February 12, 2016

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS
DOUG LITTLE –CHAIRMAN
BOB STUMP
BOB BURNS
TOM FORESE
ANDY TOBIN

IN THE MATTER OF THE APPLICATION OF UNS ELECTRIC, INC. FOR THE ESTABLISHMENT OF JUST AND REASONABLE RATES AND CHARGES DESIGNED TO REALIZE A REASONABLE RATE OF RETURN ON FAIR VALUE OF THE PROPOERTIES OF UNS ELECTRIC, INC DEVOTED TO ITS OPERATIONS THROUGHOUT THE STATE OF ARIZONA AND FOR RELATED APPROVALS.	DOCKET NO. E-04204A-15-0142 **Public Comment**

Introduction

The comments below cover two major topics.

SECTION 1 discusses and evaluates the impact of the UNSE proposed rate changes. It is shown that Basic Service Charges greater than the present $10/month are regressive surcharges. The Peak Demand Charge is evaluated and shown to be inappropriate since it will not easily be understood by customers, and at this time data are not available to determine whether or not it is a regressive billing charge. As an alternative to the above method a Top-Down accounting approach is proposed which is transparent and can easily be used to determine the necessary numbers to guide the planning process in order to maximize the probability that UNSE has a reasonable opportunity to earn its Commission-authorized rate of return.

SECTION 2 addresses the replacement of net metering with net billing, and discusses the impact of Peak Demand Charges on Distributed Generation (DG) customers and the DG marketplace. Net billing is an accounting method based on covering *indirect* fixed and variable costs using volumetric charge rates. It provides a fair and transparent method for DG customers to pay their fair share. It is shown that if Peak Demand Charges are introduced, they are likely to result in regressive charges, and will have the effect of greatly reducing or, more likely, eliminating the DG market.

SECTION 1 -Proposed Rate Changes

The Basic Service Charge

The rational for employing increased Basic Service Charge is based on the stated UNSE desire to cover more of their fixed costs (i.e. every cost they incur other than for fuel). However, the Basic Service Charge is effectively a regressive charge in that the lower monthly kWh-consumption customers are effectively subsidizing the higher monthly kWh-consumption customers.

This regressive charge effect can be illustrated using the data provided in the Adjusted Schedule H-5 form.[1] The median usage of all customers is 666-kWh per month (i.e. half of the customers consume that amount or less per month, the other half more than that). Using the Cumulative Bill and Cumulative kWh numbers provided on the Adjusted Schedule H-5 form for the year 2014, it is inferred that the lower half of the customer-population consumes just 19.3% of all the electricity consumed by all UNSE customers. Accordingly, the top half of the customer-population consumes 80.7% of the electricity consumed by UNSE customers in 2014.

This consumption group imbalance needs to be fairly taken into account regarding a charge for fixed costs. From the standpoint of covering fixed costs, it is fair to charge an amount that reflects the customers' use of the various components that make up the delivery of electricity to the customer (generation, transmission, delivery). The wear and tear on the system parts is much greater (four times as much) by the top half of consuming customers compared to those in the lower half of consuming customers. Clearly, then using a fixed monthly service charge to cover these costs is not fair; such a charge effectively results in the lower-consuming 50% of customers subsidizing the higher consuming 50% of customers. Therefore, covering the fixed cost associated with the wear and tear on the system is more appropriately, and fairly, covered as part of the volumetric rate ($/kWh).

There is still an appropriate place for a fixed monthly service charge on the customer bill based on the type of fixed charge. Fixed charges can be *direct* or *indirect.* A *direct* service charge is levied to cover a service that all customers utilize to the same degree. Traditionally, line hook-up to the residential consumer, meter, meter reading and billing are fairly charged, and typically are covered by the present $10.00 per month Basic Service Charge. Other *indirect* fixed charges, similar to the one discussed above related to customer usage, are more fairly covered as part of the volumetric rate.

Peak Demand Charges

The Peak Demand Charge is based on a customer's Peak Demand, which is the maximum energy used (in kWh) in a defined time interval (most typically, 15 minutes, 30 minutes or one hour) during a given billing month. The major contributors to peak demand are the high power drawing loads (kW), for example, air conditioners, clothes dryers, washing machines, dishwashers, furnace blowers. Each of these power draws, or combinations of them, may be on for tens of minutes, or more, during the defined time interval used to determine Peak Demand.

It is most likely that the Peak Demand Charge is a regressive charge. UNSE, however, does not provide monthly Peak Demand data (kW) versus Consumption data (kWh) -similar to what is provided on the Schedule H-1 Form - that, for the purposes of analysis, are essential in assessing the impact of peak demand charges on all residential customers.

Alternatively, the regressive charge effect of Peak Demand billing can also be illustrated using the data provided in the Adjusted Schedule H-5 form.[2] The Form indicates that the mean usage of all customers is 834-kWh per month. Using the Cumulative Bill and Cumulative kWh numbers provided on the Adjusted Schedule H-5 form for the year 2014, it is inferred that 60% of the UNSE residential customers consume 834-kWh, or less, mean per month. It is reasonable to assume that most of the residential customers in this group have, and use, many of the high-power drawing items listed above (air-conditioning, etc.).

[1]UNSE Application (May 5, 2015) – Volume 4 of 4 - Schedules
[2]UNSE Application (May 5, 2015) – Volume 4 of 4 - Schedules.

Figure 1 shows three plots of the monthly bill (in $) on the vertical axis versus the monthly consumption (in kWhs) on the horizontal axis. The three line plots are derived from the input values listed at the top portion of the Figure. The solid line plot is based on a two-level rate (Basic Service Charge and an inclined block Energy Charge)[3]. The two dashed line plots are based on a three-level rate (Basic Service Charge, an Energy Charge plus a Demand Charge).[4] To determine the Demand Charge portion of the bill it is necessary to incorporate the Peak Demand (in kW) experienced during the billing period. The Peak Demand values used were inferred from numbers provided in the testimony of Dallas Dukes.[5]

Monthly Bills with and without Demand Charge

	No Demand Charge	3.6 kW Peak Demand	6.7 kW Peak Demand
Basic Service Charge ($)	$15.00	$15.00	$15.00
No Demand Charge			
Energy Charge-(0-400 kWh) ($/kWh)	0.08007		
Energy Charge-(>400 kWh) ($/kWh)	0.10007		
Demand Charge			
Demand Charge (0-7 KW) ($/kW)		6.00	6.00
Demand Charge (>7-kW) ($/kW)		9.95	9.95
Monthly Peak Demand (kW)		**3.60**	**6.70**
Energy Charge ($/kWh)		0.05926	0.05926

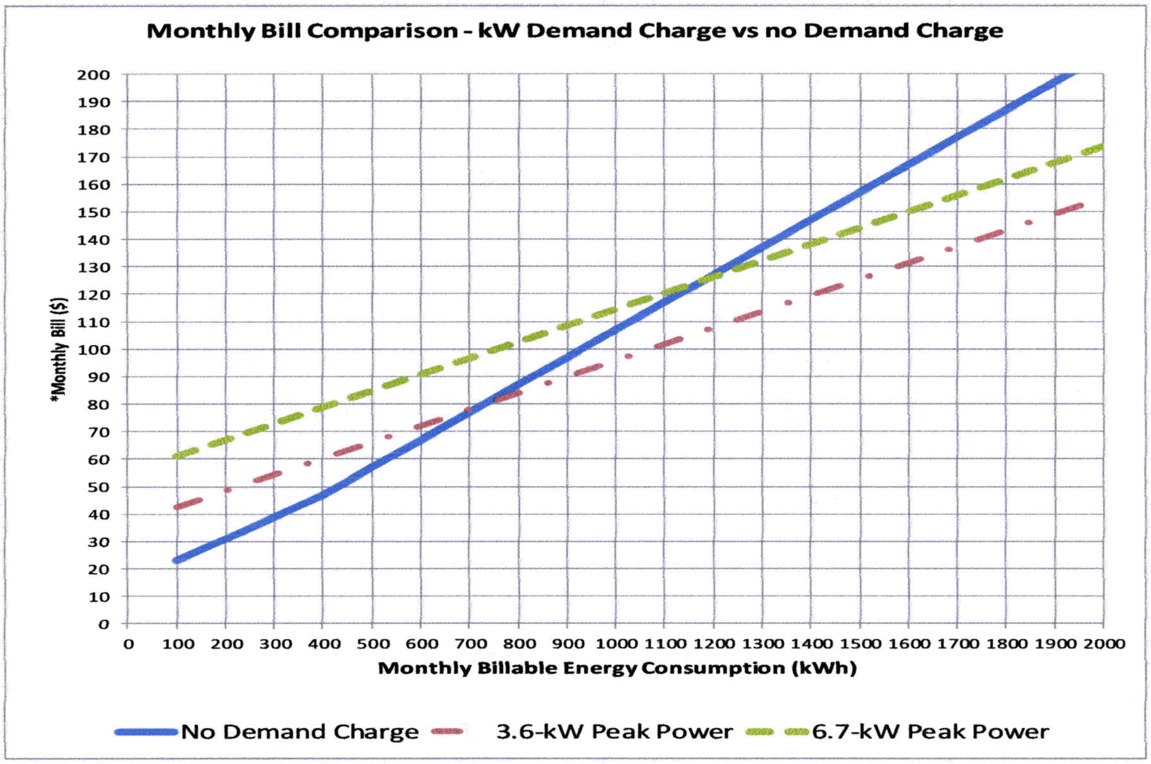

Figure 1

The plots in Figure 1 illustrate that, for a modest Peak Demand of 3.6 kW during the monthly billing period, all customers consuming less than 834-kWh (60% of the residential customers) would be paying more per month than at the traditional volumetric rate (i.e. no Demand Charge). Conversely, those consuming more than 830-kWh during the billing period would be paying less. If the customer Peak Demand is a more robust

[3] UNSE Application (May 5, 2015) – Volume 2 of 4 Craig Jones Testimony – Exhibit CAJ-3 - Residential Service (RES-01).
[4] UNSE Application (May 5, 2015) – Volume 2 of 4 Craig Jones Testimony – Exhibit CAJ-3 - Residential Service (RES-01 Demand).
[5] UNSE Application (May 5, 2015) – Volume 2 of 4 Dallas Dukes Testimony – page 25.

6.7 kW during the billing period, then all customers with a monthly consumption rate of less than 1200-kWh would be paying more than if they would normally pay at the more conventional volumetric-based rate.

The details of the plots indicated in Figure 1 are obviously dependent on the input values listed at the top portion of the Figure. In order to make a valid assessment of the impact and fairness (e.g. making sure that those customers at the low end of the monthly kWh-consumption spectrum are not subsidizing the customers at the high end of that spectrum), it is necessary to gather the data that indicate the Peak Power Demand of all customers in the monthly kWh consumptions spectrum.

As previously discussed, the utilization of a Basic Service Charge to address *indirect fixed costs* is not fair as it leads to the lower-consuming (kWh) customers base subsidizing the higher consuming customers. In a similar manner, and for the same reasons, the utilization of a Demand Charge ($/kW) is not fair. Furthermore, the utilization of a Demand Charge is far from transparent. Introducing the Load Factor as a figure of merit may be useful to utility experts; it is far from transparent to customers. Customers generally have a reasonable idea of how to "control" their bill based on kWh numbers. However, although the peak Power Demand (kW) might be understood, until now the customer has no data showing on their bill to indicate that number for a given billing period. Furthermore, it is not clear how to "control" that number as it relates to their bill.[6]

The fairer and more transparent method for billing customers is based on the continued utilization of volumetric pricing to cover all *indirect* fixed costs associated with generation, transmission and delivery beyond the *direct* fixed costs associated with local service, meter reading and billing covered by the $10.00 monthly Basic Service Charge.

A Top-Down Accounting methodology can be readily employed to achieve this objective. This approach is a "simple results driven methodology" in comparison to employing "the criteria of theoretically sound cost causation".[7] The former is simple and transparent; the latter is complicated, cumbersome, tedious and opaque. It appears to be a fundamental tenet of the latter approach that "there is no requirement that residential customers fully understand the components of the rates to promote sound decisions related to a more complex rate design."[8]

The Top-Down Accounting approach can be utilized to get to billing rate numbers in a straight-forward manner. It can be implemented on a customer-class by customer-class basis, and within a customer class on a rate-schedule by rate-schedule basis. Finally, these results can be summed together in a way to ensure that UNSE will have a reasonable opportunity to earn its Commission-authorized rate of return.

Top Down Accounting

The objective of the Top-Down Accounting approach is to use three design and/or measurable inputs to determine an Average Energy Charge ($/kWh) for a given customer class. The three inputs are

- the required/desired annual revenues ($)
- the required/estimated production (kWh), and
- the number of customers in that class.

[6] The existing Residential TOU billing option, however, does provide customers the opportunity to impact their bill based on time of use, which effectively is "managing" peak demand times that reflect the peak demand times of utility.
[7] UNSE Rebuttal Testimony, January, 19, 2016 – H. Edwin Overcast Testimony -. Page 37
[8] UNSE Rebuttal Testimony, January, 19, 2016 – H. Edwin Overcast Testimony -. Page 36

Figure 2 shows an example of the Top-Down Accounting approach applied to the Residential Customer Class for two cases based on available input data numbers. The input numbers were derived from data provided in the UNSE Rebuttal Testimony, or estimated, as noted at the bottom of Figure 2.

The input numbers for the UNSE Adjusted year ending December 31, 2014 yield the output numbers for Average Energy consumption (834-kWh) per month, the Average Monthly Bill ($91.41) and the Average Energy Charge Rate ($0.0976/kWh). The latter number reflects the inclusion in the monthly bill of the *direct* fixed Basic Service Charge of $10.00 per month. It is fairly straight-forward to implement an increased block charge rate for two or three levels if necessary. All that is required is that the weighted average of the inclined block schedule calculates out to the Average Energy Charge Rate, in this case $0.0976/kWh.

The input numbers in Figure 2 for the proposed UNSE budget for the residential customer class include the Annual Revenues Required ($94,097,555.00) and the Number of Customers (76,035). The Annual Production Required is an estimate (742,000,000-kWh) and represents a 2.5% decrease from the December 31, 2014 reflecting recent trends.[9] These input numbers yield the output numbers for Average Energy consumption (813-kWh) per month, the Average Monthly Bill ($103.13) and the Average Energy Charge Rate ($0.1084). This Average Monthly bill takes into account the contribution of the *direct* fixed cost Basic Service Charge of $15.00/month.

Top Down Acounting Method for getting to Customer bill - Residential Class

INPUTS	Units	Adjusted Dec. 31, 2014	**note**	Proposed	**note**
Revenue					
Annual Revenue Required	($/year)	83,400,000	**a**	94,097,555	**a**
Annual kWh Required	(kWh/yr)	761,215,000	**b**	742,000,000	**c**
Number of Customers	(#)	76,035	**b**	76,035	**b**
Charges					
Direct (Fixed Cost) Service Charge - DSC	($/month)	10		15	
OUTPUTS					
Average Energy Consumption	(kWh/mo.)	834		813	
Average Monthly Bill	($/month)	91.41		103.13	
Average Energy Charge Rate - with DSC	($/kWh)	0.0976		0.1084	

Note a: UNSE Rebuttal Testim. Jan. 19, 2016 – Craig Jones Testimony -. Schdule H-1 - Exhibit CAJ-R-4
Note b: UNSE Rebuttal Testim. Jan. 19, 2016 – Craig Jones Testimony -. Schdule H-2-1 - Exhibit CAJ-R-4
Note c: reflects a 2.5% reduction in Annual kWh Required based on recent history

Figure 2

[9] UNSE Application Docket E-04204A-15-0142, May 5, 2015, Volume 1, page 3.

As an aside, and somewhat puzzling, is the comparison of Average (i.e. mean) Monthly bill calculated using Top-Down Accounting ($103.13/month) compared to the monthly residential bill calculated for the mean ($91.75/month) as provided in the Bill Impact Proposed Rate Table by UNSE.[10] The former leads to an Annual Revenue of $94.097.555.00 as proposed, while the latter yields only $83,714,535.00, over ten million dollars short of what is required for the planned Annual Revenue.

SECTION 2 – Net Metering....and Beyond

It is clearly time to address the shortcomings of the current net metering policy (A.A.C. R14-2-2306). Generally, the criticism of the present policy relates to a question of fairness: are the residential PV array owners (DG customers) covered by this policy "paying their fair share"? What UNSE has proposed in their pending rate case essentially eliminates the value accounting features of the current net metering policy. However, the value accounting method they propose to be applied to future DG customers (i.e. those who submit a completed application for interconnection to UNSE Electric's grid facilities after June 1, 2015) is far from fair and appropriate. What is needed is *a new value accounting method* that fairly addresses the issues. What is proposed below (call it *Net Billing*) builds on the qualitative features of what UNSE has submitted, but takes into account a more balanced evaluation of the value of DG solar-generated electricity produced by the DG customer.

Beyond Net Metering....Net Billing

In order to ensure fairness for applications for residential DG arrays after June 1, 2015, a new value accounting method is required. Any value accounting method for accommodating residential DG will include the following elements:

Imported Electricity is Electricity *delivered* by the Utility *to* the residential DG.

Self-Consumed Electricity is Solar PV Electricity generated by the residential solar PV Distributed Generator (DG) and *directly consumed* on the DG site.

Exported Electricity is Solar PV Electricity generated by the residential DG and *received* by the Utility.

The cost and value accounting for each of these elements are:

Imported Electricity has an associated cost.
Self-Consumed Electricity has value *only* to the DG.
Exported Electricity has an associated value.

Imported Electricity

In the *Net Billing* value accounting method, the *imported electricity cost rate* would be the same one that applies to all non-DG residential customers. It is important to note that a residential DG array site, designed to produce the annual total consumption of electricity for that site, typically provides 70% of that site's solar-generated electricity *to* the utility (and correspondingly, purchases 70% of the electricity it consumes on an annual basis from that utility). This implies that with the *net billing* the DG customer is paying the same fee rate, like all other non-solar residential customers, on 70% of what he annually consumed before having the residential PV solar array. This is illustrated in Figure 3.

[10] UNSE Rebuttal Testimony, January, 19, 2016 – Craig Jones Testimony -. Schedule H-4 - Exhibit CAJ-R-4

In Figure 3[11] each filled square corresponds to the per cent (on the vertical axis) of electricity that is *imported* based on the corresponding percent of the annual kWh consumption that is produced by the DG array (on the horizontal axis). The down-pointing arrow in the figure indicates that for a DG array designed to produce 100% of the annual consumption of electricity at the site of the DG array, 70% of the of the total array annual output must still be *imported* from the utility.

Referring to Figure 3 it is noted, that over a fairly broad range (60-150%) of the total annual consumption provided for by the DG solar array, that the DG array site still requires the acquisition of 70% of its annual consumption from the utility (i.e. the filled squares are hovering close to 70% value on the vertical axis).

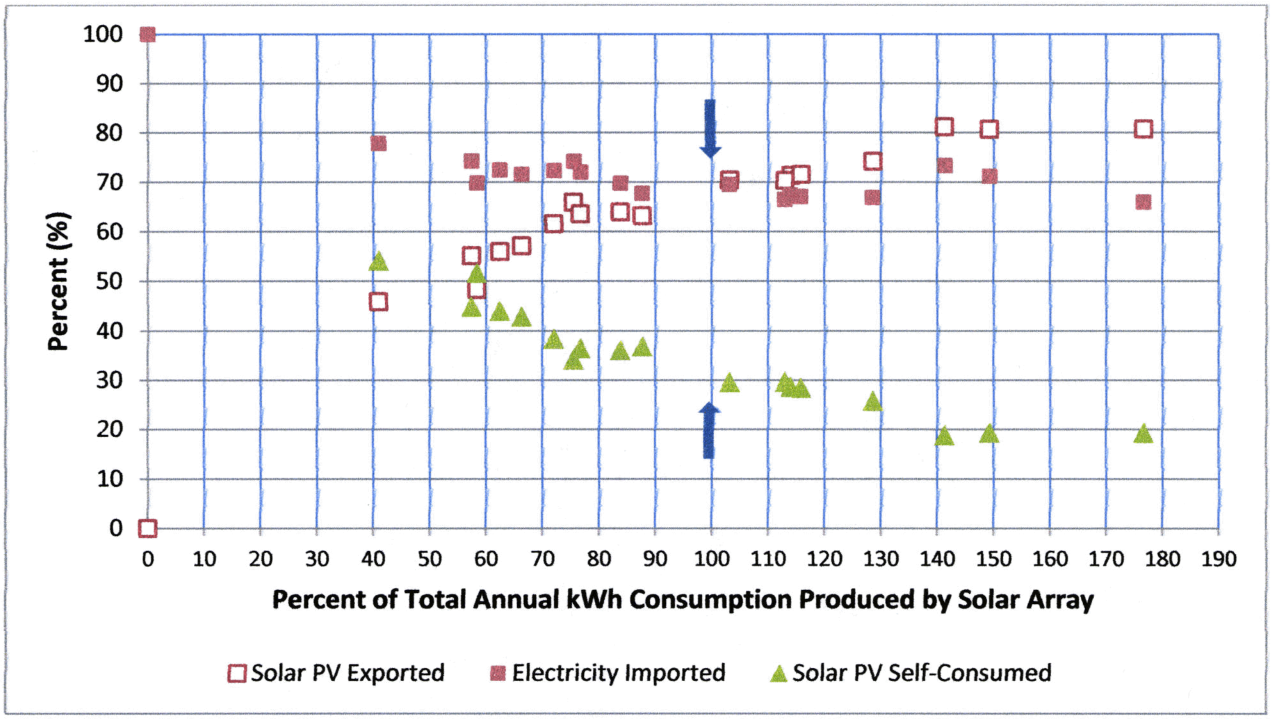

Figure 3

Self-Consumed Electricity

DG customers by virtue of their *self-consumed electricity* are no longer requiring some percentage of the electricity they formerly consumed and that was provided by the utility. In Figure 3 each filled triangle corresponds to the percent of *self-consumed* electricity (on the vertical axis) that occurs based on the percent of total annual consumption produced by the DG solar array (on the horizontal axis).

The up-pointing arrow in Figure 3 indicates that for a DG array designed to produce 100% of the annual consumption of electricity at the site of the DG array (horizontal axis), 30% of the of the total array annual output is self-consumed (on the vertical-axis). These DG customers, by virtue of their *self-consumed electricity,* are no longer using 30% of what they formerly consumed. In this regard this 30% savings for DG customers is not unlike the savings that are realized by any customer employing LED or CFL lighting instead of incandescent bulbs, or that they realize with the acquisition of a more energy efficient air-conditioner, refrigerator, clothes dryer, washing machine or dishwasher.

[11] Data for Figure 3 gathered from local DG homeowners and provided by local utility.

Exported Electricity

The issue then reduces to making a fair determination of the value of the *exported electricity.* In Figure 3 each open square corresponds to the per cent (on the vertical axis) of electricity that is *exported* based on the corresponding percent of the annual kWh consumption that is produced by the DG array (on the horizontal axis). The down-pointing arrow in Figure 3 indicates that for a DG array designed to produce 100% of the annual consumption of electricity at the site of the DG array (horizontal axis), 70% of the of the total array annual output is exported to the utility (vertical axis).

UNSE proposes employing a Renewable Credit Rate, which would be reset annually. This rate would compensate the DG owners for any excess energy their DG system produces and *exports* to UNSE with bill credits at a rate that reflects the current cost of utility-scale solar energy (presently this rate is $0.0584 per kWh). It is not clear what *indirect* fixed costs, associated with the transmission and distribution of the electricity from such a utility-scale solar electricity generator, are included in that rate.

Net Billing

A more fair and transparent method is to track the annual costs at each step along the way from the delivery of fuel (coal, natural gas or sunlight) through electricity generation, then subsequent transmission and distribution. These annual itemized costs can be used to determine the volumetric cost rate ($/kWh) at each step based on the planned total annual volumetric production of electricity. This approach will yield an itemized cost rate (in $/kWh) each for generation, transmission and distribution. Thus, alternative electricity generators can be compensated for their delivery of electricity based on what parts of the total delivery system they utilize: for utility scale solar, both transmission and distribution; for DG, only distribution.

There are already examples in the industry that provide a breakdown of costs into generation, transmission and distribution charges based on a volumetric accounting.[12] In this particular case, the indicated generation cost rate is $0.030795/kWh, the transmission rate is $0.049412/kWh and distribution rate is $0.041393/kWh. Thus, for net billing, the NG customer would pay $0.1216/kWh (the sum of the three individual volumetric rates) to the utility for the *imported* electricity. For electricity *exported to* the utility the DG customer would be credited $0.080207/kWh (the avoided cost that the utility would have to pay for generation and transmission were it not for DG electricity). The DG customer would not be credited $0.041393/kWh (the distribution charge) to reflect the fact that the DG customer is using the distribution network to deliver its *exported* electricity.

Impact of Peak Demand Charges on DG Customers

With the introduction of a Peak Demand Charge, the DG-customer effectively becomes a low kWh demand customer, and as such, subject to the same inequities that were discussed above in Section 1, and illustrated in Figure 1. For example, based on a modest Peak Demand of 3.6 kW during the monthly billing period, a DG customers consuming less than 834-kWh (which for DG customers would be their *imported* electricity) will pay more per month than on a traditional volumetric basis (i.e. no Demand Charge).

A second effect related to employing Peak Demand Charges is its impact on the payback time for a DG installation. Table 1 shows an estimate of the Simple Payback Time calculated using the monthly billing and savings data indicated for the 950 kWh per month consumption case provided in the table by Dukes.[13] Whereas the 12.2 year payback estimate realized with net metering is probably interesting to a

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[12] TRICO Docket E-01461A-15-0363, October 23, 2015, Volume 1 – David Hedrick testimony – Exhibit DWH-8.

[13] UNSE Rebuttal Testimony, January, 19, 2016 – Dallas Dukes Testimony -. Page 22.

potential customer, the greater than 19 years Payback Time, resulting as a consequence of introducing a Peak Demand Charge rate, will clearly be a significant factor, and likely discourage any new DG prospects.

Table 1			
Rate Schedule	**Monthly Bill ($)**	**Savings ($/month)**	**Simple Payback Time (years)**
2-part rate+ DG + Net Metering	$0.00	$100.08	12.2
3-part rate + DG +Net Metering	$36.01	$64.07	19.1
3 part rate + DG + Credit for Export	$41.77	$58.31	21.0

Assumption in Calculating Payback time:
NG Array Size: 6-kW
Annual Array Production: 10,800 kWhs
Array Installation Cost; $21,000.
Federal Tax Credit Rate: 30%
Net Array Cost $14,700
Notes:
If Net Array Cost is financed, then effect is to increase Payback Time.
If Cost Rate of electricity from utility increases, then effect is to reduce Payback Time.

Conclusion

To be fair and transparent it is necessary to replace the present Net Metering Policy with a new accounting method (*Net Billing*) for new DG customers that appropriately accounts for the value of the electricity that the DG *exports* to UNSE. Given the need to accomplish this, coupled with several other developments in the electricity production/storage marketplace, it is now time to change the accounting method by which commercial electricity providers cover their *indirect* fixed costs. The introduction of Peak Demand Charges leads to billing confusion, and likely is a regressive charge. Furthermore, its implementation would likely lead to the demise of the DG market. The implementation of volumetric accounting ($/kWh) for all charges, other than a $10.00 per month service charge to cover *direct* fixed costs (metering and billing) for distribution, will lead to fairness among customer classes, and will facilitate a more equitable determination of the value of new alternatives for providing electricity to the grid.

Summary Points

1. A BasicService Charge in excess of $10.00 per month, which fairly covers direct fixed charges, results in the lower-kWh-consuming customers subsidizing higher-kWh-consuming customers since it is the latter group who are incurring the bulk of the indirect fixed costs.
2. A Peak Demand Charge is inappropriate since it will not easily be understood by customers, and at this time data are not available to determine whether or not it is a regressive billing charge.
3. Using kWh volumetric-based accounting for each step in the electricity generation to delivery process is the fairest and most transparent approach.
4. A Top-Down accounting approach is transparent and can easily be used to determine the necessary volumetric accounting numbers for maximizing the probability that UNSE has a reasonable opportunity to earn its Commission-authorized rate of return.
5. Net billing, based on covering all customer charges using volumetric rates, provides a fair and transparent method for DG customers to pay their fair share.
6. If Peak Demand Charges are introduced, it will have the effect of greatly reducing or, more likely, eliminating the DG market.

RESPECTFULLY SUBMITTED this 12th day of February, 2016

Robert B. Hall

Robert B. Hall
4809 W. Pier Mountain Place
Marana, AZ 85658

(520) 572-8317
Solar_Bob@msn.com

ORIGINAL and thirteen copies of foregoing **MAILED** this 12th day of February, 2016 to:

Docket Control
ARIZONA CORPORATION COMMISSION
1200 West Washington Street
Phoenix, Arizona 85007

COPY of the foregoing was **MAILED** this 12th day of February, 2016 to:

Bradley S. Carroll
UNS Electric, Inc.
88 East Broadway Blvd., MS HQE910
P. O. Box 711
Tucson, Arizona 85702

Mark Holohan, Chrmn.
Arizona SEIA
2122 W. Lone Cactus Dr., Suite 2
Phoenix, AZ 85027