160673
1/18/17

GRU Electricity Rates in 2015 Compared to the U.S.

Electricity rates across utilities are sometime compared based on the charge for 1,000 kWh to residential customers. That comparison generates two unfortunate incentives: (1) to emphasize current rates instead of long-run rates, creating a temptation to reduce maintenance, reliability, and far-sighted capital structure; and (2) to distort rates to reduce the charge for 1,000 kWh to residential customers, at the expense of better rate structures for residential, commercial, and industrial users. In this brief I look only at the second aspect, GRU's overall rates—residential, commercial, and industrial—compared to utilities across the U.S. The result is that, compared to national sector price ratios, GRU transfers about $18 million a year from the commercial and industrial sectors to the residential sector. It may be that the balance across the sectors – residential, commercial, and industrial – is a larger policy issue than the tiered pricing of residential power.

GRU's total price of electricity per MWH, P_{GTOT}, is given by

(1) $P_{GTOT} = P_{GR}S_{GR} + P_{GC}S_{GC} + P_{GI}S_{GI}$

where P stands for price, S for share, and the subscripts represent GRU G, residential R, commercial C, and industrial I. Equation (1) says that the total price is a weighted average of residential, commercial and residential weights, where $S_{GR} + S_{GC} + S_{GI} = 1$.

Similarly, the total price of electricity per MWH for the U.S., P_{ATOT}, is

(2) $P_{ATOT} = P_{AR}S_{AR} + P_{AC}S_{AC} + P_{AI}S_{AI}$

where the subscript A represents the United States of America. I ignore the tiny amount of electricity sold for transportation by a few utilities, which represents 0.05% (or one-twentieth of one percent) of all power generated.

Filling in data from EIA-826, released November 21, 2016, for 2015 https://wwweia.gov/electricity/data.cfm#sales, where I have calculated averages for the U.S. weighted by MWH.

	Total	Residential	Commercial	Industrial
GRU:	(1') $148.50 =	$144.60 x 0.453 +	$157.50 x 0.458 +	$121.70 x 0.089
U.S.:	(2') $103.40 =	$124.50 x 0.410 +	$103.80 x 0.341 +	$ 68.20 x 0.249

Several facts stand out from these equations. First, while total GRU rates are 44% higher than the national average, GRU's commercial rates are 52% higher than the nation's compared to only 16% for residential rates. Strikingly, GRU's industrial rates are 78% higher than the nation's. Obviously the structure of GRU's rates diverges starkly from U.S., being higher for commercial than for residential customers, even though the cost of distribution is lower for commercial customers.

Also noteworthy is that GRU's industrial share of power use is roughly a third of the national average, perhaps not surprising given that the utility's industrial rates are not far from double the U.S. average. Generation and distribution costs for industry fall far below residential costs, a feature poorly reflected in GRU's rate structure. Generation costs are lower for industrial consumers because of industry's high ratio of total usage to coincident peak usage. Distribution costs are lower partly because of lower billing costs per MWH.

GRU's low share of industrial use, 9% instead of 25%, raises GRU's average cost. But that is partly offset by GRU's high share of power delivered to commercial customers, who also cost less than residential customers, again because of steadier demand and lower billing costs per MWH. To see that, adjust the national rates by sector to match GRU's residential, commercial, and industrial shares:

(3) $P_{AG} = P_{AR}S_{GR} + P_{AC}S_{GC} + P_{AI}S_{GI}$

(3') P_{AG} = \$124.50 x 0.453 + \$103.80 x 0.458 + \$ 68.20 x 0.089 =\$110.00,

which is 6% higher than the average U.S. cost. If the U.S. retained its sectoral rates but changed to the GRU sectoral weights (more residential, more commercial, and less industrial), the hypothetical increase in the national rate would explain about 14% of the higher GRU total rate.

An alternative comparison would be to construct P_{GA}, or GRU's hypothetical price using GRU rates and national sector shares:

(4) $P_{GA} = P_{GR}S_{AR} + P_{GC}S_{AC} + P_{GI}S_{AI}$

(4') P_{GA} = \$144.60*0.410 + \$157.80*0.341 + \$121.70 x 0.249 = \$143.40,

which is 3% lower than GRU's actual total price, \$148.50. Depending on which index you use for comparison, somewhere between three and fourteen percent of GRU's excess cost over the national average arises from sectoral composition. GRU's high commercial share offsets its low industrial share, but not completely.

Let $R = P_{GTOT}/P_{AG}$ = \$148.50/\$110.00 = 1.35 stand for the ratio of the GRU average price to what the U.S. average price would be applying U.S. prices by sector to GRU residential, commercial, and industrial shares. Then you can multiply each GRU sector price by R to obtain a vector of prices that would match GRU revenue while maintaining U.S. price ratios.

The table below shows that if GRU charged its residential, commercial, and industrial sectors enough to cover its costs, including the transfer to the city, but with rates proportional to national rates by sector, it would receive an extra \$19 million from residential customers offset by \$19 million less

from commercial and industrial customers. The extra burden on industrial customers is especially severe, given the modest amount of power they purchase.

Differential Charges to Customer Classes Based on Proportional Average National Rates by Class

Price per MWH	Total	Residential	Commercial	Industrial
U.S.	$110.00	$124.50	$103.80	$68.20
Ratio	1.35	1.35	1.35	1.35
U.S. Adjusted	$148.50	$168.10	$140.10	$92.10
GRU Actual	$148.50	$144.60	$157.50	$121.70
Price Difference	$0	-$23.50	$ 17.40	$ 29.60
MWH	1,765,193	799,153	808,740	157,300
Cost Difference	$0	-$18.8 million	$14.1 million	$4.7 million

Part of the explanation for GRU's relatively high commercial and industrial rates, relative to residential rates, is that it is municipally owned. Averaged across U.S. MOUs, commercial rates are 94% of residential rates and industrial rates are 71% of residential rates. For investor-owned utilities, the corresponding ratios are 82% and 53%. GRU's ratios are 109% and 84%, still much higher than typical of MOUs. Nationally, only 3% of all power is provided by suppliers with higher commercial-to-residential price ratios than GRU and only 6% with higher industrial-to-residential ratios.

As a side note, without the cost of perhaps $60 million for the GREC PPA the total GRU rate could have been $114.50, close to the sector-adjusted average U.S. price of $110.00. Overall rates, as measured by the Energy Information Agency, are perhaps 23% higher as a consequence of the PPA. That's without accounting for any maintenance or other distortions resulting from the effort to keep current, as opposed to levelized, rates down.