Cascade Natural Gas Corporation: Low-Income Rate Analysis for Washington

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I. EXECUTIVE SUMMARY

With the transition toward a low carbon energy future comes a requirement for substantial investments in the energy supply infrastructure. Concern over energy affordability, especially for low-income households, is evidenced by recent legislation, including Washington SB-5295 which became effective July 25, 2021. Provisions of SB-5295 allow regulated utilities to offer discounts and special rates to reduce the energy burden, which is the percentage of income spent on household energy, faced by low-income[1] customers. Furthermore, SB-5295 also allows regulated utilities to recover the cost of low-income rate discounts and special rates up to 5% of their revenue requirements, subject to commission approval.

Cascade Natural Gas Corporation (Cascade) selected Forefront Economics Inc and H. Gil Peach and Associates to conduct a study to better understand the current energy burden of their customer base and the likely impacts of a discounted rate program designed to lower the energy burden of low-income customers in accordance with the objectives of SB-5295. This paper presents the approach and findings of our study.

Objectives

The overall objective is to describe the energy burden facing Cascade customers in sufficient detail that allows an understanding of the differences in energy burden by location, using refined measures of household income. More specifically, objectives include:

1. Develop county level estimates of the number of low-income customers and the energy burden facing these groups of customers.[2]
2. Describe energy burden in sufficient detail to illuminate possible affordability issues in subgroups of the low-income customer base. For example, a discounted rate program that works to lower energy burden on income qualified customers as a whole may fail to achieve energy burden goals for households with very low income.
3. Propose and analyze the impacts on low-income, and other customers, of a discounted rate program for low-income customers that:
    a. Lowers total energy burden as directed in SB-5295.[3]

[1] "Low-income" means household incomes as defined by the department or commission, provided that the definition may not exceed the higher of eighty percent of area median household income or two hundred percent of the federal poverty level, adjusted for household size (Revised Code of Washington 19.405.020, Definition 25).
[2] "Energy burden" means the share of annual household income used to pay annual home energy bills (Revised Code of Washington 19.405.020, Definition 17).
[3] SB-5295 states that "Each gas or electrical company must propose a low-income assistance program comprised of a discount rate for low-income senior customers and low-income customers as well as grants and other low-income assistance programs. The commission shall approve, disapprove, or approve with modifications each gas or electrical company's low-income assistance discount rate and grant program. The gas or electrical company must use reasonable and good faith efforts to seek approval for low-income program design, eligibility, operation, outreach, and funding proposals from its low-income and equity advisory groups in advance of filing such proposals with the commission. In order to remove barriers and to expedite assistance, low-income discounts or grants approved under this section must be provided in coordination with community-based organizations in the gas or electrical company's service territory including, but not limited to, grantees of the department of commerce, community action agencies, and community-based nonprofit organizations."

b. Provides rate discounts in proportion to need.[4]
c. Is proportional by fuel (same percentage bill discount for natural gas and electric bills).
d. Is not overly onerous to administer.

These objectives guided the analysis presented in this paper.

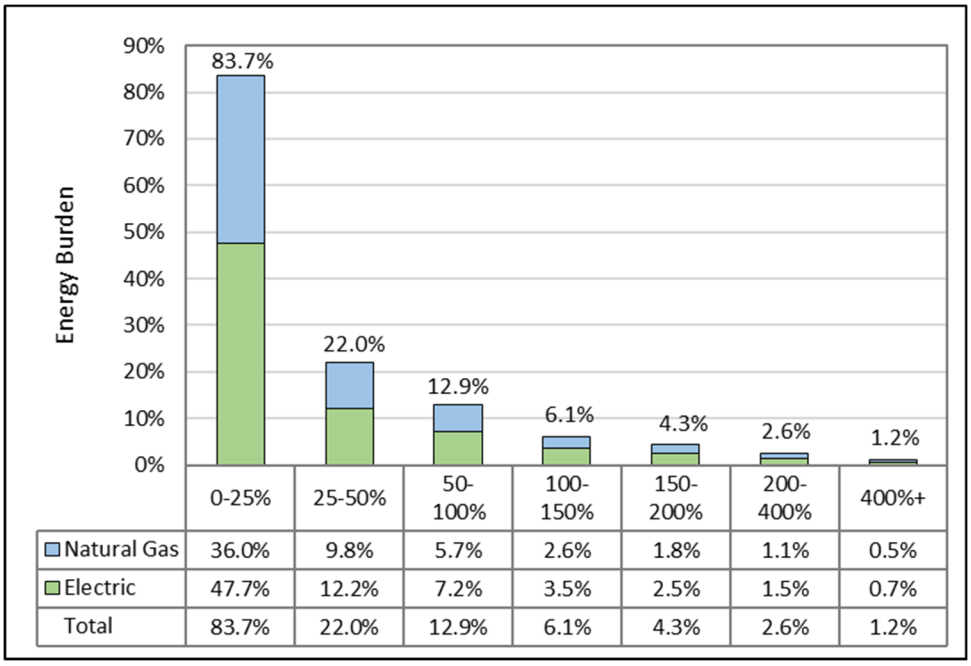
Summary of Approach and Findings

Unless otherwise stated, all of the results in this report pertain to the counties served by Cascade in the state Washington. These counties are listed in Table 2 and are collectively referred to as the Cascade Washington service territory. Our analysis is based on data from Cascade, the Low-Income Energy Affordability Data (LEAD) tool, and Low-Income Home Energy Assistance Program (LIHEAP) applicant data. These sources are described in more detail in the Background and Approach section. All references to energy costs and energy burden are before reductions from bill assistance programs unless otherwise stated. A summary of major findings is listed below:

- Taken together, homes heated with natural gas and homes heated with electricity make up nearly nine out of every 10 homes in the service territory. Electricity is the predominant heating fuel in the Cascade service territory, accounting for 60% of all households. Natural gas heated homes make up 28% of all households in the Cascade service territory.
- Within the service territory there are approximately two homes heated with electricity for every one home heated with natural gas. For households with less than 150% of Federal Poverty Level (FPL), electric heated homes outnumber gas homes by a 4 to 1 margin. Income distribution for gas heated homes is skewed more toward higher incomes and less toward lower incomes, compared to electrically heated homes.
- There are nearly 25,000 Cascade residential customers with incomes below 150% of FPL. About half of these customers have incomes below 100% of FPL.
- Using LEAD data, the total energy burden for Cascade customers below 100% FPL is 15.4%, meaning annual household electric and natural gas bills are 15.4% of annual income. About 43% of the annual energy costs in this income group are for natural gas bills and 57% for electricity. The fuel specific energy burdens are 6.6% for natural gas and 8.4% for electric.
- When LIHEAP data is used to refine the analysis of the 100% of FPL income group, wide variation in the energy burden is observed within sub-groups of low-income customers (see Figure 1). For example, the total energy burden for Cascade customers in the 0-25% of FPL income group is estimated at 84%, the 25-50 FPL group at 22% and the 50-100 FPL group at 13%. In all these groups natural gas costs contribute about 45% of the total energy costs with electric costs accounting for 55%.
- Using energy bill discounts ranging from 93% for the 0-25% FPL group to 2.4% for the 100-150% FPL group and assuming 20% of the 25,000 eligible customers sign-up for a discounted bill program, the total cost of the program comes to 0.4% of retail revenue requirements. If all 25,000 customers below 150% of FPL enrolled in the discounted bill program, the total cost of the program would come to 1.9% of retail revenue requirements.
- At the 20% participation level, when program costs are spread across rate groups using the proportion of base revenue as the spreading criteria, average monthly customer bills increase no more than 0.7% in any customer class. The average monthly residential bills would increase $0.20 (0.4%).

[4] "Energy assistance need" means the amount of assistance necessary to achieve an energy burden equal to six percent for utility customers (Washington Administrative Code 194-040-030 Definitions).

- Less than 3,000 of the 25,0000 customers below 150% FPL are in the less than 50% FPL income groups. Although bill discounts are largest for these customers, the relatively small number of customers in the lower than 50% FPL groups help to keep the total cost of a discounted bill program low.



	0-25%	25-50%	50-100%	100-150%	150-200%	200-400%	400%+
Natural Gas	36.0%	9.8%	5.7%	2.6%	1.8%	1.1%	0.5%
Electric	47.7%	12.2%	7.2%	3.5%	2.5%	1.5%	0.7%
Total	83.7%	22.0%	12.9%	6.1%	4.3%	2.6%	1.2%

Figure 1. Energy Burden by FPL Group, Cascade Washington Residential Customers

In the next section our approach is discussed in greater detail. Subsequent sections discuss the income status and energy burden of Cascade's residential customer base and a tiered rate discount program for achieving energy burden targets.

II. BACKGROUND AND APPROACH

A residence heated with natural gas will have three kinds of energy burden. The "overall" energy burden is the percentage of household income required to pay for both electricity and natural gas. The electricity energy burden for electricity is considered separately. The gas energy burden for natural gas is considered separately. Generally, the higher the household income, the lower the energy burden. Conversely, the lower the household income, the larger the percent of household income required to pay energy bills. For example, energy burden is exceptionally low for upper-income households (often 1% or less), average for households in the middle of the income distribution, and quite high for households in the lower poverty ranges. Consider this as a mathematical problem of moving from the center to the bottom of a distribution. Here, as the bottom of the poverty range is approached, the energy burden accelerates dramatically and becomes quite extreme. Below about 25% of the federal poverty level (FPL) there is a "bottom effect." Below this level, households are in extreme difficulty and energy burdens become exceptionally large.

Payment assistance programs likely compatible with Washington legislation take two forms: direct payment assistance (similar in operation to Cascade's Washington Energy Assistance Fund (WEAF) and the federal/state Low-Income Home Energy Assistance Program (LIHEAP) or lowering bills through rate design. Although two different approaches, these can be made equal in effects.

(1) **Standard Billing with Structured Payment Assistance** - First, following the model used by the State of Nevada, cost-of-service rates would not be modified. In this approach, customers receive cost-of-service bills. However, subsequently, on a case-by-case basis, payment assistance equivalent to a rate reduction is provided. This support, combined with LIHEAP, brings the portion of the bill that remains the responsibility of the low-income household to the planned energy burden target (or, as close as possible given available funding). The energy burden target in Nevada is the empirically determined median household energy burden for the state from the prior year (calculated each year).[5] From 2003 through 2022, the energy burden target for Nevada has been approximately 2% overall energy burden (combined natural gas and electric). In Nevada, this single target is used for all program households from 0-150% of the federal poverty level (FPL). The part of the annual energy bill above the approximately 2% overall energy burden target is paid from the state Universal Service fund. The fund is sustained by a small per therm adder and a small per kWh adder,[6] and collection is managed by the Public Utility Commission of Nevada (PUCN). Of the funding each year, 75% is administered by the Nevada Division of Welfare and Supportive Services (DWSS) for payment assistance and 25% administered by the Nevada Housing Division (NHD) through its subgrantees for low-income weatherization.

[5] There are some additional details in calculation, but this is the essence of the method.

[6] The Universal Service fund adder applies to all customers, except for certain large industrial customers. Nevada also has a variation within this program that provides for arrearage forgiveness. Arrearage forgiveness is only provided to a household once every five years. There are also emergency service provisions and a way for non-low-income households to temporarily qualify due to a sudden drop in income, for example, as happened due to COVID and COVID control rules that affected jobs, or due to sudden extensive medical bills, or similar major life events.

(2) **Tiered Rates** - A second approach is to lower the energy bills for low-income households below cost-of-service billing, using a rate design, subject to approval by the Washington Utilities and Transportation Commission. In this approach LIHEAP and WEAF would continue to function as they do currently. The rate design, however, would lower the individual low-income household energy bills to be paid. Within this rate design approach there are two ways to proceed:

a. **Individualized PIPP** - The rate design can be structured as a full Percentage of Income Payment Plan (PIPP) in which the energy bill for each household is tailored to the individual household income.
b. **Grouped Tiers** - Alternatively, the rate design can be structured in the form of rate tiers (for example, 0-25%, 25-100%, 100-150%, and 151-200% of poverty), with each tier of households assigned a common energy burden target (for example the median of the range or the first quartile of the range).

Considerations

There are several considerations to take into account.

Bottom Effect in Lowest Rate Tier Limitation – The lowest poverty tier has a bottom effect where normal relations that can be expected for higher income poverty groups or non-poverty groups do not apply. In the lowest poverty category, for example, from 0-25% of poverty, all mathematically based logical rate structures break down. These are households with so little income that they simply cannot pay their bills, and a logically structured rate that works for the higher ranges of poverty incomes does not work in the bottom range. Some utilities have tried a kind of "time out" and "hands off" for this group of households, with a time limited token payment coupled with referral to state social services and waiving of minimum payment rules and forgiveness of any penalties and fees.[7]

Moving from Cost-of-Service Rates – A problem in moving off cost-of-service rates is that the apparent energy bills (the actual "please pay" amounts for energy charged to low-income households) are lower than actual costs to the system. A side effect of using a rate subsidy is that from a LIHEAP perspective, initial bills (pre-LIHEAP) will be lower than actual costs. LIHEAP will not "see" true costs. This means that a portion of the subsidy derived from other customers will be offsetting an equivalent decrease in federal funding applied per individual household. This is a cost shift from the federal government to the state (utility customers within the state). It is likely that this cost shift will be negligible since LIHEAP funds cover a relatively small fraction of eligible households each year, while the rate change is likely to provide a subsidy to many more customers than the LIHEAP portion of eligible households, including households from 151-200% of poverty (LIHEAP currently runs to 150% of poverty). Also, the intent is to serve more eligible households overall. To the extent more eligible households are served, LIHEAP dollars will be lower per household but will likely be distributed to many more households. If so, the potential loss of federal dollars can be made up by bringing LIHEAP dollars to more qualified households. To the extent this

[7] Gaz de France (now Gaz Reseau Distribution France) has used this approach. It requires careful structuring of the hand off to state social services, and adequate funding on the state social services side. PECO Energy in Philadelphia used a similar approach for a number of years for households without income due to a number of major life changing conditions such as loss of an income earner, serious accident or illness, divorce, and other forms of incapacitation. Another possible approach would be an inverted rate design for all residential customers with no charge or only a token charge for the first block.

occurs, the loss of federal dollars will be negligible.[8] To make this work, a vigorous effort is required to recruit qualified households to the new low-income rate.

Data Warehouse Limitation – Implementation of a full PIPP with individual bill tied directly to individual household income would require a database storing household incomes, number of persons in household, and related information. Currently, Cascade does not collect this type of information (though the CAP agencies operating under the Department of Commerce do collect and retain this information). Cascade would prefer not to collect and maintain this information on customers. If a full PIPP is desired, it is likely best structured using a non-profit agency to maintain the data necessary to operate a PIPP.

Billing System Limitation – Cascade's current billing system is equipped to provide for five tiers using one standard residential rate plus up to four special rates. Beyond this (more tiers or a full PIPP) it would be very expensive to develop a more targeted approach. Costs of changing billing system software are high; a certain amount of flexibility is built-in to the software package; beyond that programming costs can be high. The best time to move from tiers to a PIPP is when billing software is being replaced for other reasons.

PIPP Advantage - A mathematical proof that the PIPP rate design yields the most efficient aggregate billing consistent with an affordable rate is as follows. Billings for any tier of a tiered rate design with a single rate per tier will include a portion of households within the tier that are over-billed and a portion within the tier comprised of households that are under-billed. However, for rate designs that fully comply with the affordability criteria, the number of over-billed households is zero and the number of under-billed households is zero. This most efficient rate design, with no over-billing and no under-billing, is the rate tailored to each household, the PIPP. Best efficiency is reached by increasing the number of tiers until each tier is a single household, which is the PIPP.

Approach

Our approach to modeling the impact of special rates designed to lower the energy burden of low-income customers is basically a simulation exercise using algorithms that reflect empirical measurements and assumptions. Measurements are the result of summary data that inform the simulation about key customer metrics such as customer counts, energy bills and household income and the distributions of these variables. Program design elements are reflected in assumptions used by the algorithms to estimate customer impacts.

Because we are interested in simulating impacts geographically and with enough detail to gain insights to small subsets of customers within the overall low-income population, multiple data sources are brought together in the analysis. The data sources used in this report are presented in this section followed by a discussion of the assumptions used to define the rate designs presented in this report.

[8] Amount of federal funding and percent of federal funding within total assistance are reasonable performance metrics.

Data Sources

Internal (Cascade) data and external data sources were used in our analysis of low-income rates. Each source is listed and discussed below.

Cascade Natural Gas (Internal): Cascade data forming the basis of our analysis includes county level data on number of customers, dollars billed, LIHEAP customers, LIHEAP benefits applied and the benefits from bill assistance programs other than LIHEAP. Cascade also provided billing data for calculating the total annual natural gas bill for LIHEAP customers in their Washington service area. This data allowed for a better estimate of the total energy burden than data received from Washington State Department of Commerce which only included the estimated heat portion of the annual gas bill.

Low-Income Energy Affordability Data (LEAD) (External): The LEAD Tool was designed by the United States Department of Energy and U.S. Census to "… help states, communities and other stakeholders create better energy strategies and programs by improving their understanding of low-income housing and energy characteristics." (LEAD Tool website). LEAD provides three different household income models for viewing and accessing results: Area Median Income (AMI), Federal Poverty Level (FPL) and State Median Income (SMI).[9] We used data from LEAD to determine the customer distribution between each level represented in the FPL and SMI income models and as the source for energy burden estimates within each income category.

Low-Income Home Energy Assistance Program (LIHEAP) (External): LIHEAP data for Cascade customers was obtained from the state. These household specific data included the county of residence, household income, household size and electric and natural gas fuel cost. We used this information to develop greater detail in the income categories of low-income customers than is available from the LEAD Tool.

Assumptions and Calculations

The concept of energy burden is straightforward and measures the percentage of annual income a household spends for energy used within the dwelling. Because our focus is Cascade's customer base, we assume we are essentially dealing with households whose primary heating fuel is natural gas. While a small number of Cascade customers may actually heat with some fuel other than utility delivered natural gas, we assume that number is small and insignificant to our analysis. Accordingly, our formula for energy burden considers the annual energy costs for two fuels as follows:

Total Energy Burden = (Annual Natural Gas Cost + Annual Electricity Cost) / Annual Household Income

Natural Gas Energy Burden = Annual Natural Gas Cost / Annual Household Income

Electric Energy Burden = Annual Electricity Cost / Annual Household Income

[9] Documentation of LEAD can be found at: Ma, Ookie, Krystal Laymon, Megan Day, Ricardo Oliveira, Jon Weers, and Aaron Vimont. 2019. *Low-Income Energy Affordability Data (LEAD) Tool Methodology*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-74249. https://www.nrel.gov/docs/fy19osti/74249.pdf. We will refer to this document as the LEAD Tool Methodology hereafter in this report.

Empirical analysis shows that the cost of fuels other than natural gas and electricity in homes that heat with natural gas to be low.[10] Home charging of electric vehicles has the potential to overstate the level of electricity usage in the home. However, given the current low level of EV penetration, especially in low-income households, we do not expect home charging for transportation usage to be a factor in our analysis of low-income energy burden and discount rates.

[10] LEAD data show other fuels account for less than one half of one percent of total energy costs in homes heated with natural gas in the Cascade service area.

III. LOW-INCOME CUSTOMERS AND ENERGY BURDEN

Cascade's low-income customer base is described in this section of the report. Energy burden is also presented and discussed.

Number and Location of Low-Income Customers

It is useful to begin our analysis of the distribution of Cascade customers across income groups with a higher-level look at the distribution of all households within the Cascade Washington service territory by primary heating fuel and income group. This distribution calculated from the LEAD data is presented in Table 1 and represents all customer and non-customer households within the Cascade Washington service area.

Table 1. Income Distribution by Main Heating Fuel in Cascade Counties

Primary Heating Fuel	Federal Poverty Level						Percent of All Households
	0-100%	100-150%	150-200%	200-400%	400%+	Total	
Bottled Gas	5%	4%	6%	27%	58%	100%	5%
Electricity	12%	9%	10%	31%	38%	100%	60%
Fuel Oil	6%	4%	5%	30%	55%	100%	1%
Other	9%	4%	4%	31%	52%	100%	1%
Utility Gas	5%	5%	6%	27%	57%	100%	28%
Wood	10%	7%	8%	33%	42%	100%	5%
Total	**10%**	**8%**	**8%**	**30%**	**45%**	**100%**	**100%**

The last column of Table 1 shows the distribution of households across primary heating fuel. Most households within the Cascade service territory heat with electricity (60%) followed by natural gas (28%). Together, electricity and natural gas heating account for nearly 90% of all households. Bottled gas (propane) and wood each make up most of the remaining households along with a small number of fuel oil and other heating fuels.

Comparing electricity and natural gas heated households, it is clear from Table 1 that income is distributed significantly differently between the two primary heating fuels. Whereas households within the two lowest income groups make up only one in 10 homes heating with natural gas, these two low-income groups account for one in five households that heat their homes with electricity. At the top end of the income distribution, we see the same pattern with over 400% FPL accounting for 57% of natural gas heated households compared to only 38% of electrically heated households.

When it comes to income, natural gas heated households are more affluent than electrically heated households. There are likely many reasons for this discrepancy in household incomes including the cost of construction in smaller, low-cost units and the historically low cost of electricity in the Pacific Northwest. Dwellings that tend to be the most affordable for low-income families are often less expensive construction where the first-cost of building a

housing unit is more important than the annual cost of heating. For smaller units, construction costs are typically minimized by providing zonal electric heating as the primary heat source.

Natural gas service is also an optional addition to the utility services available to a dwelling which may help explain why natural gas heated households tend to be more affluent than electrically heated households. Because there are roughly twice as many households that heat with electricity than there are households heating with natural gas and electrically heated homes are skewed more heavily toward low-income groups than natural gas heated households, a relatively small portion of the energy burden challenge can be addressed through discounted natural gas prices.

We now focus on the 28% of households in the Cascade service area that heat with natural gas. The percentage distribution of natural gas heated households by income category and county from LEAD was multiplied by the actual county level residential customers counts to arrive at the distribution of Cascade customers by income group. The resulting percentage distribution by income group for each county in the Cascade Washington service territory is shown in Table 2.

Table 2. Percentage Distribution of Cascade Residential Customers by Income Category and County

	Federal Poverty Level					
County	**0-100%**	**100-150%**	**150-200%**	**200-400%**	**400%+**	**Total**
Adams	13%	9%	10%	35%	33%	100%
Benton	4%	3%	5%	24%	65%	100%
Chelan	5%	6%	9%	33%	47%	100%
Cowlitz	5%	7%	6%	35%	47%	100%
Douglas	2%	5%	7%	31%	56%	100%
Franklin	8%	4%	7%	31%	49%	100%
Grant	9%	2%	5%	34%	49%	100%
Grays Harbor	10%	10%	10%	30%	40%	100%
Island	9%	6%	9%	36%	41%	100%
Kitsap	6%	5%	5%	33%	51%	100%
Mason	10%	14%	12%	31%	34%	100%
Skagit	7%	5%	8%	33%	47%	100%
Snohomish	3%	3%	3%	22%	69%	100%
Walla Walla	7%	6%	8%	32%	47%	100%
Whatcom	5%	6%	7%	29%	53%	100%
Yakima	7%	11%	10%	36%	36%	100%
Total	**6%**	**6%**	**7%**	**31%**	**50%**	**100%**

The total percentage distribution of Cascade customers by income group shown in Table 2 differs slightly from the percentages for utility gas heated homes shown in Table 1. This is because the actual Cascade residential customer counts by county differs slightly from the distribution of utility gas heated households in LEAD data.[11]

[11] LEAD data reflect all households, including households served by natural gas utilities other than Cascade. Utility gas service is provided by both Cascade and Puget Sound Energy in Island, Kitsap, Skagit and Whatcom counties.

The number of Cascade customers by income group is shown in Table 3.

Table 3. Cascade Natural Gas Residential Customers by Income Category and County

County	Federal Poverty Level						Percent of All Residential
	0-100%	100-150%	150-200%	200-400%	400%+	Total	
Adams	142	100	113	391	361	1,107	1%
Benton	733	623	868	4,449	12,176	18,849	9%
Chelan	67	68	109	399	580	1,223	1%
Cowlitz	169	210	176	1,112	1,467	3,134	2%
Douglas	5	15	24	101	182	327	0%
Franklin	1,026	494	912	3,841	6,036	12,309	6%
Grant	71	19	42	263	384	779	0%
Grays Harbor	355	381	368	1,081	1,456	3,641	2%
Island	579	405	603	2,422	2,780	6,789	3%
Kitsap	1,981	1,560	1,762	10,747	16,603	32,653	16%
Mason	185	271	227	600	651	1,934	1%
Skagit	1,933	1,446	2,006	8,788	12,524	26,697	13%
Snohomish	203	179	233	1,505	4,665	6,785	3%
Walla Walla	869	674	948	3,816	5,635	11,942	6%
Whatcom	2,318	2,957	3,207	13,271	24,542	46,295	23%
Yakima	1,819	2,980	2,516	9,312	9,414	26,041	13%
Total	**12,455**	**12,382**	**14,114**	**62,098**	**99,456**	**200,505**	**100%**

Nearly 25,000 of Cascade's residential customers are under 150% of FPL guidelines. Reducing the energy burden of these customers is the objective of discount rates of low-income customers. In the next section, the energy burden of Cascade residential customers across income groups is examined.

Description of Current Energy Burden

LEAD provides estimates of energy burden based on household income and the annual cost of energy used in the dwelling. LEAD defines energy burden as "the average annual housing energy costs divided by the average annual household income".[12] We use the same definition of energy burden throughout this report.

Before presenting energy burden estimates we first provide statistics on the components of energy burden. Average household income and energy cost by fuel are shown in Table 4.

Table 4. Components of Energy Burden, Households Heating with Natural Gas, Cascade Counties

County	Number of ACS Responses	Average Annual			Energy Burden		
		Household Income	Electric Bill	Natural Gas Bill	Electric	Natural Gas	Total Energy
Adams	267	$67,439	$1,235	$327	1.8%	0.5%	2.3%
Benton	257	$112,241	$1,205	$295	1.1%	0.3%	1.3%
Chelan	25	$99,559	$618	$179	0.6%	0.2%	0.8%
Cowlitz	68	$95,510	$1,135	$619	1.2%	0.6%	1.9%
Douglas	24	$104,516	$766	$89	0.7%	0.1%	0.8%
Franklin	235	$89,562	$1,203	$420	1.3%	0.5%	1.8%
Grant	61	$81,649	$1,197	$211	1.5%	0.3%	1.8%
Grays Harbor	138	$72,215	$1,505	$805	2.1%	1.1%	3.3%
Island	1,779	$78,972	$812	$820	1.0%	1.0%	2.1%
Kitsap	487	$86,271	$788	$661	0.9%	0.8%	1.7%
Mason	188	$64,050	$1,430	$721	2.2%	1.1%	3.4%
Skagit	1,666	$86,831	$799	$727	0.9%	0.8%	1.8%
Snohomish	717	$124,324	$963	$818	0.8%	0.7%	1.4%
Walla Walla	214	$83,970	$1,049	$232	1.2%	0.3%	1.6%
Whatcom	891	$93,009	$771	$812	0.8%	0.9%	1.7%
Yakima	302	$77,118	$1,003	$501	1.3%	0.6%	2.0%
Total	**7,318**	**$104,133**	**$939**	**$707**	**0.9%**	**0.7%**	**1.6%**

The number of American Community Survey (ACS) responses show the number of responses to the household income and energy cost questions from the ACS for each county. When questions have different number of responses, the lowest number is shown in the table. Dollar values are based in the same time period that the 2018 ACS 5-year data were collected (2014-2018). Total energy burden shown in Table 4 may not equal the sum of electric and natural gas burden due to the cost of other household fuel (not shown) and rounding.

The overall energy burden for gas heated homes in Cascade served Washington counties is 1.6%. Electric and Gas costs contribute roughly 60% and 40%, respectively, to household total energy burden. The total energy burden across income groups for households heating with natural gas is shown for each county in the Cascade service area in Table 5.

[12] LEAD Tool Methodology (Page 1, footnote 3).

Table 5. Total Energy Burden by Income Group, Households Heating with Natural Gas, Cascade Counties

County	Federal Poverty Level				
	0-100%	100-150%	150-200%	200-400%	400%+
Adams	10.6%	5.2%	4.3%	2.6%	1.5%
Benton	18.9%	5.9%	4.1%	2.4%	1.1%
Chelan	20.8%	5.4%	1.9%	1.3%	0.6%
Cowlitz	18.0%	6.9%	4.2%	3.1%	1.2%
Douglas	3.0%	3.8%	2.6%	1.4%	0.7%
Franklin	12.9%	5.7%	3.8%	2.3%	1.4%
Grant	12.2%	2.6%	4.6%	2.8%	1.2%
Grays Harbor	23.9%	8.4%	5.8%	4.1%	2.1%
Island	18.6%	6.2%	4.0%	2.7%	1.4%
Kitsap	13.6%	6.7%	4.1%	2.4%	1.3%
Mason	16.3%	8.3%	5.6%	4.0%	2.2%
Skagit	15.3%	5.9%	4.3%	2.6%	1.2%
Snohomish	18.7%	6.5%	4.8%	2.6%	1.2%
Walla Walla	12.8%	4.4%	3.8%	2.2%	1.1%
Whatcom	14.7%	6.5%	4.5%	2.8%	1.2%
Yakima	11.7%	5.6%	3.9%	2.6%	1.1%
Overall	**15.4%**	**6.2%**	**4.4%**	**2.6%**	**1.2%**

The total energy burden over all counties in the Cascade service area ranges from over 15% for the lowest income group to just over 1% for households in the highest income group. For households at or below the FPL, total energy burden ranges from a high of nearly 24% in Grays Harbor County to a low of 3% in Douglas County.[13]

The natural gas energy burden across income groups for households heating with natural gas is shown for each county in the Cascade service area in Table 6.

[13] Douglas County results across income groups may be unreliable due to the low number of ACS responses (see Table 4).

Table 6. Natural Gas Energy Burden by Income Group, Households Heating with Natural Gas, Cascade Counties

County	Federal Poverty Level				
	0-100%	100-150%	150-200%	200-400%	400%+
Adams	2.4%	1.1%	0.9%	0.5%	0.3%
Benton	4.3%	1.2%	0.9%	0.5%	0.2%
Chelan	1.0%	1.3%	0.6%	0.3%	0.1%
Cowlitz	5.9%	2.5%	1.2%	1.0%	0.4%
Douglas	0.2%	0.6%	0.2%	0.2%	0.1%
Franklin	4.7%	1.2%	0.9%	0.6%	0.3%
Grant	1.7%	0.2%	0.9%	0.4%	0.2%
Grays Harbor	6.4%	3.1%	1.7%	1.5%	0.7%
Island	9.2%	3.0%	1.9%	1.3%	0.7%
Kitsap	6.0%	3.0%	1.7%	1.0%	0.6%
Mason	4.9%	2.8%	1.6%	1.4%	0.7%
Skagit	7.3%	2.7%	1.9%	1.2%	0.6%
Snohomish	8.8%	3.0%	2.1%	1.2%	0.5%
Walla Walla	2.0%	0.5%	0.4%	0.3%	0.2%
Whatcom	8.0%	3.6%	2.3%	1.4%	0.6%
Yakima	4.4%	1.9%	1.4%	0.9%	0.3%
Overall	**6.6%**	**2.6%**	**1.8%**	**1.1%**	**0.5%**

The natural gas energy burden over all counties in the Cascade service area ranges from 6.6% for the lowest income group to 0.5% for households in the highest income group. For households below the FPL, natural gas burden ranges from a high of 9.2% in Island County to a low of 0.2% in Douglas County.[14]

Because LEAD data trues up ACS data on energy costs to actual amounts reported to FERC, the energy burden results presented in this section of the report can best be thought of as reflecting the cost of energy before bill assistance programs.[15] Bill assistance programs available to Cascade customers are briefly discussed below. Further discussion of the impact of these programs on energy burden is presented in the section of the report dealing with rate design impacts.

[14] Douglas county results across income groups may be unreliable due to the low number of ACS responses (see Table 4).
[15] Email communications with U.S. Department of Energy staff responsible for LEAD development support this interpretation of the data.

Bill Assistance Programs

There are three bill assistance programs for Cascade customers in Washington, and in response to the COVID pandemic, Cascade provided a major one-time program to help with loss of income due to the pandemic. The three regular programs are the federal/state Low-Income Home Energy Assistance Program (LIHEAP), Cascade's Washington Energy Assistance Fund (WEAF), and Cascade's Washington Winter Help program. The special program during the pandemic is Big Heart. Winter Help Crisis was also implemented as a pandemic response.

LIHEAP - The federal/state Low-Income Home Energy Assistance Program is the major source of utility payment assistance funding in Washington State. Federal guidelines permit states to set LIHEAP eligibility from 110% to 150% of the federal poverty level (FPL). Income eligibility for LIHEAP in Washington is at 150% (2022 and 2021), and before that was 125% of poverty (2020, 2019, 2018). Program eligibility depends on program year and household size. For reference, household income at the federal poverty level (100% of poverty) is shown by year and household size in Table 7. The dollar values corresponding to 150% and 125% of poverty in 2022, back to 2018 are shown in Table 8.

Table 7. 100% Federal Poverty Level by Year and Household Size (2018 - 2022)

Program Year	Household Size (Number of Persons)								
	1	2	3	4	5	6	7	8	Each Additional
2022	$13,590	$18,310	$23,030	$27,750	$32,470	$37,190	$41,910	$46,630	$4,720
2021	$12,880	$17,420	$21,960	$26,500	$31,040	$35,580	$40,120	$44,660	$4,540
2020	$12,760	$17,240	$21,720	$26,200	$30,680	$35,160	$39,640	$44,120	$4,480
2019	$12,490	$16,910	$21,330	$25,750	$30,170	$34,590	$39,010	$43,430	$4,420
2018	$12,140	$16,460	$20,780	$25,100	$29,420	$33,740	$38,060	$42,380	$4,220

Table 8. Income Eligibility by Household Size (2018 - 2022)

Program Year	Household Size (Number of Persons)								
	1	2	3	4	5	6	7	8	Each Additional
2022 (150%)	$20,385	$27,465	$34,545	$41,625	$48,705	$55,785	$62,865	$69,945	$7,080
2021 (150%)	$19,320	$26,130	$32,940	$39,750	$46,560	$53,370	$60,180	$66,990	$6,810
2020 (125%)	$15,950	$21,550	$27,150	$32,750	$38,350	$43,950	$49,550	$55,150	$5,600
2019 (125%)	$15,613	$21,138	$26,663	$32,188	$37,713	$43,238	$48,763	$54,288	$5,525
2018 (125%)	$15,175	$20,575	$25,975	$31,375	$36,775	$42,175	$47,575	$52,975	$5,400

Washington customers must apply for LIHEAP to receive it, and Cascade encourages customers to apply. LIHEAP cannot be used for customers who do not apply, but the Community Action Agencies (CAAs) that administer

LIHEAP can make customers aware of the program and assist with applications. LIHEAP grant amounts go to the individual customers who apply and are approved, following federal/state guidelines.[16] The CAAs can meld other payment assistance dollars with LIHEAP grants to try to develop affordable bills for payment-troubled customers who meet program income eligibility requirements.[17]

WEAF – Cascade Natural Gas's Washington Energy Assistance Fund provides payment assistance up to $500 per program year following verification of low-income status. Beginning in April 2020, due to the effects of the global COVID pandemic, customers having trouble paying their bills are eligible to apply for hardship grants of $400 and the annual cap of WEAF assistance to a household has been temporarily lifted. Also, the low-income verification requirement was temporarily suspended to permit non-low-income customers to qualify due to income loss during the pandemic. This permits quick provision of hardship grants. WEAF is administered (using a calculator) by the Community Action Agencies. Eligibility for WEAF is at 200% of poverty.

Winter Help – Winter Help is a customer contribution fund which is made available each year by Cascade for payment assistance. Though called Winter Help, the program is available throughout the year. It is funded by customer donations, plus an annual $50,000 company contribution. For the completed 2020-2021 program year, customer donations were $117,322 and the company added $50,000. Any unused funds roll over into the next program year. Eligibility for Winter Help is at 200% of poverty (without a calculator). Winter Help grants by the CAA are subject to adjustment by the company, based on account history and current activity.

LIHEAP, WEAF, and Winter Help are administered by Community Action Agencies that serve as subgrantees of the Washington State Department of Commerce, in accord with a program implementation manual. Payment assistance to a household can be provided separately or together from these programs, depending on CAA analysis of need and program guidelines.

Big Heart – Customers are eligible for the Big Heart Grant if they are a Washington customer and earn no more than 200% of the Federal Poverty Level. Individual customers can receive multiple grants up to $2,500 in additional bill assistance. Customers who received energy assistance in the previous 24 months may automatically receive a grant to forgive account balances due, up to the $2,500 limit. The Big Heart Grant Program is in addition to all other grants, and does not disqualify customers from receiving further assistance, or assistance from other organizations. Funding for Big Heart totaled $3,709,875 which represented 1.5% of the company's Washington

[16] Cascade does not have access to LIHEAP funding independent of amounts approved to be credited to individual customers and does not process LIHEAP applications to determine if customers qualify. Cascade signs an annual vendor agreement with Community Action Agencies in Cascade territory. The agreement states that Cascade will comply with the LIHEAP program rules, which are administered by the agencies.

[17] Note that LIHEAP participation is limited to household members who are U.S. citizens or who are approved non-U.S. citizens. Cascade does not require U.S. citizenship for service. A mixed U.S. citizen/non-U.S. citizen household may still receive LIHEAP but excluded household members affect the household size calculation and result in a lower LIHEAP benefit amount for the household.

retail revenues. The program closed on March 28, 2022 when all of the funds were spent. Big Heart was directly administered by Cascade.

In Washington, funds are directed to pay the oldest debt first. Payment assistance can cover arrearage and current charges, and, in some cases, can create a credit for future bills.

Elements Related to Bill Assistance Programs

For understanding context, certain other programs and program considerations can be relevant to bill assistance:

Arrearage Management Program – Cascade does not currently have an arrearage management program (AMP program); however, an AMP program is in development. AMP programs often include both a customer responsibility element to encourage customer payment of arrearage and a provision to enable arrearage forgiveness when payment is not possible given the economic situation of a household.

Payment Agreement – If a customer is having trouble making payments, Cascade will assist by setting up payment arrangements up to eighteen months, with no up-front payment required. Two broken/renegotiated payment agreements are allowed. These provisions are sensible in providing options for households experiencing payment problems.

CARES Program – Cascade does not have a CARES-type program, a social work/referral approach for customers who are unable to pay due to major life events, such as severe injury, life-threatening sickness, and approach of death. A CARES program provides a referral service for customers experiencing temporary hardships, such as family emergencies, divorce, unemployment, and medical emergencies. CARES may provide support, direction, and resources to help customers address their hardship situations and make it easier to pay their utility bills. CARES programs are not common, and those we are aware of were created by commission order. A regular CARES program would require some additional staffing. Though Cascade does not have a CARES-type program with dedicated social workers or community liaison workers, in practice there are some referrals.

Waiver of Terminations – During COVID, Cascade waived terminations to help payment troubled households during the pandemic. WUTC has extended this wavier. These protections will remain in place until 30 days after the commission completes a review of its existing credit and collection practices, which the commission expects to complete over the next year. (https://www.utc.wa.gov/news/2022/utc-extends-customer-protections-fee-bans-energy-customers). Waiver of termination policies are especially important for households at or below 50% FPL.

Waiver of Fees and Penalties – During COVID, Cascade has waived fees and penalties. WUTC has extended this wavier (https://www.utc.wa.gov/news/2022/utc-extends-customer-protections-fee-bans-energy-customers). These protections will remain in place until 30 days after the commission completes a review of its existing credit and collection practices, which the commission expects to complete over the next year.

Program Control Tools – Bill payment assistance programs are typically designed to provide a program logic, such as a target energy burden (as in this report). However, certain program control tools are typical for bill assistance programs, such as a minimum payment rule and a maximum subsidy rule. Such program control tools are useful. However, care must be taken to ensure that they apply in workable ways. For example, suppose there is a minimum payment of $40 per month, and failure to pay leads to either termination from the bill assistance program or entry into a process for termination of service. This rule might work well for the upper parts of the program eligible income tiers. But it cannot work for the 0-25% tier, where constant economic crisis and fear exist and there is no prospect of coming up with the $40 payment, much less the larger amounts currently due and the even larger amount in arrears. In structuring low-income rates, program control tools should carefully consider the impacts on the lowest income customers, particularly customers in the range of 0-50% of federal poverty level.

Performance Metrics – Bill assistance programs should have accompanying performance metrics. For example, LIHEAP internally has a set of measures for assessing program outcomes. One of these is energy burden. For example, for LIHEAP a household with a $10,000 income and a $1,000 annual overall energy cost (natural gas plus electricity) has a pre-LIHEAP energy burden of 10%. If LIHEAP pays $250 for this household, the energy burden after LIHEAP is 7.5%. From a utility perspective, continuity of service (and payment) is the prime objective and performance metrics should indicate how well bill assistance programs are meeting this objective, and the other objectives of the program (such as attaining the energy burden target). Because of the multifaceted nature of low-income rates, performance metrics should cover performance of the arrearage management system, the performance of the low-income rates, and the capture of federal dollars for assistance to customers.

Gap Jumping – There is typically a notable gap between customers served by bill assistance programs, and people who design, manage, and carry-out the programs. It is not unusual for this gap, which may (but not always) include income, education, opportunity, degree of freedom and of freedom from fear, lifespan, and racial and ethnic identification to make it difficult for programs to be effective, particularly so for the 0-25% of poverty group. A useful test that program designers, managers, and staff can use is to always ask if any aspect of a program makes practical sense from the perspective of the program participant. The point is to maintain continuity of service by providing actual "please pay" bill amounts customers in different difficult situations can actually feel able to pay. Programs have to be able to work from within the life worlds of customers. So, it is important to listen and incorporate participant perspective in program design and in operations.

Qualifying Customers not in the Bill Assistance Problem – Initiation of a new utility bill assistance program generally creates five customer categories: (1) Customers who are in the program, (2) customers who qualify for the program but are not in the program, (3) customers who do not qualify for the program but whose income is insufficient and who are in many cases in essentially the same income and payment situation as the top tier of customers who qualify for the program, (4) all other residential customers, and (5) all other core revenue customers. Households in Categories 2-5 are assessed an additional charge to provide subsidy amounts for households in the bill assistance program. Customers who qualify but are not in the program are assessed the additional charge to

provide subsidy amounts for customers in the program. Assessing this additional charge to customers who qualify but are not in the program is counter-productive to the goal of maintaining continuity of service (and of affordable payment). This means there should be a substantial effort to identify and bring these customers (Category 2) into the program. We know from aggregate census data the approximate number of qualifying households and will know the number of households in the program, which can be used to construct a performance metric.

The ALICE Problem – Category 3 customers are characterized by insufficient income but have income over the eligibility range for the program. These are customers above the poverty line, and above the eligibility limit for the program but who are also income insufficient. These households are in the top ranges of the "ALICE" group – households that are Asset Limited, Income Constrained, Employed (ALICE), though, of course, some members of this group are not employed but are receiving income from social services or social insurance (such as Social Security). Assessing a subsidy charge to customers who do not qualify for the program but are also income insufficient is counter-productive to the goal of maintaining overall continuity of service (and of affordable payment). This means ALICE customers should not be assessed the subsidy cost for the program. We know from aggregate census data and the ALICE studies the approximate number of ALICE households at the state level. Households that do not earn enough to afford basic necessities are about one-third (34%) of Washington households[18]. This ALICE problem exists for all low-income programs, and it is substantial.

The Middle-Income Exclusion Problem – Generally, income eligibility for low-income bill assistance programs is rigorously observed using twelve-months of income data. However, during COVID, because middle-income and even some upper-income households could suffer sudden drop of income to within program eligibility level within a month, income limits were interpreted as actual income or income limits were temporarily suspended for many utility payment assistance programs. From experience in other states, it can be reasonable to create program rules to accommodate households above the general income limits for the program to qualify households due to an immediate emergency situation (for example, accident, death, unusual medical expense, inability to continue working, COVID business shutdown). This provision for special cases and temporary adjustment makes programs more equitable, providing assurance regardless of income. In the design of social welfare programs there are two initial directions: means testing and universal benefit. Means testing makes sense because otherwise households that do not need the program benefit receive it. Universal benefit makes sense because it simplifies the program and makes the benefit available to all households (similar to funding fire and police services). Low-income rates in the U.S. are means tested. However, all other customers pay the subsidies that enable low-income rates. It would seem equitable to permit customers who pay for the subsidies to temporarily qualify for low-income rates when they experience an immediate emergency that reduces their current income for the previous month to a level that

[18] United Ways of the Pacific Northwest, ALICE in Washington: A Financial Hardship Study (ALICE 2020). https://unitedforalice.org/ (Then go to State Reports, then Washington.)

qualifies as low-income. These customers are non-low-income when measured by income in the past twelve months, but are low-income as measured in the current month.

IV. RATE DESIGN IMPACTS

In this section we present a low-income rate design to achieve specific objectives. Features of the proposed rate design not only reflect objectives, but also various assumptions and constraints. Objectives, assumptions, and constraints are presented and discussed below. A low-income rate design is then presented along with an estimate of the impact on energy burden. While LEAD data provide a good basis for estimating the size of the low-income customer population, they do not provide sufficient income detail to understand the energy burden facing the lowest income households. In this section, we show a more detailed income breakdown of low-income customers and the associated energy burden.

Objectives, Assumptions and Constraints

While there are seemingly countless variations on a discount rate for low-income customers, the possibilities are narrowed by specific objectives, assumptions, and constraints.

Objectives

- Lower total energy burden to 6%.
- Refine analysis to shed light on very low levels of income where household energy burden may be obfuscated when averaged in with a larger group of low-income customers.

Assumptions

- Bill discounts are shared between natural gas and electric in proportion to each fuel's share of total energy burden. Or, more simply, the same percentage discount is applied to the total natural gas bill and electric bill.

Constraints

- Avoid designs that require Cascade to collect and store household income.
- Avoid rate designs that are overly complex and a burden to administer. For tiered rate discounts, attempt to limit the number of rate discount tiers to no more than four to limit system setup and implementation costs.

Impacts on Energy Burden

To meet the objective of examining very low levels of household income, it was necessary to refine the analysis by breaking the lowest FPL bin in the LEAD data into subgroups. As shown in prior tables, the lowest level of household income broken out in the LEAD data is 100% FPL and under. Forefront Economics obtained detailed data from Washington state Department of Commerce on all LIHEAP applications from Cascade customers for the 2018 through 2021 program years. These data included size of household, household income, annual electric bill and annual natural gas bill and provided the empirical basis for breaking the 0-100% FPL from LEAD into smaller subgroups.[19] The results of the refined analysis are shown in Table 9.

[19] Because the Washington Department of Commerce stores the estimated heating portion of the annual gas bill rather than the annual gas bill, our team matched actual billing data from Cascade so that we could calculate the natural gas energy burden and the total energy burden from the LIHEAP data.

Table 9. Refined Energy Burden Calculations, Cascade Customers

FPL %					Energy Burden		
	Customers	Household Income	Electric Bill	Natural Gas Bill	Electric	Natural Gas	Total
0-25%	1,229	$1,712	$817	$616	47.7%	36.0%	83.7%
25-50%	1,515	$6,397	$783	$630	12.2%	9.8%	22.1%
50-100%	9,710	$10,515	$761	$602	7.2%	5.7%	13.0%
100-150%	12,382	$23,641	$834	$619	3.5%	2.6%	6.1%
150-200%	14,114	$34,652	$861	$614	2.5%	1.8%	4.3%
200%+	161,554	$118,660	$959	$724	0.8%	0.6%	1.4%
Total	**200,505**	**$104,133**	**$939**	**$707**	**0.9%**	**0.7%**	**1.6%**

The FPL bins in Table 9 are the LEAD bins with the lowest LEAD bin (0-100% FPL) broken out to show detail for 0-25%, 25-50% and 50-100% FPL bins. Table 9 also groups the two highest income bins from LEAD into a single 200%+ group. The customer counts for the three lowest income bins were derived by spreading the customer count from the LEAD 0-100% group (12,455 from Table 3) by the distribution of customers between the lowest FPL bins found in the LIHEAP data. Likewise, household income, annual electric bill, and annual gas bill for the lowest three FPL bins in Table 9 represent LEAD data spread to the more detailed income bins based on the distributions of these variables found in the LIHEAP data.[20]

A few relationships from the data in Table 9 are listed below:

- There are a relatively small number of total customers in the smallest income bins. Part of the reason is that we are dealing with households who use natural gas as their primary heating fuel. LEAD data presented in Table 1 shows that the income distribution of homes heated with natural gas is skewed more heavily toward the higher income bins than are homes heated with electricity. Part of the reason for this is that smaller, low-construction-cost dwellings are typically heated with electricity to keep initial construction cost low.
- Although these are homes that heat with natural gas, annual natural gas costs make up less than half (43%) of the total annual cost of natural gas and electric service.

The lowest income bin of 0-25% of FPL is the smallest group in terms of number of Cascade customers and their total energy burden is the highest at 84%, 14 times the target of 6% burden. This compares to an energy burden of 22% in the next highest income group, 25-50% of FPL. A tiered discounted rate design with discounts set at each income bin to bring the income group to the targeted energy burden is presented in Table 10.

[20] As modified to use total annual natural gas cost from Cascade billing data instead of the estimated portion of cost used for heating, as explained in Footnote 19.

Table 10. Tiered Discounted Rates by Income Group

FPL %	Energy Burden Targets			Bill Multiplier to Achieve Goal	
	Electric	Natural Gas	Total	Electric	Natural Gas
0-25%	3.4%	2.6%	6.0%	0.072	0.072
25-50%	3.3%	2.7%	6.0%	0.272	0.272
50-100%	3.3%	2.7%	6.0%	0.463	0.463
100-150%	3.4%	2.6%	6.0%	0.976	0.976

The energy burden for each fuel in Table 10 reflects the proportion that each fuel makes up of the total energy cost for that income group. A bill multiplier to achieve the energy burden target is also shown in Table 10 and is the same for each fuel. The multiplier of 0.072 for the lowest income group means that if customers are asked to pay 7.2% of their natural gas bill and 7.2% of their electric bill, their natural gas, electric and total energy burden would be reduced to the targets of 2.6%, 3.4% and 6.0%, respectively. For the highest income group shown in Table 10, a small discount of 2.4% (0.976 bill multiplier) is sufficient to achieve energy burden targets.

The cost of providing discounts at the levels shown in Table 10 is shown in Table 11 for two levels of low-income customer participation.

Table 11. Cost of Low-Income Discounted Natural Gas Rates

FPL %	Annual Gas Revenue @ Full Participation			Annual Gas Revenue @ 20% Participation	
	Current	Discounted	Impact	Discounted	Impact
0-25%	$757,829	$54,311	-$703,518	$617,125	-$140,704
25-50%	$954,437	$259,259	-$695,179	$815,402	-$139,036
50-100%	$5,843,487	$2,706,053	-$3,137,434	$5,216,000	-$627,487
100-150%	$7,664,339	$7,480,968	-$183,371	$7,627,664	-$36,674
	Total Rate Subsidy		-$4,719,501		-$943,900
	Administration		-$283,170		-$56,634
	Total Cost		-$5,002,671		-$1,000,534
	Retail Percent Increase		1.9%		0.4%
	Base Percent Increase		4.7%		0.9%

The "Current" column shows the full amount of the bill for each income group. Discounted and Impact columns show the amount of revenue after the low-income tiered discount and the difference from current revenue, respectively. Discounted and Impact columns are shown for two levels of participation, all low-income customers and 20% of low-income customers. Although unrealistic, the full participation scenario shows the upper limit of the revenue impact from the discounted low-income rate program specified in Table 10. Likewise, 20% participation may be a stretch considering LIHEAP participation has been somewhat less than 10% of our estimate of Cascade

customers under 150% of FPL. At full and partial (20%) levels of participation, the cost of the discounts, including 6% administration expenses, amount to 1.9% and 0.4% of retail revenue requirements, respectively.[21]

The bill impacts of partial participation (20%) are shown in Table 12 by customer class.

Table 12. Annual Impact of Low-Income Rates by Cascade Customer Class, Partial Participation

	Customer Class / Rate Schedule					
	Residential Sch. 503	**Commercial Sch. 504**	**Industrial Sch. 505**	**Large Industrial Sch. 511**	**Interruptible Sch. 570**	**Transportation Sch. 663**
Total Cost	$491,430	$266,931	$24,076	$19,663	$1,505	$196,929
Base % Inc	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Avg. Bills	$54.08	$242.11	$1,563.89	$12,368.41	$16,075.99	$12,940.93
Avg. Therms	54	271	1,992	16,639	23,233	285,881
Avg Bill Impact	$0.20	$0.78	$3.60	$25.85	$14.99	$87.74
Pct Impact	0.4%	0.3%	0.2%	0.2%	0.1%	0.7%

Costs are spread across customer classes proportional to base revenue, the amount of revenue from the fixed and volumetric charge associated with the rate schedule, excluding any additional tariffs or riders. For example, fuel cost adjustments are not included in base revenue. For residential customers, bills would increase an average of 20 cents a month (0.4%) in order to fund the discounted rate program. Schedule 663 customers would experience a 0.7% increase in their natural gas bill.

[21] The assumption of 6% administrative expenses is judgmental in nature and not based on empirical program expenses. This planning value should be replaced as experience is gained with actual program costs.

V. APPENDIX A

Tables in this section are the same tables in the body of the report that deal with service territory and residential customer characteristics by income group except that Appendix tables are expressed in terms of State Median Income (SMI) groups whereas the tables in the body of the report are expressed in terms of Federal Poverty Level (FPL). Table A-1 through Table A-6 are based on LEAD and Cascade data while Table A-7 through Table A-10 add additional detail derived from LIHEAP Data.

Table A-1. Income Distribution by Main Heating Fuel in Cascade Counties

Primary Heating Fuel	State Median Income						Percent of All Households
	0-30%	30-60%	60-80%	80-100%	100%+	Total	
Bottled Gas	6%	12%	10%	10%	63%	100%	5%
Electricity	14%	20%	12%	11%	43%	100%	60%
Fuel Oil	7%	11%	11%	10%	60%	100%	1%
Other	10%	9%	11%	11%	58%	100%	1%
Utility Gas	6%	12%	10%	10%	63%	100%	28%
Wood	11%	17%	13%	11%	48%	100%	5%
Total	**11%**	**17%**	**11%**	**10%**	**50%**	**100%**	**100%**

Table A-2. Percentage Distribution of Cascade Residential Customers by Income Category and County

County	State Median Income					
	0-30%	30-60%	60-80%	80-100%	100%+	Total
Adams	14%	21%	12%	13%	40%	100%
Benton	4%	9%	7%	9%	70%	100%
Chelan	7%	19%	18%	5%	51%	100%
Cowlitz	7%	14%	14%	13%	53%	100%
Douglas	2%	16%	16%	6%	60%	100%
Franklin	9%	13%	11%	11%	56%	100%
Grant	10%	9%	13%	13%	55%	100%
Grays Harbor	11%	21%	10%	11%	46%	100%
Island	9%	17%	13%	14%	47%	100%
Kitsap	7%	11%	12%	12%	57%	100%
Mason	11%	26%	10%	12%	41%	100%
Skagit	8%	15%	12%	12%	53%	100%
Snohomish	3%	7%	7%	8%	74%	100%
Walla Walla	8%	16%	12%	12%	52%	100%
Whatcom	6%	15%	11%	10%	58%	100%
Yakima	9%	22%	14%	13%	42%	100%
Total	**7%**	**15%**	**11%**	**11%**	**56%**	**100%**

Table A-3. Cascade Natural Gas Residential Customers by Income Category and County

County	State Median Income						Percent of All Residential
	0-30%	30-60%	60-80%	80-100%	100%+	Total	
Adams	157	228	136	144	442	1,107	0%
Benton	792	1,699	1,411	1,782	13,167	18,851	9%
Chelan	81	229	219	67	628	1,224	1%
Cowlitz	205	435	425	394	1,677	3,136	2%
Douglas	8	52	51	19	197	327	0%
Franklin	1,088	1,593	1,401	1,394	6,833	12,309	6%
Grant	75	73	104	98	429	779	0%
Grays Harbor	412	777	367	395	1,691	3,642	2%
Island	642	1,132	870	922	3,223	6,789	3%
Kitsap	2,325	3,714	3,823	4,036	18,754	32,652	16%
Mason	222	508	191	225	788	1,934	1%
Skagit	2,161	3,894	3,232	3,222	14,187	26,696	13%
Snohomish	227	480	473	571	5,036	6,787	3%
Walla Walla	986	1,869	1,462	1,379	6,246	11,942	6%
Whatcom	2,801	6,791	4,916	4,802	26,986	46,296	23%
Yakima	2,283	5,794	3,664	3,255	11,044	26,040	13%
Total	**14,465**	**29,268**	**22,745**	**22,705**	**111,328**	**200,511**	**100%**

Table A-4. Components of Energy Burden, Households Heating with Natural Gas, Cascade Counties

County	Number of ACS Responses	Average Annual			Energy Burden		
		Household Income	Electric Bill	Natural Gas Bill	Electric	Natural Gas	Total Energy
Adams	267	$67,530	$1,247	$329	1.8%	0.5%	2.4%
Benton	259	$112,204	$1,205	$296	1.1%	0.3%	1.3%
Chelan	25	$100,320	$648	$183	0.6%	0.2%	0.9%
Cowlitz	68	$95,740	$1,141	$620	1.2%	0.6%	1.9%
Douglas	24	$104,870	$796	$89	0.8%	0.1%	0.9%
Franklin	236	$89,551	$1,209	$422	1.4%	0.5%	1.8%
Grant	61	$81,871	$1,193	$212	1.5%	0.3%	1.8%
Grays Harbor	138	$72,398	$1,513	$806	2.1%	1.1%	3.3%
Island	1,779	$79,037	$812	$824	1.0%	1.0%	2.1%
Kitsap	493	$86,209	$786	$660	0.9%	0.8%	1.7%
Mason	188	$64,984	$1,471	$729	2.3%	1.1%	3.4%
Skagit	1,666	$86,925	$799	$727	0.9%	0.8%	1.8%
Snohomish	717	$124,354	$964	$818	0.8%	0.7%	1.4%
Walla Walla	214	$84,102	$1,053	$233	1.3%	0.3%	1.6%
Whatcom	891	$92,974	$771	$814	0.8%	0.9%	1.7%
Yakima	301	$77,144	$1,006	$504	1.3%	0.7%	2.0%
Total	**7,326**	**$104,163**	**$940**	**$708**	**0.9%**	**0.7%**	**1.6%**

Table A-5. Total Energy Burden by Income Group, Households Heating with Natural Gas, Cascade Counties

County	State Median Income				
	0-30%	30-60%	60-80%	80-100%	100%+
Adams	10.3%	4.7%	3.2%	2.3%	1.6%
Benton	17.9%	4.3%	2.8%	2.3%	1.1%
Chelan	15.8%	3.0%	1.6%	1.1%	0.6%
Cowlitz	17.2%	4.5%	3.3%	3.2%	1.3%
Douglas	3.9%	3.4%	1.9%	0.9%	0.7%
Franklin	12.5%	4.1%	2.7%	2.2%	1.4%
Grant	11.4%	4.5%	3.3%	2.3%	1.3%
Grays Harbor	21.2%	6.4%	4.4%	4.1%	2.3%
Island	17.0%	4.4%	3.1%	2.6%	1.5%
Kitsap	12.3%	4.5%	2.8%	2.2%	1.3%
Mason	14.6%	6.4%	4.1%	4.0%	2.4%
Skagit	14.3%	4.5%	3.0%	2.4%	1.3%
Snohomish	17.2%	5.0%	3.4%	2.5%	1.2%
Walla Walla	11.2%	3.7%	2.4%	2.1%	1.2%
Whatcom	13.2%	4.9%	3.4%	2.5%	1.3%
Yakima	10.7%	4.4%	3.0%	2.4%	1.2%
Overall	**14.0%**	**4.7%**	**3.2%**	**2.5%**	**1.2%**

Table A-6. Natural Gas Energy Burden by Income Group, Households Heating with Natural Gas, Cascade Counties

County	State Median Income				
	0-30%	30-60%	60-80%	80-100%	100%+
Adams	2.4%	1.0%	0.7%	0.4%	0.3%
Benton	3.9%	1.0%	0.6%	0.5%	0.2%
Chelan	0.8%	0.7%	0.3%	0.3%	0.1%
Cowlitz	5.7%	1.5%	1.1%	1.1%	0.5%
Douglas	0.2%	0.3%	0.2%	0.1%	0.1%
Franklin	4.5%	0.9%	0.7%	0.6%	0.4%
Grant	1.6%	0.8%	0.6%	0.3%	0.2%
Grays Harbor	5.9%	2.1%	1.4%	1.5%	0.8%
Island	8.5%	2.1%	1.5%	1.3%	0.7%
Kitsap	5.5%	2.0%	1.3%	1.0%	0.6%
Mason	4.4%	1.9%	1.3%	1.5%	0.8%
Skagit	6.9%	2.0%	1.4%	1.1%	0.6%
Snohomish	8.2%	2.3%	1.6%	1.1%	0.5%
Walla Walla	1.6%	0.4%	0.3%	0.3%	0.2%
Whatcom	7.2%	2.6%	1.6%	1.3%	0.6%
Yakima	4.0%	1.5%	1.1%	0.9%	0.4%
Overall	**6.1%**	**1.9%**	**1.4%**	**1.0%**	**0.5%**

Table A-7. Refined Energy Burden Calculations, Cascade Customers

					Energy Burden		
SMI %	**Customers**	**Household Income**	**Electric Bill**	**Natural Gas Bill**	**Electric**	**Natural Gas**	**Total**
0-15%	2,997	$4,339	$809	$625	18.6%	14.4%	33.1%
15-30%	11,468	$11,506	$762	$603	6.6%	5.2%	11.9%
30-60%	29,268	$32,665	$872	$632	2.7%	1.9%	4.6%
60-80%	22,745	$49,877	$870	$675	1.7%	1.4%	3.1%
80% +	134,033	$129,675	$972	$732	0.7%	0.6%	1.3%
Total	**200,511**	**$104,163**	**$940**	**$708**	**0.9%**	**0.7%**	**1.6%**

Table A-8. Tiered Discounted Rates by Income Group

	Energy Burden Targets			Bill Multiplier to Achieve Goal	
SMI %	**Electric**	**Natural Gas**	**Total**	**Electric**	**Natural Gas**
0-15%	3.4%	2.6%	6.0%	0.182	0.182
15-30%	3.3%	2.7%	6.0%	0.506	0.506
30-60%	3.5%	2.5%	6.0%	N/A	N/A

Table A-9. Cost of Low-Income Discounted Natural Gas Rates

	Annual Gas Revenue @ Full Participation			Annual Gas Revenue @ 20% Participation	
SMI %	**Current**	**Discounted**	**Impact**	**Discounted**	**Impact**
0-15%	$1,873,944	$340,152	-$1,533,792	$1,567,185	-$306,758
15-30%	$6,918,406	$3,498,991	-$3,419,415	$6,234,523	-$683,883
30-60%	$18,489,303	$18,489,303	$0	$18,489,303	$0
	Total Rate Subsidy		-$4,953,207		-$990,641
	Administration		-$297,192		-$59,438
	Total Cost		-$5,250,399		-$1,050,079
	Retail Percent Increase		2.0%		0.4%
	Base Percent Increase		4.9%		1.0%

Table A-10. Annual Impact of Low-Income Rates by Cascade Customer Class, Partial Participation

	Customer Class / Rate Schedule					
	Residential Sch. 503	**Commercial Sch. 504**	**Industrial Sch. 505**	**Large Industrial Sch. 511**	**Interruptible Sch. 570**	**Transportation Sch. 663**
Total Cost	$515,765	$280,149	$25,268	$20,637	$1,580	$206,681
Base % Inc	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Avg. Bills	$54.08	$242.11	$1,563.89	$12,368.41	$16,075.99	$12,940.93
Avg. Therms	54	271	1,992	16,639	23,233	285,881
Avg Bill Impact	$0.21	$0.81	$3.78	$27.12	$15.73	$92.09
Pct Impact	0.4%	0.3%	0.2%	0.2%	0.1%	0.7%

VI. APPENDIX B

This appendix contains a four-part crossover table for comparing the two income models used in this report, federal poverty level (FPL) and state median income (SMI). Part A shows annual household incomes at various FPL cutoffs and household size. FPL cutoffs are expressed as percentages of federal poverty guidelines. An FPL of 50%, for example, means the income level that equates to 50% of the federal poverty guidelines and varies by household size. Part B shows annual household incomes at various SMI cutoffs and household size. SMI cutoffs are expressed as decimal values of state median income. An SMI of 0.6, means the income level that equates to 0.6 of the state median income and varies by household size.

Part C shows the corresponding SMI decimal value at various FPL cutoffs. Likewise, Part D shows the corresponding FPL percentage value at various SMI cutoffs. Values from Part C and Part D can be calculated directly from values in Part A and Part B. For example, as shown in Part D an SMI of 0.30 for a family of four corresponds to an FPL of 77%. This result is calculated from dividing the annual incomes for a family of four at 0.6 SMI by the FPL (at 100%) for a family of four ($30,531/$39,750=077% FPL).

Table B-1. Washington FPL and SMI Crossover Tables 2021 Program Year

Household Size	Part A. Household Income at Various FPL Cutoffs and Household Size					
	25%	**50%**	**75%**	**100%**	**125%**	**150%**
1	$4,830	$9,660	$14,490	$19,320	$24,150	$28,980
2	$6,533	$13,065	$19,598	$26,130	$32,663	$39,195
3	$8,235	$16,470	$24,705	$32,940	$41,175	$49,410
4	$9,938	$19,875	$29,813	$39,750	$49,688	$59,625
5	$11,640	$23,280	$34,920	$46,560	$58,200	$69,840
6	$13,343	$26,685	$40,028	$53,370	$66,713	$80,055
7	$15,045	$30,090	$45,135	$60,180	$75,225	$90,270
8	$16,748	$33,495	$50,243	$66,990	$83,738	$100,485

Household Size	Part B. Household Income at Various SMI Cutoffs and Household Size					
	0.15	**0.30**	**0.45**	**0.60**	**0.80**	**1.00**
1	$7,938	$15,876	$23,814	$31,752	$42,336	$52,920
2	$10,380	$20,761	$31,141	$41,521	$55,361	$69,202
3	$12,823	$25,646	$38,468	$51,291	$68,388	$85,485
4	$15,265	$30,531	$45,796	$61,061	$81,415	$101,768
5	$17,708	$35,416	$53,123	$70,831	$94,441	$118,052
6	$20,150	$40,301	$60,451	$80,601	$107,468	$134,335
7	$20,608	$41,216	$61,824	$82,432	$109,910	$137,387
8	$21,066	$42,132	$63,198	$84,264	$112,352	$140,440

Household Size	Part C. Equivalent SMI Cutoff by FPL Cutoff and Household Size					
	25%	**50%**	**75%**	**100%**	**125%**	**150%**
1	0.091	0.183	0.274	0.365	0.456	0.548
2	0.094	0.189	0.283	0.378	0.472	0.566
3	0.096	0.193	0.289	0.385	0.482	0.578
4	0.098	0.195	0.293	0.391	0.488	0.586
5	0.099	0.197	0.296	0.394	0.493	0.592
6	0.099	0.199	0.298	0.397	0.497	0.596
7	0.110	0.219	0.329	0.438	0.548	0.657
8	0.119	0.238	0.358	0.477	0.596	0.715

Household Size	Part D. Equivalent FPL Cutoff by SMI Cutoff and Household Size					
	0.15	**0.30**	**0.45**	**0.60**	**0.80**	**1.00**
1	41%	82%	123%	164%	219%	274%
2	40%	79%	119%	159%	212%	265%
3	39%	78%	117%	156%	208%	260%
4	38%	77%	115%	154%	205%	256%
5	38%	76%	114%	152%	203%	254%
6	38%	76%	113%	151%	201%	252%
7	34%	68%	103%	137%	183%	228%
8	31%	63%	94%	126%	168%	210%