

Public Utility Ratemaking:

Context for SRP's 2019 Public Pricing Process

Prepared for:

Salt River Project Management

Prepared by:

Susan F. Tierney, Ph.D.

Analysis Group, Inc.

Date:

February 17, 2019

Acknowledgments

This is an independent report prepared by Susan F. Tierney, Ph.D., of Analysis Group at the request of Salt River Project (“SRP”) Management. The report reflects the analysis and opinions of Dr. Tierney alone and does not necessarily reflect those of Analysis Group’s clients or other consultants, or of SRP Management.

About Susan Tierney

Dr. Tierney, a Senior Advisor in Analysis Group’s Denver office, is an expert on energy and environmental policy analysis, regulation and economics, with a focus on the electric and natural gas industries.

She is a former Assistant Secretary for Policy at the U.S. Department of Energy. In Massachusetts, she previously served as the state cabinet official for environmental affairs, a public utility commissioner (where she was a rate regulator for the state’s investor-owned electric, natural gas, water, and telephone utilities), and Executive Director of the Massachusetts Energy Facilities Siting Council. She also previously chaired the Board of Directors of the Massachusetts Water Resources Authority, a public authority established by the state’s legislature to provide wholesale water and sewer services to 3.1 million people and more than 5,500 large industrial users in 61 metropolitan Boston communities.

As a consultant, she has advised and worked on issues for a variety of clients, including energy companies, government agencies, customer groups, foundations, environmental groups, tribes, other non-governmental groups, and others. She has testified before Congress and state legislatures, as well as in proceedings before state and federal courts and regulatory agencies.

About Analysis Group

Analysis Group provides economic, financial, and business strategy consulting to leading law firms, corporations, government agencies, and other organizations. The firm has more than 850 professionals, with offices in Boston, Chicago, Dallas, Denver, Los Angeles, Menlo Park, New York, San Francisco, Washington, D.C., Montreal, London, Brussels, and Beijing.

Analysis Group’s energy and environment practice is distinguished by the consultants’ expertise in economics, regulation, finance, markets, and public policy, as well as in environmental economics and energy infrastructure development. We have worked for a wide variety of clients including energy producers, suppliers and consumers; investor-owned and publicly owned utilities; regulatory commissions and other public agencies; tribal governments; power system operators; foundations; financial institutions; environmental organizations; start-up companies; and many others.

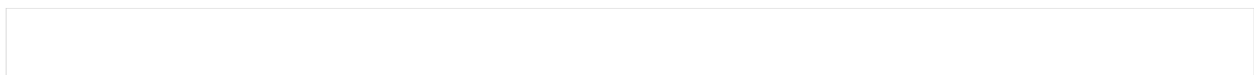


Table of Contents

EXECUTIVE SUMMARY	1
Scope of Work	1
Major Observations and Conclusions	1
1. BACKGROUND: SRP'S PUBLIC PRICING PROCESS	1
2. UTILITY RATEMAKING (PRICING) PRINCIPLES AND PRACTICES	2
Principles and practices	2
Five Steps of Ratemaking	8
3. ECONOMICS AND UTILITY RATE DESIGN: A BALANCING ACT	12
Pricing Principles in Utility Ratemaking	12
4. SRP MANAGEMENT'S 2019 PRICING PLAN PROPOSALS	14
Overview and background	14
Overall Observations	15
Context for SRP Management's Proposals for Residential Distributed Generation Customers	17
APPENDICES	21
APPENDIX 1: TIERNEY BIO	22
APPENDIX 2: DOCUMENTS REVIEWED	23



EXECUTIVE SUMMARY

Scope of Work

In February 2019, the management of the Salt River Project Agricultural Improvement and Power District (“SRP”) requested that I prepare an independent report on public utility ratemaking principles and approaches, and to assess the consistency of the SRP Management’s 2019 pricing proposals with those well-established principles, policies, and approaches. I have understood that my report would be provided to the SRP Board and made available to the public at large.

My educational training and professional experience—including as a former state utility regulator, as former chairman of the board of a major public authority that provides water and sewer services, and as a consultant and expert witness on electric-industry economics and regulation issues—has given me technical and policy background to bring to this assignment.¹

Major Observations and Conclusions

I understand that SRP has a pricing process that follows statutory authority and guidelines established by the Arizona Legislature.² Among other things, these guidelines set forth the important role that the board of a public power utility (such as SRP) play in making decisions about the terms and conditions under which the utility provides retail electricity service in its service territory. Although the managements of such public utilities provides important financial, operational, economic, and other technical information about various aspects of the provision of utility service, the boards of such public utilities have the ultimate authority to establish rates charged to customers of the utility.

SRP has recently undertaken a pricing process to establish new rates for customers that, once approved by the SRP Board, would go into effect starting in mid-year 2019. I have reviewed numerous documents published on, before and after December 20th, 2018,³ the date on which SRP Management published its proposal for new price plans. I have also reviewed other relevant literature. Based on those documents, and my experience and observations on changes in ratemaking approaches that are being adopted in various parts of the country, I have independently reached several conclusions:

¹ Appendix 1 provides my bio.

² I note, for example, Arizona Revised Statutes, Title 30 (Power) and Title 48 (Special Taxing Districts).

³ Appendix 2 lists various documents that I reviewed in preparing this report on SRP’s on-going public pricing process. The footnotes in this report other documents that I also reviewed, although these footnotes are not exhaustive of the studies, media reports, and so forth, with which I am aware on such topics.

- There are well-established steps (or elements) in the process by which utilities develop new prices (or rates) to be charged to their customers. There are also well-established principles that guide the development and approval of such pricing plans. These ratemaking principles seek to assure, through rates charged to customers, that: (1) the utility can remain financially healthy by generating revenues sufficient to cover its cost of providing utility service; (2) customers pay their fair share of the utility's cost of servicing them; and (3) customers are provided with price signals to inform them about the utility's costs, so that they can make their own decisions about whether to consume electricity or to reduce their consumption.
- When applied in practice, these principles of ratemaking introduce the need to balance the application of economic considerations (such as pricing services at the utility's marginal cost) with the requirement that rates be set to recover a utility's total (or "embedded") cost of providing service. Utility management, and the decision-makers that review management's pricing proposals and ultimately approve final prices, exercise judgment and discretion in balancing marginal-cost pricing principles with cost-of-service revenue-recovery principles, which results in different rate designs being adopted in different jurisdictions, for different utilities within a common jurisdiction, or even for different customer classes within a single utility.
- My review of the documents associated with SRP Management's 2019 pricing proposal leads me to conclude that the utility has relied on standard substantive and procedural steps. The proposed rate plans were established through a process and using principles that are consistent with electric industry norms (including that customers pay their fair share of the costs the utility incurs to provide them with service). The proposed rate package reflects SRP Management's application of judgment in accounting for and balancing the impacts of many important and relevant considerations, including:
 - reductions in SRP's overall cost to provide electricity service to its customers;
 - the provision of product options and high-quality service to customers;
 - the need for maintaining the financial health of the utility;
 - the continued efficient and reliable operations of the system in the face of growth in demand;
 - furtherance of sustainability principles and practices into SRP's business; and
 - equity among different types of customers, some of whom rely on SRP for all of their power and other customers who choose to generate some of their power.

Notably, the rate options being proposed for residential solar customers also reflect the kinds of options being proposed and, in many cases, adopted by regulators of investor-owned utilities and boards of publicly owned utilities in other parts of the country.

1. BACKGROUND: SRP'S PUBLIC PRICING PROCESS

The Salt River Project Agricultural Improvement and Power District ("SRP") is an Arizona political subdivision that performs traditional utility functions, with regard to both electricity service and water-delivery service. SRP has a board of directors that is publicly accountable by way of a vote of customers as prescribed by the Arizona Legislature.

The SRP Board of Directors is currently undergoing a public process to review and consider changes in SRP's electric rates as proposed by SRP Management on December 20, 2018. SRP Management's proposal would result in an overall average annual price decrease of 2.2 percent. This proposal also includes a number of changes in rate design, including new time-of-use on-peak hours, three new price-plan options for customers who generate some of their own electricity, and other rate and program elements.

SRP's public pricing process anticipates that there will a decision by the SRP Board at a meeting on March 25, 2019, after a series of stakeholder and board meetings at which issues in the pricing proposal will be presented and discussed. Any rate changes adopted by the Board would go into effect in customer bills beginning in May 2019.

As part of the public announcement of its proposal, SRP Management published a number of its studies on December 20th, 2018:

- SRP Management's complete proposal: "Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle" (also known as the "Blue Book").
- Detailed plans for customers' rates as proposed in SRP Management's complete proposal: "Appendix A to Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle: Proposed Standard Electric Price Plans and Riders."
- Two studies that were performed by SRP Management and that support its proposed changed to rates:
 - "Cost Allocation Study in Support of Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle" (also known as the "Cost Allocation Study" or "Green Book"). An appendix in the Green Book includes information on the utility's marginal costs to provide service.
 - "Derivation of Proposed Changes to SRP's Transmission and Ancillary Services Prices," Effective May 1, 2019."

Concurrent with the publication of those documents, SRP also released two expert reports:

- A report prepared by expert consultants hired by the SRP Board to assess the reasonableness of SRP Management’s price proposal: “Review of SRP Cost of Service and Rate Design,” December 2018, co-authored by a team of experts and analysts from The Brattle Group, led by Philip Q. Hanser (which I will refer to as the “Brattle Study”).
- A report prepared by an expert hired by SRP Management to comment on “Financial Market and Capital Structure Considerations In Public Power Pricing Decisions” (December 20, 2018), authored by Michael Mace, Managing Director of PFM Financial Advisors (which I will refer to as the “PFM Financial Study”).

In early February, 2019, SRP Management requested that I independently review the SRP Management’s proposal and then prepare an independent report on public-utility ratemaking principles and approaches, and the consistency of SRP Management’s proposal with them. After reviewing the documents described above, and assessing them in the context of my knowledge of utility ratemaking, electric-industry economics, and trends in the industry that are affecting the character of reasonable and appropriate rate designs, I have independently reached several conclusions, which I reported in the Executive Summary to this report and which I describe further in the sections below.

2. UTILITY RATEMAKING (PRICING) PRINCIPLES AND PRACTICES

Principles and practices

Around the United States, the utility ratemaking process establishes the prices and terms and conditions under which utilities provide goods and services to customers. Electric utility ratemaking has long been guided by certain basic principles. Although the details of how utility regulators of investor-owned utilities and decision-making bodies of publicly owned electric utilities apply these principles to individual cases have varied over time, these principles have formed the foundation of the purposes and practices of ratemaking.

Utility Ratemaking Process and Principles

There are well-established steps (or elements) in the process by which utilities develop new prices (or rates) to be charged to their customers. There are also well-established principles that guide the development and approval of such prices. These ratemaking principles seek to assure, through rates charged to customers, that:

- (1) the utility can remain financially healthy by generating revenues sufficient to cover its cost of providing utility service;
- (2) customers pay their fair share of the utility’s cost of servicing them; and
- (3) customers are provided with price signals to inform them about the utility’s costs, so that they can make their own decisions about whether to consume electricity or to reduce their consumption.

The touchstone guidance on utility ratemaking was first described in James Bonbright’s seminal book, *The Principles of Public Utility Rates*, published in 1961 (with other editions since then). Bonbright emphasized the need for regulators and other ratemaking decision-makers to adopt utility rates (i.e., prices) designed fundamentally around principles of fairness and efficiency.

Bonbright described the three primary objectives of ratemaking and the “criteria of a sound rate structure” for a utility that provides service to customers and where the customer pays them for such service:

- (a) the revenue-requirement or financial-need objective, which takes the form of a fair-return standard with respect to private utility companies;
- (b) the fair-cost-apportionment objective, which invokes the principle that the burden of meeting total revenue requirements must be distributed fairly among the beneficiaries of the service; and (c) the optimum-use or consumer-rationing objective, under which the rates are designed to discourage the wasteful use of public utility services while promoting all use that is economically justified in view of the relationships between costs incurred and benefits received.⁴

In laymen’s terms, these criteria for sound ratemaking set forth that, through rates charged to customers: (1) the utility is financially healthy through having the opportunity to generate revenues sufficient to cover its cost of providing utility service;⁵ (2) customers pick up their fair share of the utility’s cost;⁶ and (3) customers see price signals to inform them about the cost to provide the next unit of electricity service to them, so that they can make their own decisions about whether to consume electricity or to reduce their consumption.⁷

In addition to describing the criteria of sound ratemaking, Bonbright also described principles to guide utilities in developing proposed rate structures and rate levels and to guide rate-setting decision-making bodies in approving rates that the utility may charge its customers.

- From the point of view of the utility’s entire rate package, “level” often refers to whether the revenues expected to be generated by rates charged to customers will be sufficient (or adequate) to cover the utility’s cost to provide service.

⁴ Bonbright Principles, page 292. Also, James Bonbright, Albert Danielsen, and David Kamerschen, *Principles of Public Utility Rates*, Second Edition, 1988 (hereafter referred to as “Bonbright Principles 2nd Edition”).

⁵ This is sometimes referred to as revenue sufficiency or revenue adequacy.

⁶ This objective refers to equity issues so that customers pick up their fair share of the utility’s costs, given the benefits they receive from utility service.

⁷ This is sometimes referred to as an efficiency principle or objective.

- With respect to a particular rate that would be charged to customers fitting a particular profile (e.g., residential rates to electricity customers who live in homes or apartment buildings), the term “rate structure” refers to components (or elements) of the rate which charge customers for one or another aspect of their electricity usage.
- “Rate” refers to the actual price or charge attached to each element.

For example, there may be several elements in the rate structure:⁸

- *Customer charge (or monthly service charge)*: a charge associated with being a customer of the utility and having access to the power system, and is often a fixed amount that the customer pays regardless of the level of use;⁹
- *Energy charge*: a payment associated with the amount of electricity the customer uses over the entire length of a billing period;¹⁰ and
- *Demand charge*: a charge tied to the customer’s highest amount of use over a prescribed window during the billing period.¹¹

Each element would have a price attached to it: For example, the customer charge would be \$X dollars per customer; the energy charge would be Y cents per kWh of usage; and, the demand charge would be Z cents per kW of demand. In any billing period, the customer’s bill would be the sum of those different rate elements.

Bonbright’s standard ratemaking principles for providing adequate, stable and predictable revenues and rates, taking cost, efficiency and equity considerations into account, are summarized in Table 1, below.

⁸ This example describes a three-part rate structure. But for some customers, a utility might have a two-part rate structure that included only a monthly service charge and a volumetric rate that recovered the remaining costs at Y cents per kWh. And certain customers may have “riders” that specify other elements (such as the terms of net energy metering, or separate charges or rebates for certain types of equipment) in addition to the basic elements of the rate structure.

⁹ Bonbright Principles, pages 306, 312.

¹⁰ Bonbright Principles, pages 306, 307.

¹¹ Bonbright Principles, pages 306, 310.

Table 1 Bonbright's Ratemaking Principles	
Provision of adequate, stable and predictable revenues and rates	Cost, efficiency and equity considerations:
▪ Effectiveness of yielding total revenue requirements without socially undesirable expansion of the rate base or socially undesirable level of product quality and safety ▪ Revenue stability and predictability, with a minimum of expected changes seriously adverse to utility companies. ▪ Stability and predictability of the rates themselves, with minimal unexpected changes that are seriously adverse to existing customers.	▪ Efficiency of the rate classes in discouraging wasteful use of service while promoting all justified types and amounts of use. ▪ Reflection of all of the present and future private and social costs and benefits occasioned by a service's provision. ▪ Fairness in apportioning cost of service among different consumers ▪ Avoidance of "undue discrimination" (free of subsidies) ▪ Efficiency in promoting innovation and responding economically to changing demand and supply patterns.¹²

In practice, the application of these principles is not formulaic and requires judgment—within the bounds of established ratemaking, or pricing, principles, and taking relevant technical information, comments of the parties, interested persons and the public,¹³ and other evidence into account—because many of the principles require trade-offs among each other.

For example, if conditions might cause a utility's costs to increase substantially from one time to another, the principle of "effectiveness of yielding total revenue requirements" might be in tension with "stability and predictability" in the revenue requirement and in the level of rates charged. Balancing those various principles might lead one set of ratemaking decision makers to phase new costs into rates over a three-year period of time, while another set of ratemaking decision makers might decide to introduce the costs all at once after years of no rate changes.

¹² Bonbright Principles 2nd Edition, pages 383-384.

¹³ In some jurisdictions, like SRP, "interested persons" may submit comments to the SRP Board and Management, and these comments become part of the record of information that the SRP Board reviews in making its decision on the proposed changes to rates. (Arizona Revised Statutes, Title 48 (Special Taxing Districts, Section 48-2334.) In other jurisdictions, such as state regulatory commissions' processes for setting rates, parties in a proceeding include the applicant and intervenors, and members of the public are afforded the opportunity to submit statements (which may or may not be part of the formal evidentiary record, depending upon the rules in a particular jurisdiction).

In another example, the principles of efficiency, fairness, and no undue-discrimination might lead one set of ratemaking decision makers to allow lower-income customers to be subsidized to some extent by other customers, so that lower-income customers can, for example, maintain basic electricity service.¹⁴

One group of decision makers might seek to adopt a single flat rate for all usage by customers in a particular rate class, and then set the rate level by dividing the revenue requirement by the overall expected amount of sales (kilowatt-hours (“kWhs”)) for the class. In contrast, another group of ratemaking decision makers might have the same revenue requirement target for the same customer class but decide to put in place a more complex rate structure, with different prices charged for some basic level of consumption and then a much-higher rate for kWh usage beyond that level.

Table 2 below provides illustrative examples of different rate designs for a particular set of customers. The point of these examples is that ratemaking decision makers may give more or less weight to one or another principle in one period of time compared to another, and there may be differences in judgment among the members of the rate-setting decision-making bodies that lead to discussion and debate negotiation among them to come up with an acceptable rate design. Ratemaking decision-makers routinely must use their judgment and discretion in ultimately approving and setting rates—again, within the bounds of approved pricing principles and the evidentiary or informational record.

¹⁴ In some jurisdictions, there are no price discounts for lower-income customers; in other jurisdictions, like SRP, a discount is available to eligible lower-income customers, either through waiving the monthly service charge (the approach adopted by the SRP Board) or through some other form of discounted prices.

Table 2 Examples of Hypothetical Utility Rate Structures With Monthly Bills at Different Levels of Electricity Usage					
Rate Description	Rate Elements and Levels	Total Bill Zero kWh 10 kW	Total Bill 500 kWh 10 kW	Total Bill 1000 kWh 10 kW	Total Bill 1500 kWh 10 kW
One single flat rate for each unit of electricity service used in a monthly billing period	13¢/kWh	<u>\$0</u>	<u>\$65</u>	<u>\$130</u>	<u>\$195</u>
A tiered rate, with one price for the first amount of electricity service and a different price for usage above that level	10¢/kWh at or below 500 kWh usage, and 14¢/kWh for usage >500 kWh	<u>\$0</u>	<u>\$50</u>	<u>\$120</u> (\$50 + \$70)	<u>\$190</u> (\$50 + \$140)
A single flat rate for each unit of electricity service, plus a customer charge per monthly billing period	10¢/kWh, plus a Customer Charge of \$15/month	<u>\$15</u>	<u>\$65</u> (\$50 + \$15)	<u>\$115</u> (\$100 + \$15)	<u>\$165</u> (\$150 + \$15)
A tiered rate for each unit of electricity service, plus a rate tied to the highest amount of use at any time during the month, plus a customer charge	8¢/kWh for ≤ 500 kWh of usage, 11¢/kWh for usage > 500 kWh, plus \$1/kW, plus a Customer Charge of \$15/month	<u>\$25</u> (\$10 + \$15)	<u>\$65</u> (\$40 + \$10 + \$15)	<u>\$120</u> (\$40 + \$55 + \$10 + \$15)	<u>\$175</u> (\$40 + \$110 + \$10 + \$15)

In addition to the tension that may arise among the principles set forth above, another important feature of ratemaking is that rates are designed for *classes* of customers, not individual customers, and the allocations of costs to different elements of the rate is therefore done on an aggregate or average basis. Ratemaking involves designing rates so that the overall classes' payments for electricity, given a proposed rate level and projected level of usage, produce the revenue requirement for the whole class. Within each class, an individual's usage may differ from that projected level of usage, and the utility's cost to serve that customer may be higher or lower than the average cost to serve customers in that class. As a result, some customers in a class may pay more than the class's average share of allocated costs, and others may pay less. (This point is illustrated in the information in the rows in Table 2 by the different overall monthly bills of the customers using different amounts of power, even though those customers are all on the same rates.) These outcomes are inherent in ratemaking.

Five Steps of Ratemaking

In the actual rate-development process, there are five core steps, as shown in Table 3.¹⁵

Table 3 The Core Steps in Developing and Adopting an Electric Utility's Rates	
Step 1: Determining the revenue requirement for the utility as a whole	Identifying the total amount of dollars that need to be collected through rates charged to the entire customer base
Step 2: Identifying the different customer classes	Defining groupings of customers with similar usage patterns so that they will all be charged a similar rate, or price, of electricity
Step 3: Allocating the revenue requirements to each customer class	Determining how many dollars to collect from each of the various customer classes (or classes of service)
Step 4: Designing the rate for each class of service	Determining for each customer class the structural elements of a rate - whether it is tied to energy usage over time ('energy' price), and/or energy use at a peak moment ('demand' charge), and/or tied to providing the customer with access to electricity ('customer charge') - and the price level for each rate element
Step 5: Adopting the final package of rates for all classes of service	Gaining the approval of the utility's ratemaking decision-makers (i.e., regulatory agencies for investor-owned utilities; decision-making bodies for publicly owned electric utilities), taking into account any changes in proposed rates required by decision-makers relative to the original rate proposal.

The starting point of the process is determining the total level of revenues that needs to be collected from the customer base as a whole to cover the utility's costs. This first step is sometimes called developing the utility's revenue requirement, or its cost of service. The analysis is typically done by a utility's financial department and considers the utility's costs (or budget) for a particular period of time, and then calculates the amount of money that needs to be collected (through future rates) to cover those costs. For a publicly owned utility, the calculation includes would include cost to operate and maintain the system, including investment in new assets and the cost of debt and

¹⁵ Many observers of the standard utility ratemaking process (including the authors of the Brattle Study) describe it as having three core steps: determining the revenue requirement (my Step 1 in the figure); allocating the revenue requirement to different customer classes (my Step 3 in the figure); and designing rates for each class of service (my Step 4). The step of identifying customer classes (my Step 2) is often not mentioned as a separate step, in part because it is assumed in the cost-allocation step (my Step 3). Also, the adoption of final rates by a utility regulator or a board of a publicly owned electric utility is often not described as a separate step, as I have done in my figure (Step 5); I separate this last step to highlight the fact that the review and oversight function is carried out by decision makers that are not the management of the utility itself. Many documents prepared in support of the current SRP pricing process (e.g., SRP Management's Blue Book, and the Brattle Study prepared for the SRP Board) include descriptions of some of these steps.

working capital to finance that investment. The utility's financial analysts would prepare forward-looking assessments of whether expected revenues from current rate levels and likely levels of sales will cover forecasted future costs. If not, the rate-development process would identify a new revenue target that needs to be met by new rate proposals.

In addition to the revenue-requirement analyses, the utility would also analyze patterns of customers' electricity use to determine whether there are any changes that should be made to definitions of customer classes. This would be the second step in the process. In determining whether to establish a new, separate customer class, the utility would consider issues such as: whether the usage patterns of customers with certain characteristics are materially different from those of other customers, whether the patterns of use within the proposed class are similar, whether those patterns are likely to persist over time, and whether the class members can be easily identified. The goal of this analysis is to identify the attributes of "similarly situated" customers: customers that are easily identifiable and with relatively similar patterns of electricity usage, such that they should all be charged under the same rate plan (structure and level) or set of plans. Routinely, utilities' rates have separate classes for residential customers versus non-residential customers (which are often split between commercial ("C") customers and industrial ("I") customers, or small C&I customers versus large C&I customers¹⁶). (SRP has a number of rate classes, including residential, general service, large general service, pumping, and street lighting.¹⁷)

For example, if the pattern of usage of some customers with large electricity-using equipment (e.g., a customer with significant outdoor recreational lighting, or a heated pool, or an all-electric home heating system, or a charging system for a plug-in electric vehicle, or rooftop solar systems) distinguishes them from customers without such equipment, there may be a customer class defined based on the presence of that equipment, with the customer being required to go on a special rate whose level (price) varies by time of day in a manner consistent with the varying costs of providing service during different hours of the day. In some instances, however, it may not be easy for the utility to determine whether customers do or do not have such equipment (such as might be the case for electric vehicles or electric heating systems), in which case the utility might not establish a separate class. (In the case of rooftop solar, it is relatively easy to determine whether a customer does or does not have such equipment.) The goal of establishing rate classes would be to send price signals to the customer that are tied to the utility's cost to provide service to similarly situated customers so that they can decide how to manage their use of electricity in different time periods. At times, the adoption of new technologies (like distributed energy resources) can lead to the introduction of new customer classes: for example, in recent years utilities in many states have

¹⁶ Many electric utilities, like SRP, use a "general service" category for C&I customers.

¹⁷ See SRP's December 2018 Blue Book.

proposed new classes customers with behind-the-meter solar generation. (See further discussion of this point in Section 4, below.)

The third step in the rate-development process generally involves the utility taking information from the prior two steps to assign portions of the revenue requirements to different classes of customers. This is the overall cost-allocation process, and requires a technical analysis of the utility's cost-of-service elements.¹⁸ There are typically several sub-steps here: "functionalization" of costs,¹⁹ "classification" of costs,²⁰ and "allocation of costs" to the various customer classes. Most ratemaking decision makers attempt to adhere to the "cost-causation" principle: the concept that each customer class pays the costs its usage patterns impose on the utility's cost to provide service to that class.

For example, a customer class that has a particular usage pattern (e.g., using more electricity during the overall electric system's peak period) will tend to contribute to the utility's need to make new investment (e.g., on the generation system, on the transmission system, and/or on the distribution system) to meet increases in peak demand; those customers would tend to be assigned a higher share of the incremental capital invested in those facilities built to meet peak-system demand requirements.²¹ By contrast, a customer class with relatively flat electricity usage over the course of the day may have a smaller impact on the need to add new capacity even if they use more electricity overall. Also, a customer class may have a usage pattern that tends to shift the overall electric system's period of peak demand. This could result, for example, from a group of customers having on-site solar PV power during the daylight hours: lowering demand from the grid during the middle of the day when solar generation peaks but drawing electricity from the grid during peak system hours when solar generation has declined. Another example would be a customer with an electric vehicle, whose electricity consumption may be typical during the day but much higher than other residential customers' electricity use when the car is charging at night.

The fourth step of the rate-development process is the actual design of rates for particular customer classes. In this step, the utility uses information about customer-class-specific revenue

¹⁸ This is typically called an "embedded cost of service study," because it breaks down all of the utility's costs to provide service into different categories, so that they can be eventually be tied to different customer classes.

¹⁹ Functionalization involves identifying for each line item of the utility's costs whether the expenditure is tied to the power-generation function, the transmission-of-power function, the local-distribution function, or the customer-service function.

²⁰ Classification involves determining, for each line item, whether the cost relates to energy use (electricity usage or consumption (kWh) over a period of time), demand (level of instantaneous use of electricity (kW) at a particular period of time; customer service (e.g., tied to billing and metering, and connecting the customer to the grid); and general overhead costs (e.g., costs of management of the utility).

²¹ Bonbright Principles, page 305; Lowell E. Alt, Jr., Energy Utility Rate Setting: A Practical Guide to the Retail Rate-Setting Process For Regulated Electric and Natural Gas Utilities, 2013, Chapter 8.

requirements, along with information about the attributes of the customers in each class, to develop a rate design that will satisfy a balance of the objectives of the ratemaking process. In principle, a goal of ratemaking is to have costs recovered through charges whose structure and elements match the functionalized and classified character of costs: e.g., usage charges tied to the production of power; demand charges tied to fixed investment costs associated with physical generation, transmission and delivery facilities providing the capability to provide power. Historically, however, many fixed costs have often been recovered through usage charges (particularly for residential and other small customers) due to various needs to balance multiple ratemaking principles while establishing prices for different customer groups. Also, historically, it was too expensive to install sophisticated meters for relatively low-use customers (like residential or small commercial or general-service customers), so it was impractical to bill such customers on anything other than in terms of the volume of kWh over the course of a billing period.²²

The final step in ratemaking is the actual approval of final rates that the utility is authorized to charge to customers. A state regulatory commission is the entity with responsibility to approve an investor-owned utility's rates; for a publicly owned electric utility, the governing board of the utility has the authority to approve (and/or modify, and/or reject) the specific elements of the utility management's proposed rate package. It is not uncommon for the rate-approval body to make adjustments to the utility management's proposed package before finally approving new rates that the utility may charge its customers, and when doing so, such decision-makers take care to ensure that the final approved rate package meets the principles of overall revenue adequacy (so that the utility has the opportunity to remain financially healthy) and of ensuring that customers pick up their fair share of the utility's cost.

²² "Utilities recoup a large portion of their costs from residential customers through variable energy rates even though a high percentage of costs is fixed....Residential utility bills typically have two components—a fixed monthly customer charge and a variable energy charge based on kWh usage. The variable energy charge typically makes up the lion's share of the bill..... The energy charge has traditionally been a flat \$/kWh charge although a utility's cost to serve a customer varies greatly by time of day and season. Some utilities have introduced seasonal charges, with summer and winter rates set slightly higher than rates at other times of the year. Other utilities implement time-of-use rates— mostly a two-tiered rate, with charges for peak hours (e.g., 3 – 7 pm) set considerably higher. Some utilities use complicated formulas, such as critical peak pricing, with a very high charge for absolute peak hours, a slightly lower charge for less congested times, and a very low rate for off-peak hours such as the late evening. Actual utility costs: \$56 variable costs, \$54 fixed costs; Charges on the electric bill: \$100 variable charge, \$10 fixed charge." Paul Zummo, "Rate Design for Distributed Generation: Net Metering Alternatives With Public Power Case Studies," American Public Power Association (APPA), June 2015 (hereafter referred to as "APPA Rate Design Report"), page 2.

3. ECONOMICS AND UTILITY RATE DESIGN: A BALANCING ACT

Pricing Principles in Utility Ratemaking

The balancing exercise in ratemaking (and in particular, in designing rates) described above tends to incorporate two competing purposes:

On the one hand and consistent with principles of economics, there is a desire to set the price of various rate elements in accordance with marginal-cost principles, so that the customer can see the incremental cost of serving the next unit of electricity demand and can decide whether to purchase that next kWh of electricity use (or kW of electricity demand) at that price. Adherence to this economic principle will produce efficient consumer decisions about consumption of electricity.

But, on the other hand, there is also a need in utility ratemaking to assure that the totality of rates charged to customers ends up producing the revenues needed to cover the utility's cost of providing service (known as "embedded costs"). Thus, for example, the Arizona Corporation Commission establishes for investor-owned utilities the level and structure of "rates that provide the company a fair rate of return while balancing the needs of ratepayers."²³ More generally, the Arizona Residential Utility Consumer Office states, in its explanation of the ratemaking process for investor-owned utilities in Arizona, that the "Commission authorizes a utility to charge rates which will recover expenditures which are appropriate and prudently incurred, and which provide an opportunity to earn a fair return on the utility's capital investment."²⁴

The principle of marginal-cost pricing draws upon basic economic principles relevant for competitive markets. As Bonbright suggested, marginal costs have a role to play in utility

Economics and Utility Rate Design: A Balancing Act

When applied in practice, the many principles of ratemaking introduce the need to balance the application of economic considerations (such as pricing services at the utility's marginal cost) with the requirement that rates be set to recover a utility's total (or "embedded") cost of providing service. Utility management, and the decision-makers that review management's pricing proposals and ultimately approve final prices, exercise judgment and discretion in balancing marginal-cost pricing principles with cost-of-service revenue-recovery principles, which results in different rate designs being adopted in different jurisdictions, for different utilities within a common jurisdiction, or even for different customer classes within a single utility.

²³ ACC, "Frequently Asked Questions." Available at <http://www.azcc.gov/divisions/utilities/electric/faqs.asp#b>, accessed on June 29, 2016.

²⁴ Residential Utility Consumer Office, "The Rate Making Process." Available at <https://ruco.az.gov/consumer-resources/rate-making-process>, accessed on June 30, 2016.

ratemaking by encouraging rate designs that allow customers to see price signals that help them make economically efficient decisions about whether to use electricity or not.

But Bonbright also reminds us that embedded costs also play a fundamental role in the context of utility ratemaking and pricing of services to customers. First, in order for the utility to remain financially healthy, rates need to be set at a level that affords the utility the opportunity to collect enough money to cover its cost of providing utility service.²⁵ Recalling the long lead times associated with utility planning and investment that are necessary to take place in advance of providing generation, transmission, distribution, and grid-operations services to customers at any point in time, the utility's cost of service includes the cumulative investment that the utility has made over many years in the past in anticipation of the need to provide reliable service to customers in later years. Given these lead times, investment that occurred, say, during the mid-1970s through the mid-2010s, may have been made in anticipation of providing service to customers in 2016. A utility's rates in any year need to be designed to allow the utility the opportunity to recover these costs.²⁶

Also, under cost-of-service pricing principles, utilities' rates are designed so that different groups of customers pick up their fair share of those costs. That means that individual rates charged to different customer segments need to be designed to incorporate price signals related to marginal costs, but also so that the price elements and levels allow recovery of embedded costs.

To the extent that a utility desires and attempts to price its products and services precisely on marginal-cost pricing principles but finds that doing so will not recover the full embedded cost of providing services to different classes of customers, then the utility must diverge from strict marginal-cost pricing in order to set rates appropriate to utility service.²⁷

Although marginal-cost pricing might send appropriate signals to customers, there are circumstances where reliance on marginal-cost pricing alone may not satisfy the second task in rate design—that is, to design rate elements and levels so as to produce sufficient revenues to recover the utilities cost of providing service. This would happen in situations where the utility's average cost of providing service (e.g., 10 cents/kWh) is higher than the utility's marginal costs of providing service (e.g., 8 cents/kWh). In such a case, there needs to be a combination of rate levels and elements that makes up the gap (or "residual") between revenues collected from rate elements set at marginal cost and the revenue requirement of the utility.

²⁵ Bonbright Principles, page 154. This is sometimes referred to as revenue sufficiency or revenue adequacy.

²⁶ Bonbright Principles, pages 173-174, 306.

²⁷ Bonbright Principles, page 299.

4. SRP MANAGEMENT'S 2019 PRICING PLAN PROPOSALS

Overview and background

SRP Management's current pricing plan proposal arises in the context of changing conditions in the ways that retail electricity service is supplied and consumed in communities around the nation and in Arizona.²⁸ On the one hand, the utility's own portfolio of generating resources has been changing in recent years, with implications for new asset additions, changing fuel costs (e.g., consistent with lower natural gas prices), lower carbon emissions, and other outcomes. Additionally, the SRP region has continued to experience the effects of underlying economic growth, rising customer demand for electricity demand, and the addition of nearly 4,000 new rooftop solar systems since the beginning of 2015 alone.²⁹

As described in several documents—including but not limited to SRP's December 2018 Blue Book, the December 2018

SRP Management's 2019 Pricing Plan Proposals

My review of the documents associated with SRP Management's 2019 pricing proposal leads me to conclude that the utility has relied on standard substantive and procedural steps. The proposed rate plan was developed through a process and using principles that are consistent with electric industry norms (including that customers pay their fair share of the costs the utility incurs to provide them with service).

The proposed rate package reflects SRP's application of judgment in accounting for and balancing the impacts of many important and relevant considerations, including

- reductions in SRP's overall cost to provide electricity service to its customers;
- the provision of product options and high-quality service to customers;
- the need for maintaining financial health of the utility;
- the continued efficient and reliable operations of the system in the face of growth in demand;
- furtherance of sustainability principles and practices into SRP's business; and
- fairness and equity among different types of customers, some of whom are adopting on-site equipment that produces electricity.

Notably, the rate options proposed for residential solar customers also reflect the kinds of rate designs being considered, in many cases, adopted by regulators of investor-owned utilities and boards of publicly owned utilities in other parts of the country.

²⁸ These conditions are described in the introduction of SRP's December 2018 Blue Book.

²⁹ See the presentation made by SRP personnel (John Tucker, Director of Corporate Pricing) to the SRP Board on November 28, 2018: "Rate Design Discussion - Board Meeting." Slide 13 of the presentation shows the growth in the number of customers billed on SRP's E-27 rate. The E-27 price plan went into effect with the April 2015 billing cycle, and with certain exceptions was mandatory for residential customers who added a solar system after E-27 went effect. Mr. Tucker's presentation shows, in effect, the addition of new residential solar systems starting in approximately the second half of 2015, up through October 2018, when the number was approximately 3,750 customers.

Green Book (which also describes its marginal-cost study), the PFM Financial Study, the Brattle Study, and stakeholder presentations in January 2019—SRP Management has endeavored to propose a ratemaking package that:

- meets the Board-approved pricing principles;³⁰ and
- reflects changes in the utility’s total cost of providing service (i.e., lower fuel costs and higher base costs), while keeping “up with economic growth and maintain reliability” and supporting “the transition to sustainable resources and new technologies.”³¹

With respect to pricing options available to residential customers that have added (or will add) since 2015, SRP Management has proposed four optional pricing approaches in response to feedback from customers in recent years.³²

Overall Observations

After reviewing SRP Management’s documents provided in support of its December 2018 pricing proposals, along with the Brattle Study, I conclude that the process was consistent with long-standing ratemaking principles and standards. SRP Management’s ratemaking process leading up to the development of the new rate plans (and to the review of them that is currently underway by

³⁰ The pricing principles, adopted by the SRP Board in 2000, are summarized in the December 2018 Blue Book (page 25), as follows:

- Gradualism – to enhance sound, economic decision-making by customers of all types through stabilizing price levels and smoothing the impact of cost movements that may be caused by temporary factors
- Cost Relation – to establish prices in relation to costs and SRP’s stewardship to its water constituents, and thus not to pursue the maximization of “profit”
- Choice – to constantly improve customer satisfaction through the creative design of pricing structures that reflect customers’ different desires or abilities to manage the consumption, assume more price control, or demand differentiated products and services, among others
- Equity – to treat customers of all types in an economically fair manner
- Sufficiency – to recover the cost of, and to invest and reinvest in a system of assets to perform its policy obligations, including its obligation to store and deliver water to the owners of land within the boundaries of the Salt River Reservoir District, to maintain SRP’s financial well-being, and to follow the foregoing principles.

³¹ Blue Book, page 2.

³² Comments on the then-proposed E-27 price plan included concerns that: residential customers lacked an understanding of how demand charges would affect their rates; there was no pilot program to test out the rate design before a new demand charge was introduced for residential customers; it was unusual for residential customers to face a demand charge at all; and a demand charge tied to the highest single hour of usage during any monthly billing period would expose residential customers to the risk on high monthly bills if unusual high-use event occurred in a particular month. More recently, at the January 22, 2019 public comment session that SRP’s Board and Management held on the new pricing proposals, Mr. Tucker explained that “we have heard comments from customers expressing concern about the risk [under the current pricing plan] of an anomalous event having a significant impact on their demand and thus having a significant impact on their bill...So what we’re trying to do here is respond to that concern....” Page 23 of the transcript of SRP’s presentation at its Glendale Public Comment meeting.

the SRP Board) has involved the various steps in the well-trodden path to developing rates based on the cost of providing service to customers.

As described in SRP's Blue Book and the Brattle Study, SRP Management undertook a process to develop a proposed package of rates that began with SRP's long-standing pricing principles and information about current conditions in its customers' usage patterns and the utility's cost patterns. With that technical information, SRP Management developed its current rate plan proposal. (Table 4 compares Bonbright's principles of ratemaking to the pricing principles adopted by the SRP Board in 2000 and applied to pricing plans by SRP Management and the SRP Board since then.)

Table 4 Traditional Utility Ratemaking Principles and SRP Pricing Principles	
Bonbright Ratemaking Principles	SRP Pricing Principles
Effectiveness in yielding total revenue requirements under the fair-return standard without any socially undesirable expansion of the rate base or socially undesirable level of product quality and safety.	Sufficiency – to recover the cost of, and to invest and reinvest in a system of assets to perform its policy obligations, including its obligation to store and deliver water to the owners of land within the boundaries of the Salt River Reservoir District, to maintain SRP's financial well-being, and to follow the foregoing principles. Cost Relation – to establish prices in relation to costs and SRP's stewardship to its water constituents, and thus not to pursue the maximization of "profit."
Revenue stability and predictability, with a minimum of unexpected changes seriously adverse to utility companies. Stability and predictability of the rates themselves, with a minimum of unexpected changes seriously adverse to ratepayers and with a sense of historical continuity.	Gradualism – to enhance sound, economic decision-making by customers of all types through stabilizing price levels and smoothing the impact of cost movements that may be caused by temporary factors.
Static efficiency of the rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use. Reflection of all of the present and future private and social costs and benefits occasioned by a service's provision.	Cost Relation – to establish prices in relation to costs and SRP's stewardship to its water constituents, and thus not to pursue the maximization of "profit."
Fairness in apportioning cost of service among different consumers. Avoidance of undue discrimination in rate relationships so as to be, if possible, compensatory	Equity - to treat customers of all types in an economically fair manner
Dynamic efficiency in promoting innovation and responding economically to changing demand and supply patterns. Avoidance undue discrimination in rate relationships so, to be, if possible, compensatory	Choice – to constantly improve customer satisfaction through the creative design of pricing structures that reflect customers' different desires or abilities to manage the consumption, assume more price control, or demand differentiated products and services, among others.

After my own review of the Blue Book and the Brattle Study (with the latter’s detailed description of its examination of SRP’s cost of service, marginal cost study, cost-allocation methodology, and rate design), I note—and agree with—the Brattle Study’s conclusions that:

- “[T]he methodology employed by SRP is consistent with both standard industry practices employed by other utilities and SRP’s own Pricing Principles.”³³
- “We are confident that SRP is making reasonable and fair decisions in allocating costs to customers...and we are satisfied that the study is fair, reasonable, and follows the principle of cost-causation...”³⁴
- “[W]e are confident that the SRP’s proposed rate changes and new rate designs are in accordance with their five rate design principles.”³⁵

Context for SRP Management’s Proposals for Residential Distributed Generation Customers

Before commenting on SRP’s new pricing options for residential customers with rooftop solar systems, in particular, I observe that on many occasions, SRP has been at the forefront of efforts of utilities and regulators around the United States to advance new reasonable electricity rate designs for such customers. The efforts have included early adoption of time-of-use rates and prepaid pricing programs, for example, as well as the adoption of a new rate design (in 2015) for residential customers with generation on their premises. Such efforts have sought to adopt rates that would send appropriate prices and fully support the utility’s cost to serve such customers.

In its most recent public pricing process that took place in 2015, the SRP Board adopted SRP Management’s proposal for a new three-part rate for residential customers that would thereafter be adopting rooftop solar systems.³⁶ This action was premised on the view that SRP’s traditional residential rate designs (that relied upon recovering the utility’s fixed costs through a cent-per-kWh volumetric, or usage-based, charge), combined with net-energy-metering policies, was leading to cost-shifting and inequities: (a) customers with on-site generation were not picking up their fair share of the utility’s cost to provide them with service, and (b) other customers, in effect, were picking up those costs.³⁷ This circumstance has been recognized in many jurisdictions, and handled

³³ Brattle Study, page 3.

³⁴ Brattle Study, page 20.

³⁵ Brattle Study, page 38.

³⁶ SRP, “Proposed Adjustments to SRP’s Standard Electric Price Plans Effective with the April 2015 Billing Cycle,” December 12, 2014 (“December 2014 Blue Book”), <https://www.srpnet.com/prices/priceprocess/2015/pricingfaq.aspx>.

³⁷ This view is rooted in basic economics associated with the electric system: Much of an electric utility’s cost to serve its residential customers involve fixed costs (e.g., past capital investment in generation, transmission and distribution system). Electric prices to residential consumers have traditionally recovered these fixed costs through usage-based

in different ways. For example, SRP Management ended up determining that with increasing adoption of rooftop solar, this problem of cost shifting would become ever more acute. And in order to remedy that problem, SRP Management proposed and the SRP Board adopted in 2015 the new E-27 rate for residential customers with on-site solar generation. Since then, that single rate option has been in place for residential customers installing rooftop solar systems thereafter.

Around the same time that the SRP Board adopted its E-27 rate and since then, many other utilities and ratemaking decision makers have considered and, in many cases, adopted rates that transition power prices from a historical net-energy-metering approach to new rate designs that address concerns about the recovery of the utility's fixed costs to provide service to customers with rooftop solar.³⁸ Some rate decision makers, for example, have approved continuation of net metering for residential customers that install solar panels in the future only for those customers that move on to a rate with a minimum bill (e.g., Hawaii), or with a time-of-use rate (e.g., California), or a demand charge (e.g., in Florida³⁹), or a higher fixed customer charge (sometimes called an 'infrastructure

charges. A customer that installs and uses rooftop solar to satisfy a significant portion of his/her electricity needs but nonetheless draws upon power from the grid during peak hours (and/or exports surplus power into the grid) still requires service from the utility's capital-infrastructure. The utility has to be ready to provide service—ranging from the customer's full-power needs, to partial service, to absorbing surplus power—at any point in time through the day, and especially during the hours of peak demand in the absence of solar generation. The utility absorbs the risk that the customer will need to use the grid, either to take surplus power away from the customer's premises or to provide power when the on-site generation does not fully satisfy the customer's total demand. To meet that service obligation, the utility has made prior investments to be ready to provide service today and will still have to be ready to provide service if the customer chooses—for whatever reason—to stop producing power from the solar panel. In light of these various considerations— e.g., the need to transition from net metering to other mechanisms to assure that customers with distributed energy resources pay their fair share of the utility's costs (if any) to serve them and receive appropriate compensation for the benefits (if any) they provide to the electric system—many utilities, their ratemaking decision makers, and other stakeholders have been considering and, in cases like SRP's, adopting new approaches to rate design.

³⁸ See, for example: North Carolina Clean Energy Technology Center (NC CETC), *The 50 States of Solar: 2018 Policy Review and Q4 2018 Quarterly Report*, January 2019 (hereafter "50 States of Solar: 2018"; NC CETC, *The 50 States of Solar: 2017 Policy Review and Q4 2017 Quarterly Report*, January 2018 (hereafter "50 States of Solar: 2017"); Staff Committee on Rate Design, National Association of Regulatory Utility Commissioners (NARUC), "Distributed Energy Resources Rate Design and Compensation," 2016; Lisa Wood, Ross Hemphill, John Howat, Ralph Cavanagh, Severin Borenstein, "Recovery of Utility Fixed Costs: Utility, Consumer, Environmental, and Economist Perspectives," LBNL Future Electric Regulation Series, Report No. 5, June 2016; Ahmad Faruqui et al., "Best Practices in Tariff Design," Brattle Group, June 2016; Lori Bird et al., "Impact of Rate Design Alternatives on Residential Solar Customer Bills: Increased Fixed Charges, Minimum Bills and Demand-Based Rates," NREL, September 2015; APPA Rate Design Report; Eric Ackerman and Paul DeMartini, "Future of Retail Rate Design," November 2012; RAP (Regulatory Assistance Project), "Designing Distributed Generation Tariffs Well: Fair Compensation in a Time of Transition," November 2013.

³⁹ In 2014, Lakeland Electric, a municipally owned utility in Florida, proposed to adopt new rates that included a general rate increase, changes in the costs allocated to different customer classes, and a new proposal for new customers installing PV panels on their roofs. Lakeland Electric, "2015 Rate Study Workshop #5 – Base Rate Adjustments," November 17, 2014; APPA Rate Design Report, page 11.

charge’) combined with a reduction in energy charges (e.g., in California⁴⁰), or with many other types of variations in the structure and level of charges to customers. More recently, Michigan, for example, adopted a “net metering successor tariff in 2018, which will move the state to an ‘inflow/outflow’ compensation structure, with exported energy being credited at either the locational marginal price or power supply rate.”⁴¹

According to the NC Clean Energy Technology Center “The 50 States of Solar” reports,⁴² there is substantial activity across the states, in terms of adoption of solar systems and in terms of electric rate decision makers considering and in many instances adopting new rate options for customers with solar resources:

- As of the end of 2017, “[s]tate and utility solar policies continued to undergo review in 2017, with nearly every state in the country considering policy or rate design changes – a trend which is likely to continue through 2018 and beyond.”⁴³ “Thus far [as of the beginning of 2018], the majority of states issuing net metering successor tariff decisions have opted to move to a net billing policy, allowing behind-the-meter consumption but crediting all exported energy at a rate other than retail. In 2017, Jacksonville Electric Authority, Indiana, New York, and Utah approved transitions from net metering to net billing.”⁴⁴
- “Distributed solar policy action has steadily increased over the past few years, with states and utilities taking approximately 175 actions in 2015, 212 actions in 2016, 249 actions in 2017, and 260 actions in 2018.”⁴⁵

⁴⁰ Sacramento Municipal Utility District (“SMUD”) had a traditional net metering program, after its Board approved it in 2008: “Legislation passed in California — AB 920 — discouraged the practice of paying customers at the full retail rate for surplus generation. As a result, SMUD adopted a system where it paid net generators annually at the net metering surplus compensation (NMSC) value. The NMSC value is based on SMUD’s wholesale power supply cost, which is about half of the retail rate. ...SMUD also changed its monthly customer charge, also known as a system infrastructure charge, for all customers. In 2011, SMUD determined, based on a cost study, that its marginal cost of serving a customer was about \$26. The utility wanted to better align rates with costs, so it decided increase its system infrastructure fixed charge for residential and small commercial customers to a point that was closer to the marginal cost. The fixed charge increase was offset by a reduction in energy charges.” APPA Rate Design Report, page 12.

⁴¹ 50 States of Solar: 2018, page 11.

⁴² NC CETC publishes quarterly and annual reports “to provide state lawmakers and regulators, electric utilities, the solar industry, and other energy stakeholders with timely, accurate, and unbiased updates on state actions to study, adopt, implement, amend, or discontinue policies associated with distributed solar photovoltaics (PV). This report catalogues proposed and enacted legislative, regulatory policy, and rate design changes affecting the value proposition of distributed solar PV during the most recent quarter, with an emphasis on the residential sector.” NC CETC, *The 50 States of Solar: 2018 Policy Review and Q4 2018 Quarterly Report*, January 2019, page 5.

⁴³ 50 States of Solar: 2017, page 9.

⁴⁴ 50 States of Solar: 2017, page 9.

⁴⁵ 50 States of Solar: 2018, page 16.

- “The U.S. residential solar market was relatively flat over the course of 2018, and the majority of mature state markets saw a flat or declining rate of installations. However, analysts anticipate overall growth in 2019, with 60% of residential capacity installed between 2018 and 2023 predicted to be in California, Illinois, and Florida.”⁴⁶

In effect, these states—many of which have been strong supporters of customers’ adoption of rooftop solar systems—have found that while early reliance on the policy of net energy metering had been effective in facilitating such adoption, policymakers have nonetheless begun to develop alternatives that are more granular and provide a more accurate basis for accounting for the value (benefits and costs) associated with distributed generation resources on the system. At the same time, these efforts also focus on assuring that those customers with on-site generation are both compensated for the value they provide and pick up their fair share of the costs they impose on the electric grid.⁴⁷

SRP’s new approach to pricing service to residential customers with rooftop service, which builds upon its current E-27 price plan and provides three other new pricing options, similarly relies on this principle. The underlying premise of each design is that these customers will remain grid connected, will have the option to use the grid to inject and withdraw power on demand, and will actually utilize grid services to meet full demand when on-site generation was not generating power (or sufficient power to cover the customer’s own use of electricity) or to take away excess power when the on-site generation was producing more supply than the customer himself/herself was using. Also, each rate option has been designed to collect a similar level of revenues for residential customers with rooftop solar.

In light of comments provided by stakeholders, as well as the growing body of public information available about rate designs that send appropriate price signals and generate adequate revenue recovery, SRP Management developed for options for rates available to residential electricity customers with rooftop solar.

Based on this review as well as my own knowledge of the standard principles and practices used by utilities around the country (described above), I conclude that SRP Management’s proposed residential solar rate options fit squarely within the norms of utility ratemaking.

⁴⁶ 50 States of Solar: 2018, page 7 (footnotes in the original are omitted).

⁴⁷ I have previously written about these considerations: Susan Tierney, “The Value of ‘DER’ to ‘D’: Distributed Energy Resources in Supporting Local Distribution System Reliability,” March 31, 2016.

APPENDICES

Tierney Bio

Documents Reviewed

APPENDIX 1: TIERNEY BIO

Susan F. Tierney
Analysis Group Inc.

O: 617-425-8114
Susan.tierney@analysisgroup.com

1900 16th Street, Suite 1100
Denver, CO, 80202

Dr. Tierney, a Senior Advisor at Analysis Group, is an expert on energy economics, regulation and policy, particularly in the electric and gas industries. She has consulted to energy companies, grid operators, governments, tribes, environmental groups, foundations, and other organizations on energy markets, economic and environmental regulation and strategy, and climate-related energy policies. She has served as an expert in civil litigation cases in state and federal courts, in regulatory proceedings before state and federal agencies, and in business consulting engagements.

Previously, she served as the Assistant Secretary for Policy at the U.S. Department of Energy. She was the Secretary for Environmental Affairs in Massachusetts, Commissioner at the Massachusetts Department of Public Utilities, and Executive Director of the Massachusetts Energy Facilities Siting Council. She served as Chairman of the Board of the Massachusetts Water Resources Authority.

Dr. Tierney has authored numerous articles and speaks frequently at industry conferences. She serves on a number of boards of directors and advisory committees, including chairing the board of ClimateWorks Foundation and of Resources for the Future. She is a director of the Barr Foundation, World Resources Institute, the Energy Foundation, and the Keystone Center. She is a Visiting Fellow in Policy Practice at the University of Chicago's Energy Policy Institute; and a member of the advisory councils at New York University's Institute of Policy Integrity, Duke University's Nicholas Institute for Environmental Policy Solutions, and the New York Independent System Operator (NYISO). She was a member of the National Academies of Sciences, Engineering and Medicine's Committee on Enhancing the Resilience of the Nation's Electric Power Transmission and Distribution System," and is currently a member of the Academies' Committee on Modernizing the U.S. Electricity System and the Academies' Advisory Committee on Climate Communications.

She recently chaired the U.S. Department of Energy's Electricity Advisory Committee, chaired the External Advisory Council of the National Renewable Energy Lab (NREL), co-chaired the NAESB Gas-Electric Harmonization Committee, and was co-lead author of the energy chapter of the 2012 National Climate Assessment. She chaired the Policy Subgroup of the National Petroleum Council's *Prudent Development* study of the natural gas and oil resource base in North America. She served on the U.S. Secretary of Energy Advisory Board (and its Shale Gas Subcommittee).

She taught at the Department of Urban Studies and Planning at MIT and at the University of California at Irvine, and has lectured at Harvard University, Yale University, New York University, Tufts University, Northwestern University, and University of Michigan. She received NARUC's Mary Kilmarx Award in 2015. She earned her Ph.D. (1982) and M.A. in regional planning (1976) at Cornell University and her B.A. at Scripps College.

APPENDIX 2: DOCUMENTS REVIEWED

The following documents related to SRP's pricing processes (and listed in order of date of publication) were reviewed for the purpose of preparing this report.

SRP Management, "Proposed Adjustment to SRP's Standard Electric Price Plans Effective with the April 2015 Billing Cycle" (December 12, 2014).

SRP, "SRP 2035 - FY19/FY20 Action Plan Summary, as of close of FY18" (April 30, 2018).

SRP Management (John Tucker, Director, Corporate Pricing), "Rate Design Discussion - Board Meeting" (November 28, 2018).

SRP Management, "Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle" (also known as the "Blue Book") (December 20, 2018).

SRP Management, "Appendix A to Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle: Proposed Standard Electric Price Plans and Riders" (December 20, 2018).

SRP Management, "Cost Allocation Study in Support of Proposed Adjustments to SRP's Standard Electric Price Plans Effective with the May 2019 Billing Cycle" (also known as the "Cost Allocation Study" or "Green Book") (December 20, 2018).

SRP Management, "Derivation of Proposed Changes to SRP's Transmission and Ancillary Services Prices, Effective May 1, 2019" (December 20, 2018).

SRP Management, "SRP Seeks Price Decrease," Press Release (December 20, 2018).

Philip Q Hanser, T. Bruce Tsuchida, Neil Lessem, Rebecca Carroll, Ben Qiu, and Emily Shorin, "Review of SRP Cost of Service and Rate Design," prepared for the SRP Board of Directors (December 2018).

Michael Mace, Managing Director, PFM Financial Advisors, "Financial Market and Capital Structure Considerations In Public Power Pricing Decisions" (December 20, 2018).

SRP Management (John Tucker, Director, Corporate Pricing), "Proposed Adjustment to SRP's Standard Electric Price Plans" (January 2019).

SRP, "Proposed Adjustments to SRP's Standard Electric Price Plans," Transcript of public meeting in Glendale, Arizona (January 22, 2019).

SRP, "Proposed Adjustments to SRP's Standard Electric Price Plans," Transcript of public meeting in Gilbert, Arizona (January 24, 2019).

Other literature and documents reviewed specifically for this report are noted in footnotes.