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The Multiple Dimensions of Measuring the Unaffordability of Utility Bills.

FSC was recently asked to explain the multiple dimensions that it had previously identified as critical to defining "affordability" (or, conversely, "unaffordability") within the context of the offer and design of "universal service" programs in Pennsylvania. The discussion below identifies three "dimensions" of unaffordability relied upon.

Measuring the affordability (or, rather, measuring the *un*affordability) of utility bills in Pennsylvania should take into consideration the distinction between the differing attributes of affordability. In considering the current extent of affordability (or unaffordability) under the PUC's current percentage of income regime, three attributes are relevant:

1. The "breadth" of unaffordability;

2. The "depth" of unaffordability; and

3. The total dollars of unaffordability.[1]

Each of these metrics is defined and explained in the specific sub-section of the discussion below examining each individual metric. Before assessing these three dimensions of unaffordability, however, a caution is provided with respect

[1] This metric may not be an entirely separate attribute of unaffordability. It is, however, the way in which one can assess the combined impacts of the first two metrics.

to any such analysis. The caution involves a warning about the use of averages.

The discussion below is in response to a Pennsylvania PUC Staff report on the affordability of natural gas and electric service in Pennsylvania (hereafter "Staff Report").[2]

The shortcomings of using "average" energy burdens in an affordability assessment.

Using the three metrics identified immediately above more accurately captures the extent to which affordability is achieved than an approach using average burdens. The primary problem with using average burdens is that the process of averaging allocates bills above or below the demarcation of affordability to all customers.

Assume, for example, that the definition of "affordable" is set at 15% of income. Assume further that Blackwater Utility has two low-income customers, one of whom has a burden of 12% and the other of whom has a burden of 20%. The average burden of 16% ([.20 + .12] / 2 = .16) would indicate that Blackwater's low-income program was not achieving affordability. On average, that conclusion would be correct. The average burden (16%) exceeds the affordable burden (15%). Nonetheless, half of Blackwater's customers *do* have an affordable burden.

The problem works in the opposite direction as well. Assume that Whitewater Utility has two low-income customers, one of whom has a burden of 18% and the other of whom has a burden of 10%. On average, the average burden for Whitewater's customers (14%) ([0.18 + 0.10] / 2 = 0.14) is affordable, even though half of Whitewater's customers do *not* receive an affordable bill.

The "Breadth" of Unaffordability.

The breadth of unaffordability measures the incidence of unaffordable bills within a utility's low-income population, after the application of rate affordability assistance, without taking into consideration the magnitude of the unaffordability.

Determining the breadth of unaffordability is a necessary, but not a complete, way to assess the affordability impacts of a utility Customer Assistance Program (CAP). Note, for example, that the Staff Report finds that average burdens for households with income at or below 50% of Poverty Level (whether they be natural gas, electric heating, or electric non-heating) frequently, if not generally, exceed the burden deemed to be affordable by the PUC. While the Staff Report analysis does not directly measure the breadth of unaffordability, this finding supports the conclusion that the breadth of unaffordability amongst this lowest income population is reasonably high.

This result is to be expected in the lowest-income population. The population of CAP participants with income below 50% of Poverty is that group of customers who will most likely be making minimum payments. Minimum payments are charged when a bill based on a customer's percentage of income does not exceed the minimum required payment. The situations where that is likely to occur involve the population of customers with the lowest incomes. By definition, a customer making a minimum payment will have an energy burden exceeding the

[2] Pennsylvania Public Utility Commission (January 2019). "Home Energy Affordability for Low-Income Customers in Pennsylvania" (hereafter "Staff Report").

PUC standards. If the minimum payment did *not* exceed the PUC affordable burden, the customer would not be charged the minimum payment, but would instead be making the percentage of income payment.

To the extent that having the average burdens for customers be unaffordable in the population with income at or below 50% of Poverty is of a policy concern to the PUC, the first appropriate inquiry is not directed toward the burden defined to be affordable. The first appropriate inquiry is directed toward the affordability of minimum payments.

While examining the breadth of unaffordability is important, this metric does not capture a full picture of defining an affordable burden. Measuring "unaffordability" for the "breadth" analysis is a yes/no toggle. A bill is either unaffordable or it is not; the *amount* of unaffordability is not considered. A customer that receives a bill which exceeds the burden deemed to be affordable by $10 is counted the same as the customer that receives a bill which exceeds the burden deemed to be affordable by $100. This distinction is important. A utility having 25% of its program participants receiving an unaffordable bill, with the average level of unaffordability being $5, presents a distinctly different problem than a utility having 15% of its program participants receiving an unaffordable bill, with the average level of unaffordability being $70.

It is for that reason that, in addition to measuring the breadth of unaffordability, one should measure the depth of unaffordability as well. It is to that metric we next turn.

The "Depth" of Unaffordability.

Measuring the depth of unaffordability became an important factor to consider at the time that PECO was considering whether to move from its status quo (tiered discount) to a percentage of income-based "Fixed Credit Option" ("FCO").[3]

In its "Options Report,"[4] PECO noted that "on the depth of affordability, the FCO fares well." (PECO Options Report, at 19). It is not merely the observation that the "FCO fares well" that is significant, however. On the depth of affordability, the Status Quo fared quite poorly. The average dollar amount by which a non-heating bill was *un*affordable under the Status Quo was $447, while the average dollar amount by which a heating bill was unaffordable was $652. These dollar amounts were not the average bills, but rather the average amount, on an annual basis, by which the bill exceeded an "affordable bill" *even after PECO's CAP Rate discount was applied*.

An examination of the depth of unaffordability helped to place in context the impact of the various alternatives on the breadth of unaffordability. The PECO data is set forth in the Table below.

[3] To try to minimize digressions, suffice it to say for now that the "Fixed Credit Option" that PECO was considering, and which it ultimately adopted, was a Percentage of Income Plan. The other attributes of the Fixed Credit Option are set aside, for now, as not relevant to this particular discussion.

[4] PECO Energy (September 30, 2013). PECO Energy's Report on Alternative Models for the Delivery of Customer Assistance Program Benefits Submitted Pursuant to the Commission's April 4, 2013 Order in Docket No. M-2012-2290911 (hereafter "PECO Options Report").

Conclusions about the impact which the various alternatives had on "affordability" became somewhat clearer when considering the depth of affordability in addition to the breadth of affordability. PECO found that the breadth of unaffordability in the lowest income tiers was quite high, even for the percentage of income Fixed Credit Option ("FCO"). However, that breadth of unaffordability (presented as "percent unaffordable" in Table below) was found to be somewhat misleading. The depth of unaffordability (presented as "average unaffordable bill" in the Table below) showed a different story:

- For ***non-heating*** customers, while the percentage of Tier B program participants with an "unaffordable" bill increases from 85% (Status Quo) to 99% (FCO), the dollars of unaffordability per participant are reduced to almost half ($383 vs. $215). While the percentage of Tier C customers with "unaffordable bills" increases from 52% (Status Quo) to 88% (FCO), the dollars of unaffordability per participant are reduced by more than 75% (from $483 for the Status Quo to $117 for the FCO).

- Even more dramatic reductions occur for ***heating*** customers. While the percentage of Tier C program participants with an unaffordable bill increases from 43% (Status Quo) to 75% (FCO), the dollars of unaffordability per participant decrease by more than 75% (from $757 to $184). Starting with Tier D heating customers, not only is the breadth of unaffordability reduced, but the depth of unaffordability is reduced by tremendous amounts (between 80% and nearly 90% reductions in depth of affordability for Tiers D, D1, E and E1).

As discussed above, the breadth of unaffordability is likely to increase under a percentage of income program. Minimum bills, by definition, exceed an affordable percentage of income. And minimum bills are generally applied in the lowest income tiers.

Overall, for PECO's non-heating customers, while the breadth of unaffordability increased a small amount (from 35% in the Status Quo to 39% in the FCO), the depth of unaffordability decreased substantially (72%, from $447 per participant to $124 per participant). Overall, for heating customers, while the breadth of unaffordability remained virtually constant (25% for the Status Quo and 26% for the FCO), the depth of unaffordability decreased substantially (61%, from $652 for the Status Quo to $253 for the FCO). For both heating and non-heating customers, the FCO improved both the breadth ***and*** the depth of affordability relative to the Status Quo.

The generalized applicability of the PECO analysis to other circumstances (e.g., the Staff Report) is simply that, to gain accurate insights into the extent to which current programs are, or are not, achieving affordability, it is necessary to examine both the breadth and the depth of unaffordability under current programs. The examination of "average burdens," standing alone, does not accurately portray the existence (or non-existence) of unaffordable bills.

Total Dollars of Unaffordability

It is possible to combine the breadth and depth of unaffordability into a single weighted factor in order to determine the overall impact of various program design alternatives on home energy affordability. In the consideration of PECO's program options, PECO agreed that the following calculation would be an appropriate way to determine the TOTAL DOLLARS OF UNAFFORDABLE BILLS tendered to low-income program participants:

Percent of Unaffordability x Number of Participants x Average Unaffordable Bill per Participant = Total Dollars of Unaffordable Bills

The discussion below uses data provided by PECO to show the number of participants in each income tier. By inserting this participant data, it is possible to determine the relationship between program alternatives. The results for the Status Quo and FCO options are presented in the Table attached as an appendix below.

Two critical conclusions flow from this Table:

- First, despite the results that PECO identified with respect to the breadth of unaffordability between the Status Quo and the FCO, in ***every*** income tier, a move to the FCO option reduces the total dollars of unaffordable bills rendered to low-income PECO customers. Indeed, for non-heating (R) customers, the dollars of unaffordable bills rendered to Tier B customers is reduced by 35% (from $3.193 million to $2.088 million); to Tier D and D1 customers by 81% or more (e.g., D from $4.292 million to 0.815 million); and to Tier E and E1 customers by more than 95%. For heating (RH) customers, the dollars of unaffordable bills rendered to Tier B customers is reduced by 24%; to Tier D and D1 customers by 85% to 90%; and to Tier E and E1 customers by 95% or more.[5]

- Second, in addition to the impacts in each individual income tier, a move to the FCO (relative to the Status Quo) would reduce the dollars of unaffordable bills rendered to PECO's low-income non-heating customers by more than 70%, and would reduce the dollars of unaffordable bills rendered to PECO's heating customers by 65%. Overall, a move to the FCO from the Status Quo would reduce unaffordable bills by more than $15.3 million ($14,044,705 for R; $1,264,745 for RH = $15,309,450 total).

It was acknowledged in the PECO proceeding that the PUC has not historically used the depth of unaffordability in its consideration of the impact of utility CAPs. Nevertheless, the Commission has ***always*** considered the efficiency and effectiveness of utility expenditures in achieving their ends. The Commission should not ignore the conclusion that some program options could reduce the dollars of unaffordable bills rendered to low-income customers solely because the specific metric that shows the improvement in performance has never previously been calculated and presented to the Commission.

Summary

[5] The Table shows the ratio of the amount of unaffordable bills under the FCO alternative to the amount of unaffordable bills under the Status Quo. The percentage reduction in unaffordable bills, therefore, would be one (1) minus the stated ratio.

For more information regarding the various dimensions of unaffordability, or for copies of any of the reports cited in this newsletter, please write:

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Fisher, Sheehan and Colton, Public Finance and General Economics (FSC) provides economic, financial and regulatory consulting. The areas in which *FSC* has worked include energy law and economics, fair housing, affordable housing development, local planning and zoning, energy efficiency planning, community economic development, poverty and telecommunications policy, regulatory economics, and public welfare policy.

Total Dollars of Unaffordable Bills

Non-Heating

	Status Quo Alternative					FCO Alternative				Ratio: FCO to Status Quo Total Unaf-fordable
Income Tier	# of Partici-pants	Pct Unaf-fordable	Avg Unaf-fordable Bill	Total Unaf-fordable Dol-lars		# of Partici-pants	Pct Unaf-fordable	Avg Unaf-fordable Bill	Total Unaf-fordable Dol-lars	
B	9,809	85%	$383	$3,193,320		9,809	99%	$215	$2,087,846	65%
C	17,462	52%	$483	$4,385,756		17,462	88%	$117	$1,797,888	41%
D	25,261	36%	$472	$4,292,349		25,261	43%	$75	$814,667	19%
D1	33,313	27%	$443	$3,984,568		33,313	27%	$64	$575,649	14%
E	23,056	19%	$489	$2,142,133		23,056	5%	$76	$87,613	4%
E1	18,478	16%	$492	$1,454,588		18,478	3%	$80	$44,347	3%
Total	xxx	35%	$447	xxx		xxx	39%	$124	xxx	
Sum				$19,452,714					$5,408,009	28%

Heating

	# of Partici-pants	Pct Unaf-fordable	Avg Unaf-fordable Bill	Total Unaf-fordable Dol-lars		# of Partici-pants	Pct Unaf-fordable	Avg Unaf-fordable Bill	Total Unaf-fordable Dol-lars	FCO High / (Lower) than Status Quo
B	975	83%	$594	$480,695		975	98%	$384	$366,912	76%
C	1,531	43%	$757	$498,356		1531	75%	$184	$211,278	42%
D	2,275	23%	$595	$311,334		2275	21%	$107	$51,119	16%
D1	3,360	17%	$660	$376,992		3360	9%	$125	$37,800	10%
E	2,382	11%	$722	$189,178		2382	2%	$96	$4,573	2%
E1	2288	4%	$921	$84,290		2288	1%	$193	$4,416	5%
Total	xxx	25%	$652	xxx		xxx	26%	$253	xxx	
Sum				$1,940,844					$676,099	35%

Source of participant distribution: PECO Supplemental Filing: October 15, 2013.