DIRECT TESTIMONY OF AHMAD FARUQUI

On Behalf of Arizona Public Service Company

Docket No. E-04204A-15-0142

December 9, 2015

Table of Contents

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, JOB TITLE, BUSINESS ADDRESS AND PARTY FOR WHOM YOU ARE FILING TESTIMONY.

A. My name is Ahmad Faruqui. I am a Principal with The Brattle Group. My business address is 201 Mission Street, Suite 2800, San Francisco, California 94105. I am filing testimony on behalf of Arizona Public Service Company ("APS").

Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND AND EXPERIENCE.

A. I have 35 years of consulting and research experience in the utility industry. During my career, I have advised some one hundred and twenty five electric and gas utilities, regulatory commissions, government agencies, transmission system operators, private energy companies, equipment manufacturers, and IT companies. Besides the United States, my clients have been located in Australia, Canada, Chile, Egypt, Hong Kong, Jamaica, Philippines, Saudi Arabia, South Africa, and Vietnam. I have advised them on a wide range of issues including: rate design, load forecasting, demand response, energy efficiency, distributed energy resources, cost-benefit analysis of emerging technologies, integration of retail and wholesale markets, and integrated resource planning. I have testified or appeared before a dozen state and provincial regulatory commissions and legislative bodies. I have authored or co-authored more than one hundred papers on energy economics and co-edited three books on electricity pricing and customer choice.

More details regarding my professional background and experience are set forth in my Statement of Qualifications, included as Attachment Faruqui Direct-1.

Q. WHAT ARE YOUR RESPONSIBILITIES AS A PRINCIPAL WITH THE BRATTLE GROUP?

A. I lead the firm's practice in understanding and managing the changing needs of energy consumers.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE ARIZONA CORPORATION COMMISSION ("COMMISSION")?

A. No, I have not formally testified before the Commission. However, I was invited to speak at a technical workshop before the Commission on the 20th of March, 2014. I gave a presentation that discussed the impact of changing customer energy use patterns on utilities. The workshop was entitled, "In the Matter of the Commission's Inquiry into Potential Impacts to the Current Utility Model Resulting from Innovation and Technological Developments in Generation and Delivery of Energy."[1]

II. OVERVIEW AND ORGANIZATION OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to evaluate the merits of UNS Electric's proposal to offer three-part rates to residential customers, including new net metering distributed generation ("DG") customers with rooftop photovoltaic ("PV") panels.[2]

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony begins with a discussion of ratemaking principles and the merits of a three-part rate design. An overriding principle of electric rate design is that of cost causation—those who create costs should be responsible for paying those costs. Yet the standard residential rate design in the United States does not follow this principle. Fixed costs are most often recovered through volumetric rates (expressed in cents/kWh). The result is that customers might reduce the volume of electricity they consume but not reduce the demand they place on the grid, thereby lowering their load factor. As a result, some of the fixed costs required to meet their demand can go unpaid. The cost-causers do not pay for all the costs they create, and those costs are instead shifted to customers who use more volume of electricity and have higher load factors.

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[1] Docket No.E-00000J-13-0375, Substantive Workshop No. 1(a) Special Open Meeting, March 20, 2014.

[2] Throughout my testimony I refer to these customers as "DG PV" customers.

The cost shift from lower load factor customers to higher load factor customers is a structural inefficiency that should be addressed through a rate design that includes three parts: a fixed charge, a demand charge, and a volumetric charge. With a three-part rate design, customers can more efficiently use the electric grid in a way that reduces the cost shift. In addition, demand rates provide a price signal to technologies that reduce demand. If policy-makers wish to encourage innovative distributed technologies, demand rates offer an efficient and equitable method of doing so.

My testimony concludes by evaluating UNS Electric's rate proposal in light of these principles. UNS Electric has proposed the deployment of three-part rates. Based on my review, the proposed rates appear to be based on well-established principles of rate design and would send a better price signal to customers that will encourage adoption of new technologies that are most beneficial to the power system. Given the benefits of these new three-part rate designs, as UNS Electric proceeds with the deployment of automated metering, it would be reasonable to eventually make a demand charge a feature of the rate for all residential customers.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. It is organized into several sections. Section III reviews the principles of rate design. Section IV summarizes UNS Electric's rate design proposal and evaluates the proposal in light of the generally accepted ratemaking principles and the opportunities offered by three-part rates. Section V concludes the testimony.

Q. ARE YOU SPONSORING ANY ATTACHMENTS TO YOUR TESTIMONY?

A. Yes, I sponsor the following attachment to my testimony:

- Attachment Faruqui Direct-1: Statement of Qualifications

III. PRINCIPLES OF RATE DESIGN

Q. PLEASE PROVIDE A HISTORICAL PERSPECTIVE ON THE THEORY OF ELECTRIC RATE DESIGN.

A. The principles that guide electric rate design have evolved over time. Many authorities have contributed to their development, beginning with the legendary British rate engineer John Hopkinson in the late 1800's.[3] Hopkinson introduced demand charges into electricity rates. Subsequently, Henry L. Doherty proposed a three-part tariff, consisting of a fixed service charge, a demand charge and an energy charge.[4] The demand charge was based on the maximum level of demand which occurred during the billing period. Some versions of the three-part tariff also feature seasonal or time-of-use ("TOU") variations corresponding to the variations in the costs of energy supply.[5]

In the decades that followed, a number of British, French and U.S. economists and engineers made further enhancements to the original three-part rate design.[6] In 1961, Professor James C. Bonbright coalesced their thinking in his canon, *Principles of Public Utility Rates*,[7] which was reissued in its second edition in 1988. Some of these ideas were further expanded upon by Professor Alfred Kahn in his treatise, *The Economics of Regulation*.[8]

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[3] John R. Hopkinson, "On the Cost of Electricity Supply," *Transactions of the Junior Engineering Society*, Vol. 3, No. 1 (1892), pp.1-14

[4] Henry L. Doherty, *Equitable, Uniform and Competitive Rates,* Proceedings of the National Electric Light Association (1900), pp.291-321

[5] *See, for example*, Michael Veall, "Industrial Electricity Demand and the Hopkinson Rate: An Application of the Extreme Value Distribution," *Bell Journal of Economics*, Vol. 14, Issue No. 2 (1983).

[6] The most notable names include Maurice Allais, Marcel Boiteux, Douglas J. Bolton, Ronald Coase, Jules Dupuit, Harold Hotelling, Henrik Houthakker, W. Arthur Lewis, I. M. D. Little, James Meade, Peter Steiner and Ralph Turvey.

[7] James C. Bonbright, Albert L. Danielsen, and David R. Kamerschen, *Principles of Public Utility Rates,* 2d ed. (Arlington, VA: Public Utility Reports, 1988).

[8] Alfred Kahn, *The Economics of Regulation: Principles and Institutions*, rev. ed. (MIT Press, June 1988).

Q. WHAT ARE THE GENERALLY ACCEPTED RATE DESIGN PRINCIPLES?

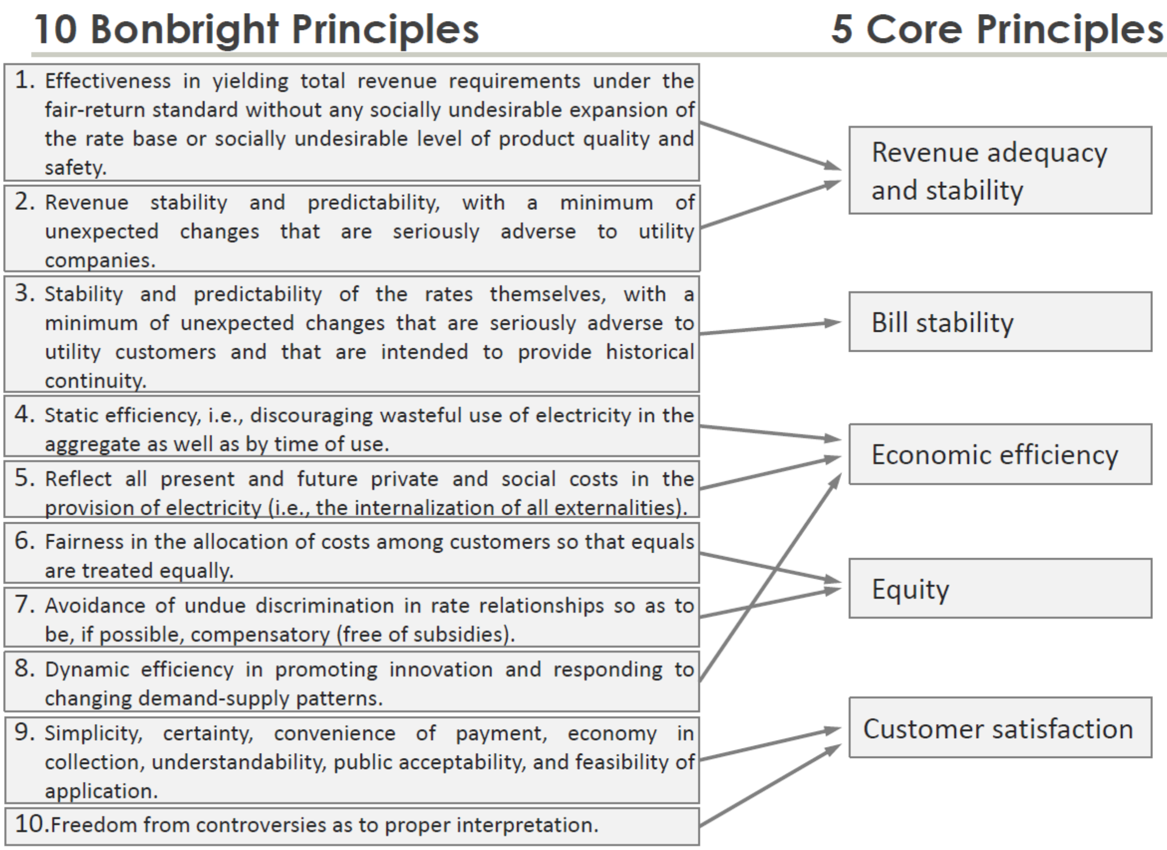
A. Professor Bonbright propounded ten principles of rate design that are widely used as a foundation for designing rates. For ease of exposition, I have grouped these into five core principles that fully encompass the concepts established by Professor Bonbright.

1. Economic Efficiency. The price of electricity should convey to the customer the cost of producing it, ensuring that resources consumed in the production and, delivery of electricity, are not wasted. If the price is set equal to the cost of providing a kWh, customers who value the kWh more than the cost of producing it will use the kWh and customers who value the kWh less will not. This will encourage the development and adoption of energy technologies that are capable of providing the most valuable services to the power grid.
2. Equity. There should be no unintentional subsidies between customer types. A classic example of the violation of this principle occurs under flat rate pricing structures (i.e., cents/kWh). Since customers have different load profiles, "peaky" customers, who use more electricity when it is most expensive, are subsidized by less "peaky" customers who overpay for cheaper off-peak electricity. Note that equity is not the same as social justice, which is related to inequities in socioeconomic status rather than cost. The pursuit of one is not necessarily the pursuit of the other, and vice versa.
3. Revenue adequacy and stability. Rates should recover the authorized revenues of the utility and should promote revenue stability. Theoretically, all rate designs can be implemented to be revenue neutral within a class, but this would require perfect foresight of the future. Changing technologies and customer behaviors make load forecasting more difficult and increase the risk of the utility either under-recovering or over-recovering costs when rates are not cost reflective.

4. Bill stability. Customer bills should be stable and predictable while striking a balance with the other ratemaking principles. Rates that are not cost reflective will tend to be less stable over time, since both costs and loads are changing over time. For example, if fixed infrastructure costs are spread over a certain number of kWh in Year 1, and the number of kWh halves in Year 2, then the price per kWh in Year 2 will double even though there is no change in the underlying infrastructure cost of the utility.
5. Customer satisfaction. Rates should enhance customer satisfaction. Because most residential customers devote relatively little time to reading their electric bills, rates need to be relatively simple so that customers can understand them and perhaps respond to the rates by modifying their energy use patterns. Giving customers meaningful cost-reflective rate choices helps enhance customer satisfaction.

Figure 1 illustrates my grouping of Bonbright's original 10 principles.

Figure 1: Deriving the 5 Core Principles of Rate Design



Q. DID PROFESSOR BONBRIGHT DISCUSS THE CONCEPT OF COST CAUSATION IN DESIGNING RATES?

A. Yes. In the first edition, an entire chapter is devoted to this topic. It is entitled: "Cost of Service as the Basic Standard of Reasonableness." In the chapter he states: "One standard of reasonable rates can fairly be said to outrank all others in the importance attached to it by experts and public opinion alike – the standard of cost of service, often qualified by the stipulation that the relevant cost is necessary cost or cost reasonably or prudently incurred."[9] Later he states that: "The first support for the cost-price standard is concerned with the consumer-rationing function when performed under the principle of consumer sovereignty."[10] He also cites another benefit of the cost-price standard

[9] James C. Bonbright, *Principles of Public Utility Rates*, (Columbia University Press: 1961) 1st Edition, Chapter IV, p. 67.
[10] Op. cit., p. 69.

when he says that "an individual with a given income who decides to draw upon the producer, and hence on society, for a supply of public utility services should be made to "account" for this draft by the surrender of a cost-equivalent opportunity to use his cash income for the purchase of other things."[11] Later in Chapter XVI, where he discusses the "criteria of a sound rate structure," he says that a purely volumetric rate assumes that the total costs of the utility vary directly with the changes in the kWh output of energy. He calls this "a grossly false assumption" and says such a rate "violates the most widely accepted canon of fair pricing, the principle of service at cost." Later, while discussing the Hopkinson rate, he says that such a "rate distinguishes between the two most important cost functions of an electric-utility system: between those costs that vary with changes in the system's output of energy, and those costs that vary with plant capacity and hence with the maximum demands on the system (and subsystems) that the company must be prepared to meet in planning its construction program."[12]

Q. PLEASE DISCUSS FURTHER HOW THE CONCEPT OF COST CAUSATION IS IN ACCORD WITH THE BONBRIGHT PRINCIPLES.

A. The Bonbright principles of economic efficiency and equity in particular embody the concept of cost causation. Economic efficiency is achieved by having cost-reflective prices. This ensures that products are only consumed by those customers who value them at more than they cost to produce. Pricing below cost is wasteful because customers will purchase and consume products that they would not choose to consume if faced with the full cost. Similarly pricing above cost is wasteful because customers, who would get a net benefit from consuming the product over its cost of production, lose out on that benefit. Respecting the equity principle requires that the tariff's design not result in unintended cross-subsidies between customers. This differs from a public policy that seeks to intentionally subsidize certain customers through the tariff. Prices

[11] Op. cit., p. 70.
[12] Op. cit., p. 310.

that are cost reflective minimize unintentional subsidies. Cost causation may need to be balanced against the other core principles such as customer satisfaction or bill stability.

Q. GIVEN BONBRIGHT'S EMPHASIS ON COST CAUSATION, WHY DOES HIS FIFTH PRINCIPLE CALL FOR REFLECTING SOCIAL COSTS (OR EXTERNALITIES) IN ELECTRIC RATES?

A. Each of Professor Bonbright's principles should be read in conjunction with the others. Reading a single principle in isolation from the others ensures that it will be taken out of context, resulting in a misinterpretation of his rate design philosophy. The fact is that the cost of service is Professor Bonbright's *basic standard* for designing rates, and it is clear from his writings that above all, rates should be cost-based. This is easily squared with the principle of reflecting social costs in the provision of electricity. If a price has been assigned to a certain externality, in other words, if it has been internalized, and that price is part of the utility's cost structure, then it is economically efficient to reflect the price of that externality in rates for all customers. However, it would violate the core principles of ratemaking if only certain customers or technologies were charged or compensated for their impact on those externalities. For instance, compensating owners of only one specific technology for reductions in emissions would lead to inefficient levels of investment in that technology when there may be other options which, if similarly compensated, would provide even greater environmental benefits. All technologies and customers should be on a level playing field when developing residential rate design.

Q. WHAT IS THE STANDARD RATE STRUCTURE FOR RESIDENTIAL CUSTOMERS?

A. The standard rate structure for residential customers in much of the U.S., and in fact in much of the globe, consists of two parts, a monthly service charge and a volumetric (kWh) energy charge. Most of the revenue is collected from the volumetric charge.

Q. HOW DOES THE COLLECTION OF COSTS ON A VOLUMETRIC BASIS COMPARE TO THE NATURE OF UTILITY COSTS?

A. The collection of utility costs through volumetric charges is at odds with the underlying cost structure of providing electricity to customers. Most of the costs do not vary with the volume of electricity that is produced and delivered to the customer, but vary with maximum demand or are otherwise fixed. In order to provide electricity to a customer, a utility must bear—directly or indirectly—costs related to energy, generation, transmission, distribution, metering, and customer service. It is true that generation energy costs generally vary with kWh electricity consumption. But generation capacity costs vary with system peak demand. Similarly, transmission costs also vary with system peak demand while distribution and transmission costs vary with maximum demand that is more local in nature. Metering, billing, customer care services, and other connection/hookup costs are a fixed cost per each customer of a particular class. Some of these costs vary across time. Generation costs will vary from hour to hour depending on the marginal generation source. Distribution and transmission networks, while used year round, are generally sized to meet class and system peak demand, respectively.

Q. WHAT IS THE CONSEQUENCE OF FIXED CHARGES BEING COLLECTED THROUGH VOLUMETRIC RATES?

A. This mismatch between cost structure and rate structure creates an inevitable and indisputable cost shift from customers with lower load factors to customers with higher load factors. Customers might reduce their load factor if, for instance, they install rooftop solar. With a lower load factor, customers paying for electricity under a volumetric rate design contribute less to the electric grid's fixed costs. Inevitably, customers with high load factors, paying for electric service under a volumetric rate design, wind up paying more for comparable service.

Q. HOW SHOULD THESE COSTS TRANSLATE INTO RATES?

A. According to the notion of cost causation, the rate structure should reflect the nature of the costs. Fixed costs, such as metering, billing, and customer service, should be collected through a fixed monthly service charge. Demand-driven costs, such as capacity costs, should be collected through a demand charge. Variable costs, such as fuel and power grid operations and maintenance (O&M), should be collected through a variable charge (also known as an energy charge).

To address the deficiencies of current two-part rates, I support the institution of a three-part rate design, consisting of a monthly service charge, a demand charge, and a volumetric charge. The fixed charge should be designed to cover the fixed costs such as metering, billing, and customer care. Sometimes it also covers the cost of the line drop and the associated transformer. The demand charge should be designed to cover demand-driven costs, such as transmission, distribution, and generation capacity. It is typically applied to the individual customer's maximum demand, either during a defined on-peak period, or regardless of time of occurrence, or based on a combination of the two. While the concept of demand is instantaneous, in implementation demand is usually measured over 15-minute, 30-minute or 60-minute intervals. The energy charge covers the cost of the fuels that are used to generate electricity. The demand charge and the energy charge might vary with the time of use of electricity and have different seasonal and/or peak/off-peak charges. Such three-part rates align the rate design with costs, a fundamental tenet of rate design.

Q. DID PROFESSOR BONBRIGHT SUPPORT THE USE OF THREE-PART RATES?

A. Yes, he did. Their usage is discussed in several places in Bonbright's canon.[13] Bonbright cites the earlier text by the British engineer D. J. Bolton,[14] who states: "More accurate costing has shown that, on the average, only one-quarter of the total costs of electricity supply are represented by coal[15] or items proportional to energy, while three-

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[13] James C. Bonbright, *Principles of Public Utility Rates*, (Columbia University Press: 1961).
[14] Bonbright says that "On many technical issues, no American treatise on electric utility rates can equal that by the distinguished British rate engineer D. J. Bolton," p. 289, n. 3.
[15] Coal was the dominant fuel for generating electricity in the United Kingdom in 1938 when the book by Bolton was first published.

quarters are represented by fixed costs or items proportional to power, etc. If therefore only one rate is to be levied it would appear more logical to charge for power and neglect the energy, were it not for certain practical difficulties of which the following are two. In the first place, the effective power demand on the system made by any particular consumer is extremely difficult to estimate and is very different from the individual maximum demand metered at the consumer's terminals. Secondly, a purely power tariff would probably lead to a waste of energy to a greater extent than a purely energy tariff leads to waste of power."[16]

Of course, with the arrival of smart meters, customer demand at times of system and distribution peak can be accurately recorded. And the choice is no longer a binary one of imposing either a demand-only rate or an energy-only rate. It is possible now to deploy a three-part pricing structure for residential customers that better reflects the cost of providing electric services. When Bonbright discusses a two-part rate structure, he is referring to what he characterizes as "the two most important cost functions of an electric-utility system"[17] -- demand and energy charges. When he moves into a discussion of three-part rate structures, he adds truly fixed charges, customer charges, to the two-part rate concept. Three-part rates are discussed at length in Bonbright's canon, beginning on page 346.[18]

Q. HOW HAS THE PRINCIPLE OF COST CAUSATION AND THREE-PART RATES BEEN APPLIED IN PRACTICE?

A. Most medium and large commercial and industrial customers across the U.S. are served under the more cost-reflective three-part rate structures. And those structures have been the norm for these customer classes for decades in much of the U.S.

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[16] D. J. Bolton, *Costs and Tariffs in Electricity Supply*, (Chapman & Hall Ltd.: 1951) p. 59.
[17] Bonbright, p. 310.
[18] Bonbright, 2nd Edition, p. 401, credits Doherty with extending the Hopkinson two-part rate into a three part rate. Henry L. Doherty, *Equitable, Uniform and Competitive Rates*, Proceedings of the National Electric Light Association (1900), pp. 291-321.

Q. HAVE THESE COST CAUSATION PRINCIPLES BEEN APPLIED TO RESIDENTIAL CUSTOMERS?

A. Historically, these principles have rarely been fully applied to residential customers. Most residential customers in the U.S. are on two-part rates, with some or all of the fixed and demand-driven charges being recovered through a variable charge.

Q. WHAT HAS PREVENTED THREE-PART RATES FROM BEING BROADLY DEPLOYED TO RESIDENTIAL CUSTOMERS?

A. Until recently, metering technology for residential customers has been a significant limiting factor. The traditional electromechanical meters that most customers had installed at their homes measured only cumulative electricity consumption and not demand. Without the ability to meter demand, utilities could not cost-effectively offer three-part rates to these customers. Advances in metering technology have changed this situation.

Q. HOW HAVE ADVANCES IN METERING TECHNOLOGY CHANGED THE UTILITY'S ABILITY TO OFFER THREE-PART RATES?

A. With the deployment of automated meters (sometimes also referred to as advanced metering infrastructure or AMI), consumption can be recorded in intervals of an hour or less. This allows the utility to collect the consumption data necessary to incorporate demand charges into rates. It has removed a large barrier to the wider dissemination of cost-reflective rates to residential customers. Given these technological developments, rate structures for residential customers should be changed.

Q. SHOULD UTILITIES UTILIZE THREE-PART RATES?

A. Yes. Now is the time to take advantage of this opportunity to make cost-reflective three-part rates a standard offering for all residential customers. These rates will recover costs from customers in an equitable manner by more accurately charging customers for their use of the power grid. A more cost-reflective rate will also encourage the adoption of emerging energy technologies and changes in energy consumption behavior that will lead to more efficient use of power grid infrastructure and resources.

Q. HOW WOULD A THREE-PART RATE ENCOURAGE THE ADOPTION OF EMERGING ENERGY TECHNOLOGIES?

A. By providing customers with a price signal that includes a component for demand, a three-part rate would encourage the adoption of technologies that are designed to smooth out a customer's load profile. Behind-the-meter battery storage, for example, could be used to release electricity during hours of high electricity demand and store electricity during hours of low electricity demand. Load control technologies, such as programmable communicating thermostats, demand limiters, and smart appliances could also help customers manage their electricity demand. If a customer took service under a three-part rate, the use of battery storage, or other demand-reducing technologies, would reduce the customer's bill. This reduction in the customer's bill is an economic value that forms the basis of the price signal created by three-part rates.

Q. ASIDE FROM TRANSMITTING PRICE SIGNALS THAT ENCOURAGE TECHNOLOGICAL INNOVATION, WOULD THREE-PART RATES PROVIDE OTHER BENEFITS TO RESIDENTIAL CUSTOMERS?

A. Three-part rates will incentivize customers to smooth their energy consumption profile even if they are not equipped with enabling technologies. More than 40 pilot studies and full-scale rate deployments involving over 200 rate offerings over roughly the past dozen years have found that customers respond to new price signals by changing their energy consumption pattern.[19]

Further, there is some evidence that customers respond not just to changes in the rate structure generally, but specifically to demand charges. The following studies arrived at this conclusion:

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[19] Some of these studies are summarized in Ahmad Faruqui and Sanem Sergici, "Arcturus: International Evidence on Dynamic Pricing," *The Electricity Journal*, (August/September 2013). Similar results were obtained from an earlier generation of 14 pricing pilots that were funded in the late seventies and early eighties by the U.S. Federal Energy Administration (later part of the Department of Energy). There were also early studies producing similar results. *See* Ahmad Faruqui and Bob Malko, "The Residential Demand for Electricity by Time-of-Use: A Survey of Twelve Experiments with Peak Load Pricing," *Energy*, Vol. 8, No. 10, (1983).

- Stokke, A., Doorman, G., Ericson, T., 2009, January. "An Analysis of a Demand Charge Electricity Grid Tariff in the Residential Sector," Discussion Paper 574, Statistics Norway Research Department.

- Taylor, T., Schwartz, P., 1986, April. "A residential demand charge: evidence from the Duke Power time-of-day pricing experiment." *Energy Journal*. (2), 135–151.

- Caves, D., Christensen, L., Herriges, J., 1984. "Modeling alternative residential peak-load electricity rate structures." *J. Econometrics*.

- Thomas N. Taylor, 1982. "Time-of-Day Pricing with a Demand Charge: Three-Year Results for a Summer Peak." Award Papers in Public Utility Economics and Regulation, Michigan State University Institute of Public Utilities, Michigan.

Q. HAVE THREE-PART RATES BEEN OFFERED TO RESIDENTIAL CUSTOMERS IN OTHER U.S. JURISDICTIONS?

A. Yes. There are at least 18 utilities in 14 states that offer a three-part rate to residential customers, including APS which has over 100,000 of its customers on a three-part rate. In most cases, the rates are available to all customers on an opt-in basis. In the case of Salt River Project ("SRP"), a three-part rate is mandatory for all residential customers who choose to install a new grid-connected DG PV system.[20]

IV. UNS ELECTRIC'S RATE PROPOSAL

Q. WHAT ARE UNS ELECTRIC'S CURRENT RATES FOR RESIDENTIAL CUSTOMERS, AND HOW ARE THEY DESIGNED?

A. My understanding is that UNS Electric's current residential rate offerings include Residential Service ("RES-01"), Residential Service Time-of-Use ("RES-01 TOU"), and Residential Service Time-of-Use Super Peak ("RES-01 TOU SP"). All three are two-part rates with a fixed monthly service charge and a volumetric charge. The

[20] SRP website: http://www.srpnet.com/prices/home/customergenerated.aspx.

Residential Service option includes a $10 fixed monthly service charge and a tiered volumetric charge with a price of 8.4 cents/kWh for the first 400 kWh per month, 9.9 cents/kWh for the next 600 kWh per month, and 10.3 cents/kWh for all remaining kWh per month. The other two options include a slightly higher fixed monthly service charge and a volumetric rate that is time-varying.

Q. HOW IS UNS ELECTRIC PROPOSING TO REDESIGN ITS RESIDENTIAL RATES?

A. UNS Electric has proposed four specific changes to its residential rate offering: (1) increasing the fixed monthly service charge, (2) reducing the number of tiers in the inclining block rate, (3) modifying the net metering payment policy for excess generation from DG PV, and (4) introducing two three-part rate options. The focus of my testimony is on the three-part rates that are being proposed.

Q. PLEASE DESCRIBE THE THREE-PART RATES THAT UNS ELECTRIC HAS PROPOSED.

A. UNS Electric has proposed two rates, one called "RES-01 Demand" and a second rate called "RES-01 Demand TOU." DG PV customers would have the option of enrolling in one of these two rates. Other residential customers would have these as options in addition to the standard residential rate options described previously (subject to the additional rate design changes that have been proposed by UNS Electric).

My understanding is that the RES-01 Demand rate includes a tiered demand charge with a price of $6/kW on the first 7 kW of monthly demand and a price of $9.95/kW on demand in excess of 7 kW. The rate also includes a fixed monthly service charge of $20/month and a variable energy charge of approximately 5.9 cents/kWh.[21] Demand is measured as the customer's maximum one-hour demand in the billing month. The "RES-01 Demand TOU" rate has the same demand and fixed monthly service charges, but a time-varying energy charge which is approximately 11.1 cents/kWh during the

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[21] Direct Testimony of Craig A. Jones on Behalf of UNS Electric, Inc., May 5, 2015, Exhibit CAJ-3, Docket No. E-04204A-15-0142.

peak period and 4.4 cents/kWh during the off-peak period in the summer, and approximately 10.9 cents/kWh during the peak period and 4.4 cents/kWh during the off-peak period in the winter. Summer is defined as May through October and the summer peak period is from 2 pm to 8 pm, excluding weekends and holidays. Winter is from November through April and the winter peak period is from 5 am to 9 am and from 5 pm to 9 pm, excluding weekends and holidays. The off-peak period is all other hours. These rates are summarized in Table 1 below.

Table 1: Summary of UNS Electric's Proposed Three-Part Rates for DG PV Customers

	RES-01 Demand	RES-01 Demand TOU
Basic service charge ($/month)	20.00	20.00
Energy charge (cents/kWh)		
Summer on-peak	5.9260	11.1110
Summer off-peak	5.9260	4.3900
Winter on-peak	5.9260	10.8960
Winter off-peak	5.9260	4.3579
Demand charge ($/kW)		
First 7 kW	6.00	6.00
Over 7 kW	9.95	9.95

Source: Direct Testimony of Craig A. Jones on Behalf of UNS Electric, Inc., May 5, 2015, Exhibit CAJ-3, Docket No. E-04204A-15-0142.

Note: Energy charge includes both delivery services charge and power supply charges

Q. ARE UNS ELECTRIC'S PROPOSED THREE-PART RATES CONSISTENT WITH THE RATEMAKING PRINCIPLE OF EQUITY?

A. Yes. Each customer imposes costs on the system some of which are fixed and the rest of which demand-driven and energy driven. Under purely volumetric tariffs, customers with high demand but low monthly consumption would not be paying their fair share of the cost of maintaining, upgrading, and expanding the utility's generation, transmission and distribution system. Instead, lower-demand customers would be covering the deficit and paying more than their fair share. UNS Electric's proposed three-part rates more closely match demand, fixed, and variable costs with demand, fixed, and variable charges and will reduce this inequity so that all customers will pay their fair share of the costs associated with the generation of electricity, its delivery through utility's transmission and distribution system, and customer service.

Q. ARE UNS ELECTRIC'S PROPOSED THREE-PART RATES CONSISTENT WITH THE RATEMAKING PRINCIPLE OF ECONOMIC EFFICIENCY?

A. Yes. As I discussed previously, the cost-based price signals in the three-part rates proposed by UNS Electric provide customers with the financial incentive to make investments in technologies or otherwise change their behavior in ways that are most beneficial to the system. Technologies and behaviors that reduce a customer's demand should ultimately lead to a more efficient use of the grid, reduced costs, and lower bills.

Q. ARE UNS ELECTRIC'S PROPOSED THREE-PART RATES CONSISTENT WITH THE RATEMAKING PRINCIPLE OF CUSTOMER SATISFACTION?

A. Yes. UNS Electric is proposing to offer new rate options to residential customers. Having a choice of cost-based pricing products is a benefit to customers. Three-part rates send customers a more accurate price signal than traditional two-part rate structures, which then allows customers to properly assess and where appropriate adopt technologies that can help them manage their bills.

Q. ARE UNS ELECTRIC'S PROPOSED THREE-PART RATES CONSISTENT WITH THE RATEMAKING PRINCIPLE OF BILL STABILITY?

A. For the residential class as a whole, there will be no change in electric bills. That would also be true for customers whose load profile is similar to that of the class. Customers whose load factors are higher than the class average will experience lower bills. As for customers whose load factor is worse than the class average, since they have been subsidized for years by the customers whose load factor was higher than the class average, and the change in rates will remove that subsidy, they will experience higher bills. However, they will have an opportunity to lower their bills by reducing their demand. And that would also be true for customers who are automatically seeing lower bills. They will have an opportunity to further lower their bills by reducing their demand.

Q. ARE UNS ELECTRIC'S PROPOSED THREE-PART RATES CONSISTENT WITH THE RATEMAKING PRINCIPLE OF REVENUE ADEQUACY AND STABILITY?

A. Yes. The introduction of a three-part rate will not change the utility's revenues. All other things being equal, a properly designed three-part rate will be revenue neutral for the class as a whole and therefore collect the same revenue as the otherwise applicable two-part rates. The main reason for moving to three-part rates is the ability to more accurately recover costs from those customers who are imposing costs on the system, and to provide customers with an incentive to consume electricity in a more efficient manner.

V. <u>CONCLUSION</u>

Q. WHAT ARE YOUR CONCLUSIONS ABOUT UNS ELECTRIC'S THREE-PART RATE DESIGN PROPOSALS?

A. The two-part rate which is presently employed throughout the industry must give way to three-part rates. Not only are two-part rates ineffective at providing the proper pricing signals, as discussed above, they do not facilitate the integration of distributed energy resources with the grid, nor do they stimulate the deployment of other innovative technologies such as customer-sited battery storage and plug-in electric vehicles.

UNS Electric proposes to begin replacing its legacy two-part rate with three-part rates that are reasonable, cost-based, efficient, and equitable. In sum, they are consistent with well-established principles of rate design. In addition, UNS Electric's proposed three-part rates better align costs with prices. In so doing, the proposed rates will provide a more accurate price signal to customers, promote the efficient use of energy around-the-clock, and encourage the development of new, demand-reducing technologies I would recommend that UNS Electric make the demand charge a feature of the rate for all residential customers as it proceeds with the deployment of automated metering to all its customers.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.