Thomas A. Loquvam
Associate General Counsel
Pinnacle West Capital Corp.,
Law Department
Mail Station 8695
PO Box 53999
Phoenix, Arizona 85072-3999
Tel 602-250-3616
Thomas.Loquvam@pinnaclewest.com

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VIA ELECTRONIC SUBMISSION ONLY
Federal Trade Commission
Office of the Secretary
600 Pennsylvania NW
Suite CC-5610 (Annex B)
Washington, DC 20580

Re: Solar Electricity Project No. P161200

To Whom It May Concern:

Arizona Public Service Company (APS) appreciates the opportunity to submit these written comments to the Federal Trade Commission Workshop, Solar Electricity Project No. P161200. The scope of this workshop is broad, and includes many of the key issues currently being discussed in the electric utility industry regarding distributed generation (DG) and rooftop solar in particular. These comments focus on a few core issues: net metering, competition between utilities and rooftop solar companies, and consumer protection. APS believes that a thorough analysis of these topics must begin with certain foundational issues, including the basics of utility rate-making, the cost shift caused by the rooftop solar, and the rooftop solar industry's attempt to change utility ratemaking from cost to value based. Accordingly, these comments focus on those basics. Additionally, these comments provide important context regarding how the rooftop solar firm's survival depends on subsidies, why rooftop solar is not a competitive threat to utilities, and rate design solutions for the benefit of customers and the rooftop solar industry.

INTRODUCTION

APS is Arizona's largest and longest-serving electric utility. APS is a vertically integrated, investor owned utility, which employs almost 6,300 Arizonans. It serves more than 1.2 million retail and wholesale customers in all or part of 11 of Arizona's 15 counties—a service territory of approximately 35,000 square miles. In total, 47% of the electricity APS provides to its customers comes from carbon free resources. Currently, APS generates over 12% of its electricity from more than 1,300 MW of renewable resources. APS has approximately 40,000 rooftop solar customers. APS is an active participant in the ongoing debate regarding the proper regulatory approach to compensate consumers for the power that they generate. As a regulated public utility, APS encourages discussion regarding these issues that will result in just and reasonable rates for all of its customers now and in the future.

I. UTILITY RATE-MAKING AND THE ROOFTOP SOLAR COST SHIFT

A. The Regulatory Compact

To avoid duplicative infrastructure, while ensuring the electrification of the United States at just and reasonable rates for consumers, investor-owned electric utilities were cast as regulated monopolies subject to economic regulation by state public utility commissions. Under the concept of the "regulatory compact," electric utilities were required to serve all customers in their service territory using rates, terms and conditions set by regulators In exchange, utilities were permitted a fair opportunity to earn a reasonable return on their invested capital. The regulatory compact continues today, requiring regulators to balance the costs to electricity consumers with an opportunity for the utility to earn a fair rate of return, and thus attract capital sufficient to provide reliable service.

B. Utility Rate-Making: the Basics

Utility rates are set in public proceedings called rate cases. In an application initiating a rate case, a utility will include detailed information regarding a recent 12- month period—the Test Year.[1] What happened during the Test Year is the basis of the utility's rate request. Critical pieces of information from the Test Year include: (i) the amount of revenue the utility received; (ii) the number of customers; and (iii) the amount of energy, or kilowatt hours (kWh), those customers used.

Utilities typically file rate cases when their revenue falls short of costs incurred. This occurs because the revenue the utility received during the Test Year from existing rates did not keep pace with increasing operational expenses and the financing costs of additional investment. At a very high level of abstraction, an electric rate case involves allocating (or spreading) the revenue a utility needs to cover its costs over the customer kWh usage experienced during the Test Year. The first step of a rate case involves determining the revenue required to cover all of its costs (revenue requirement). The second step involves designing rates that will collect that revenue requirement from different classes of customers.

1. Rate Design

Electric utility customers' bills typically involve two or three parts. A two-part bill would have a kWh charge and what is called a "basic service charge" (BSC). Two-part rates are also called volumetric rates because they are designed around the volume of energy consumed.

A third component of electric utility bills is called demand, and bills incorporating a demand component are commonly referred to as "three-part rates." Demand rates involve charging customers on the basis of the demand they place on the utility system. Energy, measured in kWh (1,000 Watt-hours), is a measure of a customer's consumption of electricity. Demand, on the other hand, is the instantaneous electrical draw of a customer's load at a single point in time, and is measured in kW (1,000 Watts).

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[1] Some jurisdictions use an upcoming 12-month period, or a forward test year. For purposes of this discussion, the distinction does not matter.

Demand is typically used in bills for commercial and industrial customers. Residential customers are typically charged on the basis of how many kWh they consume. However, APS has offered a residential demand rate for over thirty-five years, and currently serves 120,000 of its 1.2 million residential customers on a demand rate.

The magnitude of the per kW and per kWh charges is a function of rate design. Although demand is a separate bill component, it is not an additional charge intended to increase how much customers pay. Instead, when coupled with a per kW charge, the per kWh charge component of a customer's bill decreases. The overall effect of adding a demand charge to customers' bills is revenue neutral to the utility. This is because the amount of revenue to be collected from the customer has already been established in the revenue requirement phase of the rate case. The rate design phase solely concerns how that total revenue is collected based on customers' usage. The following example illustrates the revenue neutrality of rate design:

Illustrative Monthly Bill with Different Rate Designs

Assume customer consumption of:

- 1,000 kWh per month; and
- 6 kW monthly peak

	TWO-PART RATE	THREE-PART RATE
BSC	$10	$10
$/kWh	$0.09 per kWh	$0.03 per kWh
$/kW	N/A	$10 per kW
Total Monthly Bill	$100	$100

Whether this hypothetical customer takes service under a two-part or three-part rate, their monthly bill remains $100. The presence of a demand charge on a customer's electric bill is a function of *rate design*, not a function of the cost of service or the utility's revenue requirement. In rate cases, utilities determine the average amount of revenue they need to collect from each customer in each customer class to obtain their revenue requirement. Utilities then design rates for each customer class—meaning they determine the appropriate level of the specific BSC, kWh, and kW charges—that will collect the specified amount of revenue from the average customer.

2. Two-part rates: the primary flashpoint

Under two-part rates, what happens if a customer's usage does not remain the same? If one of the utility's customers uses less kWh after the rate request is approved? This is basic genesis of the cost shift and is a primary flashpoint of the dispute between utilities and rooftop solar companies. When a customer supplies some of their own kWh with rooftop solar, they do not reduce the utility's fixed infrastructure (discussed below). And in the next rate case, other customers become responsible for the revenue previously allocated to the lost kWh. That responsibility increases their rates, which is the cost shift.

C. The Cost Shift: Reallocating Revenue Responsibility Amongst Utility Customers

With regard to rooftop solar, the cost shift emanates from two sources: rate design and net metering. The fault line can be understood by considering where energy produced by rooftop solar is consumed. Energy produced by rooftop solar can either (i) be consumed instantly by the customer behind the meter; or (ii) if the energy production exceeds the customer's load, be "exported" to the grid as excess energy. The net metering-related cost shift concerns this exported energy. The rate design-related cost shift fundamentally concerns energy that is immediately consumed by the customer.

1. The rate design-related cost shift

The rate design-related cost shift occurs when the same (or greater) amount of utility revenue is spread over a smaller number of kWh than anticipated. Continuing with the example above, assume that after new rates are approved, one of the utility's customers only consumes 10 kWh per month in the next year. In that circumstance, the utility will collect less revenue in the short term. Instead of collecting $100 per month, the utility will collect $91—9 customers will consume 100 kWh at a rate of $0.10 per kWh and one customer will consume 10 kWh at the same rate.

If the utility files a new rate case and only seeks the same amount of revenue, the rate per kWh will increase. Instead of 1,000 kWh over which to spread $100, the utility's customers only consumed a total of 910 kWh per month during the new Test Year. Spreading the same $100 over this lower amount of kWh results in a $0.1099 per kWh monthly charge. If the utility's customers use the same amount of energy after this second rate case, the 9 customers using 100 kWh will pay a total of $10.99 per month and the customer using only 10 kWh will pay a total of $1.099 as illustrated below:

Customers	1	2	3	4	5	6	7	8	9	10	Total
kWh Usage	100	100	100	100	100	100	100	100	100	10	1000 kWh
kWh Charge	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	$0.1099	
Revenue Collected	$10.99	$10.99	$10.99	$10.99	$10.99	$10.99	$10.99	$10.99	$10.99	$1.10	$100

This cost shift results from the design of the utility's rates. Here, the design is that the revenue is collected on the basis of how many kWh the customers consume, as opposed to some other means of measuring how much service customers take from utilities, such as demand (measured in kilowatts, or kW) discussed below.

2. The net metering-related cost shift

With regard to rooftop solar, the cost shift emanates from a second source: net metering. Net metering is the practice of compensating (through credits or cash) a rooftop solar customer for the power that their rooftop solar system generates in excess of immediate need—power that is exported to the grid. Each kWh exported to the grid results in a single kWh credit. Credits are applied to each monthly bill to reduce the customer's bill on a per kWh basis. In APS's service territory, credits produced but not applied to a bill in one month "roll over" to the next month and to the next month and the next and so on. At the end of the year, any remaining kWh net metering credits not applied to actual customer usage are paid out in cash at APS's avoided cost

rate of 2.9 cents per kWh.[2] The policy essentially allows net metering customers to use APS's system as a "battery" throughout the day, from month to month, and even across seasons.

For fundamentally the same reasons as the rate design-related cost shift, net metering also shifts costs between customers. In the utility rate-making process, the cost of service is a zero sum process between customers. Revenue not collected from one customer for costs that are not avoided, like infrastructure, is inevitably shifted to another customer. When a net metering customer exports energy to APS, the customer receives a credit valued at the full retail rate (an average of approximately 14 cents per kWh for the typical solar customer), but APS only avoids 2.9 cents per that same kWh. When net metering customers avoid contributing to the APS's revenue requirement in this way, other customers make up the difference.

D. The Nature of Utility Costs: kWh Reduction does not Translate to Reduced Fixed Costs

Before continuing, it is worth returning to the distinction between energy (measured as kWh) and demand (measured as kW). The distinction is foundational in the energy world, and is critical to comprehending what and why utilities and their regulators do what they do. It also lies at the very root of the dispute between utilities and rooftop solar companies.

A kWh is a convenient metric upon which to measure customer usage, and reflects a product that utilities sell—energy. But it is not the only thing that utilities sell. Utilities sell not only energy as a commodity, but also the ***availability of energy***. At any time, a customer could simultaneously run every appliance and turn on each light bulb, and if the utility is doing its job right, the customer will experience minimal changes to the quality of power received. If customers were to "maximize" their use of the grid in this way, they would be increasing the total draw, or demand, they placed on the system.

Kilowatt hours reflect how much is actually flowing over a period of time. Demand, on the other hand, reflects how much ***could flow*** at any given time—the capacity. There are many different metaphors for comparing energy and demand. A water hose is a common example. Demand is the size of the hose, whereas energy is how much water is flowing through the hose. A fireman's hose might be capable of ejecting a large amount of water at any given time, meaning it has a large capacity. But the fireman's hose might only be used to produce a trickle. Similarly, a customer might only have a single light bulb on at one time, even though the utility infrastructure serving that customer's house (the available capacity) would permit a much larger use of electricity at any given time.

The distinction between energy and demand is critical to understanding the cost shift. Although the fireman's hose might only be used for a trickle, it was still built to eject a much larger amount of water. Similarly, just because a residential customer might begin using less kWh after installing rooftop solar, the utility has still built its system to account for that customer's maximum demand. The lower energy usage only means fewer kWh. Less kWh means less fuel spent to create the energy that flows as energy over the fixed infrastructure.

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[2] Avoided cost is the incremental cost that a utility would incur to produce a kWh but for receiving the kWh from the rooftop solar system.

But lower kWh does not mean lower kW. And it is the aggregate of customers' kW that drives most of utilities' fixed costs. Those fixed costs reflect everything from the large nuclear, coal, and gas generating facilities to the long transmission lines to the local distribution system that runs through neighborhoods and connects to customers' homes. Just as running a trickle of water through a fireman's hose does not reduce the size of the hose, less energy flowing over the fixed infrastructure does not reduce the size of the infrastructure. The infrastructure was already built.

E. Rooftop Solar: Reduces kWh Usage, but Does Not Reduce Fixed Utility Costs

Understanding the difference between demand and energy is also critical to understanding the root of the disagreement between utilities and rooftop solar companies. Utilities and rooftop solar companies fundamentally disagree about the nature of rooftop solar, and the value that rooftop solar can provide. Nowhere is this more clearly seen than when one considers how rooftop solar customers use utility infrastructure, even while supplying a portion of their own energy.

This issue is more than simply a general customer responsibility to contribute towards the pre-existing infrastructure that utilities built to meet their obligation to serve—private capital used for a public purpose that is always available for customers. It is that customers who install rooftop solar ***in fact use*** almost 100% of the fixed infrastructure installed to serve their homes. Everyday occurrences, such as weather patterns, system maintenance, and the sun setting, might cause a rooftop solar system to stop producing. When they stop producing, utilities are required to have enough capacity in reserve to continue supplying all of that customer's demand—including the demand previously being served by the rooftop solar array before the disrupting event—at a moment's notice. Customers with rooftop solar also rely on and regularly use the grid in other more technical ways, including in-rush current to start major appliances, to maintain power quality, and to receive the excess energy produced by the panels.

Rooftop solar arrays provide a cost savings due to the energy they produce. But those savings are almost entirely limited to the incremental fuel cost the utility would have incurred to produce that kWh. This is called a utility's "avoided cost," and each utility is required to keep an updated avoided cost report on file with its regulatory agency. For example, APS's avoided cost for energy produced during on-peak periods (periods of maximum high customer demand) is 2.9¢ per kWh. To the extent that energy produced rooftop solar permits APS to save costs, the amount saved is at or near 2.9¢ per kWh.

The energy produced by rooftop solar does not, however, cause APS to save costs related to fixed infrastructure. Those costs have already been incurred, are sunk costs, and unavoidably remain in APS's revenue requirement. In fact, MIT predicts that when photovoltaic solar penetration becomes a significant share of overall generation, the net effect will be to ***increase*** distribution costs. When power begins flowing from customers in significant quantities—a circumstance that current networks were not designed to handle—additional distribution infrastructure will be needed to maintain power quality.[3]

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[3] MIT, THE FUTURE OF SOLAR ENERGY (2015) at 162-67, available at: http://mitei.mit.edu/futureofsolar.

Recently, rooftop solar advocates have begun acknowledging the factual basis of the cost shift in regulatory proceedings across the country. In Arizona for instance, The Alliance for Solar Choice recently acknowledged that at least in the short term, rooftop solar shifts revenue responsibility to customers without rooftop solar:

> The primary costs of solar DG for non-participating ratepayers are the retail rate credits provided to solar customers through net metering, i.e., the revenues that the utility loses as a result of DG customers serving their own load.[4]

Indeed, this same witness also acknowledged, as he must, that rooftop solar-caused cost shifts raise issues of equity between customers:

> [I]f the utility's lost revenues and program costs are greater than its avoided cost benefits, then rates may rise for non-participating ratepayers in order to recover those costs. This can present an issue of equity among ratepayers.[5]

Although they acknowledge the foundational basis of the cost shift, some rooftop solar advocates still deny that it exists. This denial rests entirely on the prediction that in the future, rooftop solar will provide value that equals or exceeds the total costs shifted. This is where the disagreement between utilities and rooftop solar companies over the nature of rooftop solar is most prominent.

II. ROOFTOP SOLAR'S VALUE-BASED RATEMAKING PROPOSITION

Strong disagreement exists between rooftop solar advocates and others, including public utilities, on the nature of any future value provided by rooftop solar, and how that value, to the extent it exists, could or should be reflected in current rates. APS's perspective—that rates should only be based on actual cost and that APS's customers should pay no more for rooftop solar energy than they do for solar energy generated by larger, grid-scale solar facilities—is briefly described below.

A. Rates Must Be Based on Verifiable Data, Like Actual Costs, to Protect Customers and the Keep the Grid Maintained.

As previously described, rates are based on the actual costs that a utility incurred during the Test Year. This is done to protect both customers and utilities. If something other than cost is used, customers might pay more than cost—resulting in a windfall to the utility. Or customers might pay less than cost—weakening the utility's ability to build, maintain, and operate the electrical grid, and depriving the utility of a reasonable opportunity to earn its authorized return. Both outcomes are not only undesirable, but, for example, also illegal under Arizona law.[6]

B. Administratively Moving Hypothetical Savings Forward is Profoundly Flawed and Increases Risks to Utility Customers.

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[4] R. THOMAS BEACH AND PATRICK G. MCGUIRE, THE BENEFITS AND COSTS OF SOLAR DISTRIBUTED GENERATION FOR ARIZONA PUBLIC SERVICE (2016), submitted in In the Matter of the Commission's Investigation of Value and Cost of Distributed Generation, Docket No. E-00000J-14-0023 (Ariz. Corp. Comm'n Feb. 25, 2016).

[5] In the Matter of the Commission's Investigation of the Value and Cost of Distributed Generation, Docket No. E-00000J-14-0023, Direct Testimony of R. Thomas Beach at 5:5-8 (Ariz. Corp. Comm'n. Feb. 25, 2016).

[6] *See Simms v. Round Valley Light and Power Co.*, 80 Ariz. 145, 149, 294 P.2d 378, 380 (1956).

Ignoring the foundation stone of utility ratemaking—the cost of service during the Test Year—rooftop solar advocates argue that the rates paid by customers with rooftop solar should reflect the value that rooftop solar will hypothetically provide to the utility's system over the next 20-30 years. Specifically, they claim that rooftop solar will reduce a utility's need to build power plants and electrical wires by some amount in the future, and that the value of that future savings should be recognized today.

The means for recognizing these hypothetical future savings takes different forms. The most common is for rooftop solar advocates to use the future values to justify net metering. They argue that the levelized value of rooftop solar over 20 years exceeds the levelized cost, and because rooftop solar arguably is a net benefit over 20 years, net metering should remain intact as a form of "rough justice."

To some, the notion of "rough justice" might have an initial logic. But this logic quickly unravels under scrutiny. First, rooftop solar is a "non-firm" generation resource.[7] As a non-firm resource, it provides limited value when utilities plan the nature and timing of future investments in generation resources. For example, APS must have sufficient firm generation to meet its established peak load, plus 15% for reliability purposes. In calculating available generation for purposes of meeting this requirement, APS can only attribute very limited value to non-firm resources. Thus, even if it is true that rooftop solar does in fact reduce the need for fixed infrastructure (it is not true, as described above), APS must ***still*** incur almost all of the fixed costs it would have incurred in the absence of rooftop solar in order to fulfill these resource planning requirements. In other words, resource planning requirements largely render moot claims about the forecasted value of rooftop solar.

In addition, utilities cannot reduce costs in reliance on the forecasted value of rooftop solar for the simple reason that they are a forecast of what ***might*** happen over the next 20 years. Utilities, however, must meet their obligation to serve no matter what happens. Utilities make plans based on long-term horizons and constantly adjust those plans as they obtain more information. Even if a forecast were to demonstrate that rooftop solar was to have some future reduction in infrastructure, increasing customers' rates today to compensate rooftop solar for that hypothetical savings would be unfair. We won't know if that projected savings will actual occur until we reach the time at which the infrastructure in question would have been built. Reality must trump theory when it comes to providing electric service. This means that reality must trump theory when it comes to incurring the cost to provide electric service too.

The reality is that no one—from rooftop solar advocates to utility resource planners to regulators—knows what will happen in 10 years, 15 years or 20 years. This is why rates are strictly kept to verifiable costs. Opening the door to anything other than costs invites any number of political judgment calls to be made. Subjecting the ratemaking process to political calculations would strip utility customers of the most important protections they have in the rate setting process.

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[7] Resources that supply energy "as available" (as opposed to "as needed") are non-firm. *See* EEI GLOSSARY OF ELECTRIC INDUSTRY TERMS 119 (2005), https://www.xcelenergy.com/staticfiles/xe/Regulatory/EEIGlossaryIRPEEI2005Definitions.pdf. By contrast, firm resources are those "intended to be available at all times during the period covered by a commitment, even under adverse conditions." *See id.*

C. Value of Solar Studies Lack Basic Academic Rigor and are Mere Political Tools.

Finally, drawing conclusions about net metering based on a value of solar study is flawed because it is driven by the wrong question. The question is not "what value does rooftop solar bring?", but "what value does society collectively find desirable, and what is the most cost effective way to obtain that value?" Addressing carbon and global warming is a desirable goal of many policymakers. Indeed, 47% of APS's generation portfolio is carbon free, thanks in large part to APS's Palo Verde Nuclear Generating Station. But if progress on global warming is the objective, why pay 14¢ per kWh for rooftop solar when you could pay 3.5¢ per kWh (or lower) for solar generated by larger grid-scale solar facilities? [8] The Tennessee Valley Authority said it well: "Simply stated, most of the environmental and social benefits provided by PV systems can be achieved at a much lower total cost at utility-scale than at residential-scale."[9]

Rooftop solar advocates offer complex studies purporting to show that rooftop solar provides significant value over 20-30 years. These studies, however, are long-term forecasted projections of rooftop solar value. They are delicate calculations, carefully balanced on a perfect set of assumptions, with each judgment call being made in favor of finding the maximum amount of value. Moreover, they lack basic academic rigor. They do not compare rooftop solar to other resources, and entirely ignore that the value of solar can be obtained at a fraction of the cost with grid-scale solar. They ignore that rooftop solar is the single most expensive way to obtain renewable energy that is actually installed, as well as the least cost effective of all commonly-deployed renewable resources in reducing emissions.[10] The fact is that these studies simply do not and cannot show that rooftop solar is the best overall policy for utility customers.

Peeling back the profound flaws in value of solar studies reveals another truth: value of solar studies are solely political tools. A handful of rooftop solar advocates have sprinkled value of solar studies in several states using fundamentally the same methodology. Subsequently, they have begun claiming that because the studies are in so many states, they must be true.

But the number of studies does not prove their truth. This is an example of the ad populum fallacy, which essentially involves claiming that because so many other people believe

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[8] *See* Staff Report from City of Palo Alto Finance Committee on Wilsona Solar Renewable Power Purchase Agreement (Feb. 16, 2016), http://www.cityofpaloalto.org/civicax/filebank/documents/50920 (approved on Mar. 21, 2016, http://www.cityofpaloalto.org/civicax/filebank/documents/51640); *see also* Application of Nevada Power Co. d/b/a NV Energy for Approval of the First Amendment to Its 2014 Emissions Reduction & Capacity Replacement Plan As It Relates to Two New Renewable Energy Purchased Power Agreements, Docket No. 15-07003 (Nev. Pub. Util. Commn. Sept. 9, 2015) (indicating price of 3.6¢ per kWh).

[9] TVA, DISTRIBUTED GENERATION - INTEGRATED VALUE (DG-IV): A METHODOLOGY TO VALUE DG ON THE GRID (2015) https://www.tva.gov/file_source/TVA/Site%20Content/Energy/Renewables/dgiv_document_october_2015-2.pdf.

[10] LAZARD, LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS – VERSION 8.0 at 2 (2014), https://www.lazard.com/media/1777/levelized_cost_of_energy_-_version_80.pdf; Frank, Charles. *Alternative Energies Debate—The Net Benefits of Low and No-Carbon Electricity Technologies: Better Numbers, Same Conclusions* (Sept. 4, 2014), http://www.brookings.edu/blogs/planetpolicy/posts/2014/09/04-low-carbon-tech-lovins-response-frank.

something, "it must be true."[11] Although there are many studies, they do not prove that rooftop solar is a net benefit to customers. Indeed, because value of solar studies rely on 20-30 year forecasts of everything from population growth, to how customers use energy, to the price of natural gas, to the energy generation technologies that might be available, value of solar studies can never ***prove*** that rooftop solar is a net benefit. At best, these studies amount to a guess based on carefully chosen assumptions. And being entirely speculative, the value of solar studies cannot inform rates under well-settled legal principles.[12] Moreover, unless actual cost savings can be demonstrated ***during the test year upon which rates are set***, they do not change the utility's cost structure and should not be reflected in rates.

D. An Ongoing Litigated Proceeding on the Value of Solar in Arizona May Provide Additional Information.

If the Commission has a continuing interest on whether and how to measure rooftop solar's long-term value, events in Arizona may be helpful. A litigated proceeding before an Arizona Corporation Commission Administrative Law Judge regarding the efficacy and propriety of long-term rooftop solar valuations recently concluded.[13] To APS's knowledge, it is the first litigated proceeding of its kind.

The proceeding saw a large amount of testimony and evidence on a variety of topics, including long-term valuations of rooftop solar. Ashley Brown, the Executive Director of the Harvard Electricity Policy Group, filed direct testimony on behalf of APS.[14] His testimony offered several academic and policy-oriented conclusions that, in APS's opinion, must be considered in any serious discussion regarding how to value rooftop solar. Of particular note is Mr. Brown's opinion that compensating rooftop solar on the basis of long-term valuations actually does harm to the future of solar. If rooftop solar is never exposed to the discipline of market or cost-based pricing, it will never receive the proper incentive to improve. Purveyors of rooftop solar will receive sufficient profits from subsidies. And solar will never have the opportunity to take its place among the other generation technologies that form the core of utility resource portfolios. The hearing concluded earlier this summer, and a recommended order and opinion is expected later this year. If the topic of rooftop solar's long-term value interests the Commission, APS urges the Commission to review Mr. Brown's testimony in detail and monitor upcoming events in this ACC docket.

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[11] *See, e.g.,* http://skepdic.com/adpopulum.html.

[12] *See, e.g., West Ohio Gas Co. v. Pub. Util. Comm'n. of Ohio*, 294 U.S. 79, 82, 55 S. Ct. 324, 325 (1935) ("A forecast gives us one rate. A survey gives us another. To prefer the forecast to the survey is an arbitrary judgment."); *See Missouri ex rel Southwestern Bell Telephone Co. v. Pub. Serv. Commn. of Missouri*, 262 U.S. 276, 288, 43 S. Ct. 544, 546 (1923) (reversing a public utility commission decision to eschew actual data and rely on forecasts to set a fair return, stating "[e]stimates for to-morrow cannot ignore prices of to-day."); *Lindheimer v. Illinois Bell Tel. Co.*, 292 U.S. 151, 164, 54 S. Ct. 658, 663 (1934) ("Elaborate calculations which are at war with realities are of no avail.").

[13] *See* In the Matter of the Commission's Investigation of the Value and Cost of Distributed Generation, Docket No. E-00000J-14-0023.

[14] *See* Direct Testimony of Ashley C. Brown, Docket No. E-00000J-14-0023 (Feb. 25, 2016), available at: http://images.edocket.azcc.gov/docketpdf/0000168552.pdf at 63-194.

III. ROOFTOP SOLAR IS NOT A COMPETITIVE THREAT TO UTILITIES

A. Rooftop Solar Does Not Provide the Same Service as, and Cannot Supplant, Utilities.

APS does not inherently oppose rooftop solar or distributed technologies in general. It is not rooftop solar itself, but the flaw in utility tariffs that rooftop solar exploits, that APS opposes. Nevertheless, some solar rooftop advocates assert that utilities are questioning current net metering and rate design subsidies because rooftop solar poses a serious competitive threat to the utilities. But rooftop solar is not a real competitive threat to utilities. It does not replace the services that utilities provide. And even if paired with other technologies like battery storage, it is difficult to conceive today of how distributed technologies could be offered in a manner that renders obsolete the significant economies of scale utilities bring to bear with grid-scale deployment. As with the fact of the cost shift, rooftop solar advocates must admit certain facts to remain credible. Indeed, no less than Lyndon Rive of SolarCity has acknowledged that rooftop solar systems do not replace, but can be compatible with, the services provided by public utilities:

> Q. Does SolarCity compete against public service corporations?
>
> A. No. SolarCity is not an electric utility/public service corporation. The systems that SolarCity finances and installs do not replace the customer's need for service from their traditional utility. SolarCity offers a completely different set of products and services than a traditional public service corporation.[15]

Utilities, such as APS, grapple with integrating rooftop solar into their resource plans and rate structures in a manner that is just and reasonable for customers. It is this effort to balance the ***interests of all customers*** that has driven utility efforts regarding rooftop solar. Yet, whether as part of marketing efforts, investor relations, or regulatory advocacy, these efforts have been mislabeled as anti-competitive behavior. Because rooftop solar does not replace utilities, this anti-competitive rhetoric is a red herring that undermines constructive public policy dialogue regarding how to enable more distributed technologies in a way that does not harm, and in fact benefits, all utility customers.

B. Rooftop Solar Distorts the Regulatory Process and May Result in More Frequent Rate Increases for Customers.

Beyond rheotric regarding rooftop solar, how rooftop solar distorts the regulatory process also undermines public policy dialogue. Rooftop solar is not a competitive challenge to public utilities, but the accommodations made to spur rooftop solar have distorted the regulatory regime to the detriment of customers. As referenced, utility efforts to return regulation, especially rate-making, back to being equitable (and sustainable) for customers has wrongly been labeled by some as "anti-competitive" or "opposition" to the solar rooftop industry. In fact, the utilities' proposals will further the long term prospects of the rooftop solar industry.

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[15] In the Matter of the Application of SolarCity for a Determination That When it Provides Solar Service to Arizona Schools, Governments, and Non-Profit Entities it is Not Acting as a Public Service Corporation Pursuant to Art. 15, Section 2 of the Arizona Constitution, Docket No. E-20690A-09-0346, Pre-filed Testimony of Lyndon Rive at 1 (Ariz. Corp. Comm'n 2009).

In APS's service territory, rooftop solar customers on average only pay 38% of the cost to serve them. When utilities, such as APS, file rate cases, revenue responsibility for lost revenue per kWh—the unrecovered 62% of the cost to serve in the case of APS—is reallocated to customers without rooftop solar. This cost shift is a subsidy. It does not flow from the utility, but instead occurs between utility customers. A rapidly growing cost shift might cause utilities to seek rate increases more frequently than they otherwise would.

Moreover, experts have warned that increased rooftop solar installations may necessitate more utility infrastructure investment, particularly for distribution systems. This investment may be necessary for equipment to maintain power quality when more and more energy is exported from customers' rooftop solar systems back to the utility grid.[16] And additional investments may be needed to address the "duck curve," a system-wide phenomenon in which large amounts of solar cease producing at dusk, forcing utilities to deploy fast-ramping generation to meet what is often peak customer demand. In other words, because rooftop solar power is an intermittent resource that does not help peak demand, utilities will be compelled to increase their system investments to maintain the same service reliability that customers enjoy today. An increase in infrastructure investment is an increase in rate base, which can trigger rate increases for customers.

If not corrected, the rooftop solar cost shift, coupled with the need for additional infrastructure, could cause utilities to seek rate increases more frequently than they otherwise would. This creates rate pressure on customers. If customers become fatigued over rate increases attributable simply to the cost shifts and added equipment related to rooftop solar installations, they are unlikely to support or accept rate increases needed for critical grid investments. This could create an unstable environment for customers, utilities, and their investors.

IV. RATE DESIGN SOLUTIONS

APS, and utilities around the country, have proposed universal demand rates for residential customers as a solution to the rooftop solar-caused cost shift. This is not to kill rooftop solar, as some allege. Instead, it is to reach a middle ground in which utilities are held harmless by customer adoption of technology, new and varying types of customer-sited technologies are incentivized, and costs are not shifted to non-DG customers.

The theory behind this demand rate solution is simple: economics. As discussed above, demand rates involve charging customers on the basis of how much demand, measured in kW, they place on their utility's system. If the amount a customer pays is determined, at least in part, by the kW they use, the customer has an economic incentive to install technologies that reduce kW. Doing so would reduce their bill. Thus, demand rates send a price signal to customers that they should adopt demand-reducing technologies.

The key, from the utility perspective, is that demand-reducing technologies reduce utility costs. Unlike rooftop solar, which does not reduce, and in fact can increase, utility costs, reducing a customer's demand reduces the amount of fixed infrastructure that the utility must build, operate, and maintain to serve that customer. Instead of having 10 kW of system infrastructure "allocated" to a 10 kW customer, the utility might only need to "allocate" 8 kW of system infrastructure if that customer reduces their demand by 2 kW. Many types of currently-available

[16] MIT, THE FUTURE OF SOLAR ENERGY (2015) at 162-67 http://mitei.mit.edu/futureofsolar.

technologies can reduce customer demand, including energy efficient light bulbs, multi-speed air conditioners, load controllers, and home energy management systems. With reduced utility costs, customer adoption of demand-reducing distributed technologies will not cause the cost shift currently seen with the adoption of rooftop solar.

Ideally, utilities will be placed in a position of neutrality with regard to distributed technologies. Instead, they will focus their attention and efforts on creating a distribution network that enables customer options and promotes clean energy in a sustainable way. In fact, this is precisely the conclusion reached by environmental advocacy group the Rocky Mountain Institute.[17] Ultimately, it is not customer use of available technologies that reflects the true potential of the demand rate price signal, but instead the possibility that the demand rate price signal will encourage innovation by current and future third-party distributed technology suppliers. The opportunities for third parties resulting from the demand rate price signal is a critical reason why utility demand rates make sense, and offer a viable middle ground that meets the interests of all parties.

That utilities are proposing rate design reform that would inherently incentivize distributed technologies should further illuminate utilities' true motives. Utilities do not seek to eliminate new technologies like rooftop solar, but instead find a way to integrate distributed technologies into the physical and regulatory environment that has been the cornerstone of reliable electric service for over a hundred years.

APS offers a final note regarding the opposition of rooftop solar companies to demand charges. It has been surprising that commentators have almost exclusively focused on allegations that utilities seek to modernize rate design as a means to competition from rooftop solar. Not only is this charge wholly inaccurate, but if it could be made at all, it should be made in reverse.

Demand charges will provide an economic incentive for any existing or yet-to-be-invented distributed technology that reduces a customer's demand. As a result, demand charges will cause these existing and future distributed technologies to effectively become competition for rooftop solar. Utility customers have a finite amount of time, money, and focus (much less physical space) to spend on distributed technologies. Although there may not be a true zero sum game between rooftop solar and other distributed technologies, it is likely that some trade-off exists; that the trade-off may be significant; and that with certain technologies, there is indeed a zero sum game with rooftop solar. If it is worth investigating whether utilities seek to modernize rate design for anti-competitive reasons, it follows that it should also be worth investigating whether rooftop solar companies oppose modernizing rate design for the same reason.

V. CONSUMER PROTECTION

Although not the primary focus of these comments, APS views the need to protect its customers as critically important. For instance, the economics of rooftop solar appears to be an area of concern. To accurately assess whether rooftop solar is in a customer's best financial interest, that customer would need to conduct a long-term cost/benefit calculation. It is not clear, however, if this kind of calculation can be done with any degree of confidence. Long-term calculations of this type require forecasting a large number of complicated and unknown

[17] *See* The Economics of Demand Flexibility, available at: http://blog.rmi.org/blog_2015_08_26_report_release_the_economics_of_demand_flexibility.

variables, including the trajectory of utility rates, one's energy consumption, and the impact of future changes in technology. APS discussed these consumer-focused complications, and other concerns related to solar DG business models, in comments APS filed with the Arizona Corporation Commission on February 13, 2015.[18]

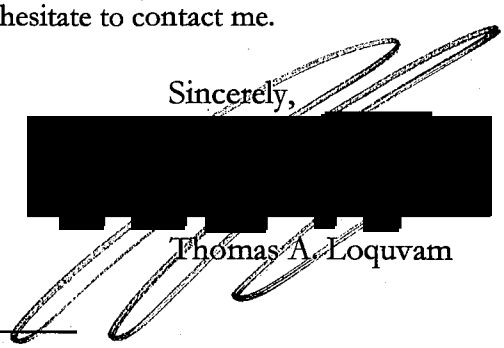
CONCLUSION

APS appreciates the opportunity to provide these public comments. The question of why electric utilities seek to modernize rate design, and whether rooftop solar is a competitive threat to utilities, are important topics that deserve considered attention. APS hopes that these comments make clear several conclusions:

- Rooftop solar is not a competitive or existential threat to utilities because:
  - Rooftop solar does not reduce (and in fact may increase) the need for utility infrastructure; and
  - Rooftop solar does not replace utility services;
- The manner in which rooftop solar impacts utility revenue is fundamentally an issue that affects utility customers—the ones who pay for the rate design and net metering subsidies;
- Because rooftop solar does not reduce the need for utility infrastructure, the significant subsidies for rooftop solar paid by utility customers far exceed any value received;
- It is not rooftop solar, but the flaw in utility tariffs that rooftop solar exploits, that utilities oppose;
- This tariff flaw, and the massive subsidies being paid to a rapidly growing number of rooftop solar systems, distorts the regulatory environment and could increase the magnitude and frequency of rate increases, with destabilizing effect for utilities, their investors, and the electrical grid;
- Modernized rate design, including electric rates that include demand charges, will reduce the negative consequences of rooftop solar for non-participating customers and provide an incentive for the research and deployment of other distributed technologies; and,
- The very fact that utilities propose a rate design that will increase the viability of distributed technologies strongly militates against the notion that utilities have an improper and anti-competitive motivation when they seek to modernize rate design.

APS thanks the Commission and its Staff for hosting this workshop and for the incredible hard work that has made it a success. If you should have any questions about any of the foregoing, please do not hesitate to contact me.

Sincerely,



Thomas A. Loquvam

[18] *See* Response to Chairman Bitter Smith Request for Comments, Solar Distributed Generation Business Models and Practices and Their Impacts, Docket No. E-00000J-14-0415 (Feb. 13, 2015), available at: http://images.edocket.azcc.gov/docketpdf/0000160033.pdf.