That is, the 11% reduction in average annual electricity use over that decade partially offset the fact that the average revenue collected per megawatt-hour for these utilities increased from $77 to $99 per year.

Table 14 – Difference in Average Annual Residential Electricity Bills 2005 - 2014

| Utility Ownership and Service Area Type | Nominal dollars | Real (2012$) |
|---|---|---|
| Rural | | |
| Cooperatives | $ 279 | $ 39 |
| Municipals | $ 203 | $ 26 |
| PUDs | $ 248 | $ 29 |
| Urban | | |
| Cooperative | $ 276 | $ 55 |
| Municipals | $ 142 | $ (28) |
| PUDs | $ 145 | $ (83) |
| | | |
| All POUs | $ 190 | $ (19) |
| All IOUs | $ 330 | $ 136 |
| Regional Average | $ 272 | $ 72 |

### Finding 6 – The higher average electricity use residential customer served by public utilities compared to those served by investor owned utilities or those serving urban and rural area does not appear to be related to differences in income.

To conclusively demonstrate whether differences in income are related to the observed differences in average annual electricity use observed between investor owned utilities and among the various types of publicly owned utilities' residential customers, utility specific demographic data on both income and electricity consumption is required. NEEA, through its 2016 Residential Building Stock Assessment is collecting this data. However, until this data is available it is only possible to determine whether there are differences in average income levels between investor owned and the major types of publicly owned utilities.

The average income by utility type was calculated using estimated median income by zip code produced by US Census, available from American Community Surveys for 2014 (ACS2014). The data from ACS2014 and the Energy Information Administration's Form 861 reports (EIA861) and a data set available from National Renewable Energy Laboratory (NREL) which associates each utility with zip codes, was then used to produce a rough estimate of each utility's average customer's income level.

Table 15 shows the median income per household and number of households by utility type. The average regional income is about $50,000 dollars. The median income is 13% higher for investor owned customers than it is for publicly owned utilities. In the publicly owned utility service areas, average income is about $47,000 dollars compared to about $53,000 dollars in investor owned utility service areas. However, the customers in the urban areas served by public utilities have the highest income level.

Table 15 - Median Income and Number of Households by Utility Type

| Ownership and Area | Median Income | Number of Households |
|---|---|---|
| **Cooperative** | **45,310** | **529,695** |
| Rural | 44,728 | 462,909 |
| Urban | 55,528 | 66,786 |
| **Municipal** | **59,463** | **457,940** |
| Rural | 46,202 | 36,743 |
| Urban | 60,897 | 421,197 |
| **PUDs** | **46,797** | **540,042** |
| Rural | 43,661 | 185,082 |
| Urban | 51,024 | 354,960 |
| **All Public Utilities** | **50,523** | **1,527,677** |
| **Investor Owned** | **53,183** | **3,180,731** |
| Other[8] | NA | 207,588 |
| **Grand Total** | **49,999** | **4,915,996** |

Data from ACS2014 was also used to estimate total population and population below the federal poverty threshold for the entire region. This data appears in Table 15. The annual poverty threshold varies by size of the family. In 2014, annual income threshold for a single individual to be consider below the poverty level was between $11,000 to $12,000 dollars. For a family of three the income threshold is about $19,000. The threshold for a family of 8 or more is about $49,000 dollars. Table provided in the appendix shows further details on income threshold levels.

The ACS2014 estimates total population and the share of population below poverty level for various geographic levels. The estimated count of population and count of people below poverty at zip code level was used to determine whether there is a difference between poverty levels in investor owned and publicly owned service areas. Utilities service areas were mapped to zip codes, then poverty data at the zip code level were used to estimate level of poverty level by utility.

The results of this analysis are also shown in Table 16. In 2014 there were about 1.8 million people or roughly 15% of regional population in poverty at regional level (Idaho, Oregon, Washington, and Western Montana). Two-thirds of this population is in investor owned utility service areas and one-third is in areas served by publicly owned utilities. While the share of people at or below the poverty level is higher in areas served by public utilities than it is areas served by investor owned utilities (16% vs. 14%), the absolute number of people with

[8] Other incudes households in zip codes area served by multiple utilities.

incomes at or below the poverty level is nearly double in areas served by investor owned utilities than in areas served by publicly owned utilities.

Table 16 - Population and People in Poverty by Utility Ownership Type[9]

| Utility Ownership | Population | People in poverty | Share in Poverty |
|---|---|---|---|
| IOU | 8,248,525 | 1,165,451 | 14% |
| Public | 3,817,408 | 621,408 | 16% |
| Other | 485,016 | 72,496 | 15% |
| Grand Total | 12,550,949 | 1,859,355 | 15% |

[9] Data in Table 16 represents the region as defined by the Northwest Power and Conservation Act, and therefore excludes Eastern Montana.

Table A-1: Housing Stock Characteristics – Dwelling Type[10]

| **Building Type** | | **Utility Type** | | **URBAN_RURAL** | | |
|---|---|---|---|---|---|---|
| | | IOU | POU | Rural | Urban | Total |
| **MFG HOME** | Count | 311,793 | 231,936 | 216,613 | 327,116 | 543,728 |
| | Percent of Total | 5.86 | 4.36 | 4.07 | 6.14 | 10.21 |
| | Row Pct | 57.34 | 42.66 | 39.84 | 60.16 | |
| | Col Pct | 9.88 | 10.7 | 17.77 | 7.97 | |
| **Multi-Family** | Count | 417,794 | 338,979 | 85,051 | 671,722 | 756,773 |
| | Percent of Total | 7.85 | 6.37 | 1.6 | 12.62 | 14.21 |
| | Row Pct | 55.21 | 44.79 | 11.24 | 88.76 | |
| | Col Pct | 13.23 | 15.64 | 6.98 | 16.36 | |
| **Single Family** | Count | 2,427,336 | 1,596,594 | 917,088 | 3,106,842 | 4,023,930 |
| | Percent of Total | 45.59 | 29.99 | 17.22 | 58.35 | 75.57 |
| | Row Pct | 60.32 | 39.68 | 22.79 | 77.21 | |
| | Col Pct | 76.89 | 73.66 | 75.25 | 75.67 | |
| **Total** | **Count** | **3,156,923** | **2,167,509** | **1,218,751** | **4,105,680** | **5,324,431** |
| | **Col Pct** | **59.29** | **40.71** | **22.89** | **77.11** | **100** |
| **Building Type** | | **Utility Type** | | **URBAN_RURAL** | | |
| | | IOU | NWP | Rural | Urban | Total |
| **MFG HOME** | Count | 311,793 | 231,936 | 216,613 | 327,116 | 543,728 |
| **Multi-Family** | Count | 417,794 | 338,979 | 85,051 | 671,722 | 756,773 |
| **Single Family** | Count | 2,427,336 | 1,596,594 | 917,088 | 3,106,842 | 4,023,930 |
| **Total** | **Count** | **3,156,923** | **2,167,509** | **1,218,751** | **4,105,680** | **5,324,431** |
| | **Col Pct** | **59.29** | **40.71** | **22.89** | **77.11** | **100** |

[10] Tables A-1 and A-2 were derived from NEEA's Residential Building Stock Assessment (RBSA). The RBSA's sample frame was designed to be statistically representative at the regional level. The parsing the results by utility ownership and service area characteristics (i.e., urban vs. rural) does not have the same level of statistical reliability or representation as the survey's regional results.

Table A-2: Housing Stock Characteristics – Detailed Building Types

| Detailed Building Type | | Utility Type | | URBAN_RURAL | | |
|---|---|---|---|---|---|---|
| | | IOU | POU | Rural | Urban | Total |
| **Double Wide** | Frequency | 189,535 | 132,896 | 127,663 | 194,768 | 322,431 |
| | Percent of Total | 3.56 | 2.5 | 2.4 | 3.66 | 6.06 |
| | Row Pct | 58.78 | 41.22 | 39.59 | 60.41 | |
| | Col Pct | 6 | 6.13 | 10.47 | 4.74 | |
| **Duplex, Triplex, or Fourplex** | Frequency | 140,168 | 36,388 | 41,908 | 134,648 | 176,556 |
| | Percent of Total | 2.63 | 0.68 | 0.79 | 2.53 | 3.32 |
| | Row Pct | 79.39 | 20.61 | 23.74 | 76.26 | |
| | Col Pct | 4.44 | 1.68 | 3.44 | 3.28 | |
| **Flats/Apartments** | Frequency | 397,900 | 315,914 | 85,051 | 628,763 | 713,814 |
| | Percent of Total | 7.47 | 5.93 | 1.6 | 11.81 | 13.41 |
| | Row Pct | 55.74 | 44.26 | 11.92 | 88.08 | |
| | Col Pct | 12.6 | 14.57 | 6.98 | 15.31 | |
| **Modular/Prefab** | Frequency | 11,605 | 13,471 | 18,517 | 6,558 | 25,075 |
| | Percent of Total | 0.22 | 0.25 | 0.35 | 0.12 | 0.47 |
| | Row Pct | 46.28 | 53.72 | 73.85 | 26.15 | |
| | Col Pct | 0.37 | 0.62 | 1.52 | 0.16 | |
| **Other** | Frequency | 0 | 2,129 | 2,129 | 0 | 2,129 |
| | Percent of Total | 0 | 0.04 | 0.04 | 0 | 0.04 |
| | Row Pct | 0 | 100 | 100 | 0 | |
| | Col Pct | 0 | 0.1 | 0.17 | 0 | |
| **Single Family, Detached** | Frequency | 2,214,069 | 1,535,379 | 843,610 | 2,905,838 | 3,749,448 |
| | Percent of Total | 41.58 | 28.84 | 15.84 | 54.58 | 70.42 |
| | Row Pct | 59.05 | 40.95 | 22.5 | 77.5 | |
| | Col Pct | 70.13 | 70.84 | 69.22 | 70.78 | |
| **Single Wide** | Frequency | 99,609 | 71,722 | 57,944 | 113,387 | 171,331 |
| | Percent of Total | 1.87 | 1.35 | 1.09 | 2.13 | 3.22 |
| | Row Pct | 58.14 | 41.86 | 33.82 | 66.18 | |
| | Col Pct | 3.16 | 3.31 | 4.75 | 2.76 | |
| **Townhouse or Rowhouse** | Frequency | 92,993 | 47,892 | 31,570 | 109,315 | 140,885 |
| | Percent of Total | 1.75 | 0.9 | 0.59 | 2.05 | 2.65 |
| | Row Pct | 66.01 | 33.99 | 22.41 | 77.59 | |
| | Col Pct | 2.95 | 2.21 | 2.59 | 2.66 | |
| **Triple Wide** | Frequency | 11,044 | 11,718 | 10,360 | 12,402 | 22,762 |
| | Percent of Total | 0.21 | 0.22 | 0.19 | 0.23 | 0.43 |
| | Row Pct | 48.52 | 51.48 | 45.51 | 54.49 | |
| | Col Pct | 0.35 | 0.54 | 0.85 | 0.3 | |
| **Total** | | **3,156,923** | **2,167,509** | **1,218,751** | **4,105,680** | **5,324,431** |
| | | **59.29** | **40.71** | **22.89** | **77.11** | **100** |

Table A-3: Poverty Thresholds for 2014 by Size of Family and Number of Related Children Under 18 Years

| Size of family unit | Weighted Average Thresholds |
|---|---|
| One person (unrelated individual)..... | 12,071 |
| Under 65 years..... | 12,316 |
| 65 years and over..... | 11,354 |
| | |
| Two people..... | 15,379 |
| Householder under 65 years..... | 15,934 |
| Householder 65 years and over..... | 14,326 |
| | |
| Three people..... | 18,850 |
| Four people..... | 24,230 |
| Five people..... | 28,695 |
| Six people..... | 32,473 |
| Seven people..... | 36,927 |
| Eight people..... | 40,968 |
| Nine people or more..... | 49,021 |
| Source: U.S. Census Bureau. | |

Table A-4: Median Income and Household Count by Utility Type

| **Ownership and Area** | **Median income** | **Margin of Error** | **Number of Households** |
|---|---|---|---|
| **Cooperative** | **45,310** | **13,125** | **529,695** |
| Rural | 44,728 | 13,220 | 462,909 |
| Urban | 55,528 | 11,459 | 66,786 |
| **Municipal** | **59,463** | **6,431** | **457,940** |
| Rural | 46,202 | 3,308 | 36,743 |
| Urban | 60,897 | 6,768 | 421,197 |
| **PUDs** | **46,797** | **13,531** | **540,042** |
| Rural | 43,661 | 13,106 | 185,082 |
| Urban | 51,024 | 14,105 | 354,960 |
| **All Public Utilities** | **50,523** | | **1,527,677** |
| **Investor Owned** | **53,183** | **10,061** | **3,180,731** |
| **Other** | | | |
| **Grand Total** | **49,999** | **+/-11,747** | **4,915,996** |

Table A-5: Income levels by state

| | Median income (dollars); Estimate; Households | Median income (dollars); Margin of Error; Households | Sum of Total; Estimate; Households |
|---|---|---|---|
| ID | 45,810 | 11,678 | 1,254,184 |
| OR | 48,719 | 9,937 | 1,163,567 |
| WA | 58,077 | 11,271 | 2,241,125 |
| WMT | 37,569 | 15,921 | 60,555 |
| #N/A | 46,621 | 16,139 | 196,565 |
| **Grand Total** | **49,999** | **11,747** | **4,915,996** |

*-cases were state could not be established.

Table A-6: Estimated Total Population, Population in Poverty and percent of population in Poverty- ACS 2014

| | Total Population: | Margin of Error | Population with Income in the past 12 months below poverty level: | Margin of Error | percent of Population |
|---|---|---|---|---|---|
| **Idaho** | 1,568,375 | 743 | 244,618 | 5,923 | 16% |
| **Montana** | 981,707 | 586 | 150,096 | 3,959 | 15% |
| **Oregon** | 3,823,874 | 1,167 | 638,816 | 9,214 | 17% |
| **Washington** | 6,765,200 | 1,658 | 916,364 | 13,006 | 14% |
| **Total 4 States** | 13,139,156 | 4,154 | 1,949,894 | 32,102 | 15% |

Table A-7: Public Utilities by Ownership and Service Territory Characteristic

| Rural Coops | |
|---|---|
| **Riverside Electric Cooperative** | ID |
| **Ravalli County Elec Coop, Inc.** | WMT |
| **Vigilante Electric Coop, Inc.** | WMT |
| **Vigilante Electric Coop, Inc.** | ID |
| **Raft River Rural Elec Coop Inc.** | ID |
| **West Oregon Electric Coop Inc.** | OR |
| **Wasco Electric Coop, Inc.** | OR |
| **United Electric Co-op, Inc.** | ID |
| **Umatilla Electric Coop Assn** | OR |
| **Tanner Electric Coop** | WA |
| **Surprise Valley Electrification Corp.** | OR |
| **South Side Electric, Inc.** | ID |
| **Salmon River Electric Coop Inc.** | ID |
| **Parkland Light & Water Company** | WA |
| **Orcas Power & Light Coop** | WA |

| | |
|---|---|
| **Oregon Trail El Cons Coop, Inc.** | OR |
| **Okanogan County Elec Coop, Inc.** | WA |
| **Ohop Mutual Light Company, Inc.** | WA |
| **Northern Lights, Inc.** | WA |
| **Alder Mutual Light Co, Inc.** | WA |
| **Northern Lights, Inc.** | WMT |
| **Northern Lights, Inc.** | ID |
| **Nespelem Valley Elec Coop, Inc.** | WA |
| **Modern Electric Water Company** | WA |
| **Missoula Electric Coop, Inc.** | WMT |
| **Missoula Electric Coop, Inc.** | ID |
| **Midstate Electric Coop, Inc.** | OR |
| **Harney Electric Coop, Inc.** | OR |
| **Lower Valley Energy Inc.** | ID |
| **Lost River Electric Coop Inc.** | ID |
| **LInc.oln Electric Coop, Inc.** | WMT |
| **Lane Electric Coop Inc.** | OR |
| **Lakeview Light & Power** | WA |
| **Kootenai Electric Coop Inc.** | WA |
| **Kootenai Electric Coop Inc.** | ID |
| **Idaho Cnty L&P Coop Assn, Inc.** | ID |
| **Hood River Electric Coop** | OR |
| **Inland Power & Light Company** | WA |
| **Inland Power & Light Company** | ID |
| **Grand Electric Coop, Inc.** | WMT |
| **Glacier Electric Coop, Inc.** | WMT |
| **Fall River Rural Elec Coop Inc.** | WMT |
| **Fall River Rural Elec Coop Inc.** | ID |
| **Farmers Electric Company, Ltd** | ID |
| **Elmhurst Mutual Power & Light Co** | WA |
| **East End Mutual Elec Co Ltd** | ID |
| **Douglas Electric Coop, Inc.** | OR |
| **Consumers Power, Inc.** | OR |
| **Coos-Curry Electric Coop, Inc.** | OR |
| **Columbia Rural Elec Assn, Inc.** | WA |
| **Columbia Rural Elec Assn, Inc.** | OR |
| **Columbia Power Coop Assn Inc.** | OR |
| **Columbia Basin Elec Cooperative, Inc.** | OR |
| **Clearwater Power Company** | WA |
| **Clearwater Power Company** | OR |
| **Clearwater Power Company** | ID |
| **Central Electric Coop Inc.** | OR |
| **Blachly-Lane Cnty Coop El Assn** | OR |
| **Big Bend Electric Coop, Inc.** | WA |
| **Benton Rural Electric Assn** | WA |

| Rural Municipals | |
|---|---|
| **City of Ashland** | OR |
| **City of Weiser** | ID |
| **City of Troy** | WMT |
| **City of Sumas** | WA |
| **Town of Steilacoom** | WA |
| **City of Soda Springs** | ID |
| **Town of Ruston** | WA |
| **Rupert City of** | ID |
| **City of Plummer** | ID |
| **City of Albion** | ID |
| **Port Angeles City of** | WA |
| **City of Monmouth** | OR |
| **City of Milton** | WA |
| **City of Milton-Freewater** | OR |
| **City of Minidoka** | ID |
| **City of McCleary** | WA |
| **City of Heyburn** | ID |
| **City of Hermiston** | OR |
| **City of Declo** | ID |
| **City of Forest Grove** | OR |
| **City of Ellensburg** | WA |
| **Town of Eatonville** | WA |
| **City of Drain** | OR |
| **City of Coulee Dam** | WA |
| **City of Chewelah** | WA |
| **City of Cheney** | WA |
| **City of Centralia** | WA |
| **City of Cascade Locks** | OR |
| **Canby Utility Board** | OR |
| **City of Burley** | ID |
| **City of Bonners Ferry** | ID |
| **City of Blaine** | WA |
| **City of Bandon** | OR |

| Rural PUDs | |
|---|---|
| **UTILITY_NAME** | region |
| **PUD No 1 of Jefferson County** | WA |
| **PUD No 1 of Whatcom County** | WA |
| **Columbia River Peoples Ut Dist** | OR |
| **Emerald People's Utility Dist** | OR |
| **Clatskanie Peoples Util Dist** | OR |
| **PUD No 1 of Mason County** | WA |
| **Vera Irrigation District #15** | WA |
| **PUD No 1 of Skamania Co** | WA |
| **PUD No 3 of Mason County** | WA |
| **PUD No 1 of Wahkiakum County** | WA |
| **PUD No 1 of Asotin County** | WA |
| **PUD No 1 of Pend Oreille Cnty** | WA |

| | |
|---|---|
| **Pacific Public Utility District No 2** | WA |
| **PUD No 1 of Okanogan County** | WA |
| **Northern Wasco County PUD** | OR |
| **PUD No 1 of Lewis County** | WA |
| **PUD No 1 of Klickitat County** | WA |
| **PUD No 1 of Kittitas County** | WA |
| **PUD No 1 of Franklin County** | WA |
| **PUD No 1 of Ferry County** | WA |
| **PUD No 1 of Douglas County** | WA |
| **PUD No 1 of Clallam County** | WA |
| **Central Lincoln People's Ut Dt** | OR |

| **Urban Municipal utilities** | | | **Urban PUDs** | |
|---|---|---|---|---|
| | | | | |
| **Tacoma City of** | WA | | Tillamook Peoples Utility Dist | OR |
| **City of Springfield** | OR | | Snohomish County PUD No 1 | WA |
| **Seattle City of** | WA | | PUD No 2 of Grant County | WA |
| **City of Richland** | WA | | PUD No 1 of Grays Harbor Cnty | WA |
| **McMinnville City of** | OR | | PUD No 1 of Cowlitz County | WA |
| **Idaho Falls City of** | ID | | PUD No 1 of Clark County | WA |
| **City of Eugene** | OR | | PUD No 1 of Chelan County | WA |
| | | | PUD No 1 of Benton County | WA |

| **Urban Coops** | |
|---|---|
| Salem Electric | OR |
| Peninsula Light Company | WA |
| Flathead Electric Coop Inc | WMT |

Table A -8: Investor Owned Utilities

| **Investor Owned Utilities** | |
|---|---|
| **Avista Corp** | WA |
| **Avista Corp** | WMT |
| **Avista Corp** | ID |
| **Puget Sound Energy** | WA |
| **Portland General Electric Company** | OR |
| **PacifiCorp** | WA |
| **PacifiCorp** | OR |
| **PacifiCorp** | ID |
| **NorthWestern Corporation** | WMT |
| **Idaho Power Co** | OR |
| **Idaho Power Co** | ID |