

# Salt River Project (SRP) Integrated System Plan Technical Working Session: Evolution of Time-of-Day Programs

*Prepared by Kearns & West*

## Technical Working Session – Meeting Overview

As part of the Integrated System Plan (ISP), Salt River Project (SRP) has hosted Technical Working Sessions where experts from around the country and SRP have explored special topics. This session focused on the evolution of time-of-day price plans, also known as time-of-use programs. The purpose was to gather expert opinions, hear stakeholder questions and discuss design and implementation of time-of-day price plans for the ISP and in future planning processes.

### Meeting Objectives

- Discuss how time-of-day price plans could evolve to better align with the needs of a changing grid and provide greater value to customers
- Discuss key considerations for designing and implementing new time-of-day price plans
- Identify strategies to advance SRP’s time-of-day price plans in future pricing and planning processes

**Topic:** Evolution of Time-of-Day Programs

**Date:** July 12, 2023

**Time:** 1:00-3:30 p.m. MST

**Location:** Virtual

All ISP stakeholders from the Large Stakeholder Group and Advisory Group were invited. Of the more than 140 organizations invited, approximately 30 stakeholders from 24 organizations and additional SRP staff members and consultants joined the Technical Working Session. Please see the appendix for attendance information. The [meeting agenda](#) and [presentation](#) are available at the [Integrated System Plan portal](#).

## Welcome and Agenda Overview

Angie Bond-Simpson, Director of Integrated System Planning and Support at SRP, welcomed attendees to the webinar. After reviewing the safety and sustainability minute, she noted that engagement for the ISP began in 2021 and she thanked stakeholders for their ongoing involvement in the process. She also thanked the SRP Board and Council members for their engagement in these Technical Working Sessions.

Bond-Simpson reviewed the meeting objectives ([slide 5](#)) and agenda ([slide 6](#)). She then introduced Adam Peterson, Director of Pricing at SRP, for his presentation on current time-of-day price plans offered by SRP.

## Current Time-of-Day Price Plans and Shifting System Dynamics

Peterson began by introducing the concept of time-of-day price plans and describing current residential and business offerings from SRP. Peterson noted, however, that changing system dynamics, such as midday solar generation and electric vehicle (EV) charging, will cause SRP to adapt new or different programs in the future. He discussed ongoing activities, such as pilot programs, efforts to save energy during peak hours and exploration of enabling technologies ([slide 10](#)). He then reviewed the purpose of time-of-day rates, explaining how they create “win-win” situations as customers shift usage away from higher cost hours and SRP incurs lower costs. Whereas historically time-of-day programs have primarily promoted bill savings, SRP looks forward to appealing to customers interested in new opportunities to reduce system emissions ([slide 11](#)).

Next, Peterson reviewed SRP’s current residential programs, noting participation from over 350,000 customers, which represents about 35% of households in the SRP service territory. These are all voluntary, opt-in programs ([slide 12](#)). He used a graph ([slide 13](#)) to illustrate differences in behavior and energy use between customers on a basic plan and customers enrolled in two time-of-day programs (E-26 and E-21). About 20% of time-of-day price plan customers shift their behaviors noticeably and residential programs likely result in a total peak reduction of more than 200 megawatts (MW) of demand with some snapback effects at the end of the peak period.

Peterson then described how the grid is evolving, using a graph of the modeled system load for 2035 overlaid with current of time-of-day programs ([slide 14](#)). He explained that current programs would miss the projected highest demand at 7:00 p.m., thereby creating challenges in meeting the net load line at about 8:00 p.m. In the future, SRP will need to manage the net load line, which will change the peak hours. Peterson described how prices tend to be lowest in the midday hours due to high renewable energy production from non-carbon emitting resources.

In the next section of his presentation, Peterson outlined the Daytime Saver Pilot Price Plan (E28) and opportunities for SRP to shift load ([slides 15-16](#)). He noted that although some people have questioned the convenience of the new hours, they appear to allow increased comfort and flexibility during the day and pre-cooled homes maintain their temperature better later in the evening. SRP is already seeing a behavioral response and will be surveying customers. He also highlighted future opportunities to shift load, such as scheduled EV charging and programmable thermostats. Peterson concluded by sharing that SRP believes time-of-day has the potential for greater benefits moving forward as technology and automation lead to increased behavioral changes.

## Panelist Presentations

Bond-Simpson introduced Arne Olson, Senior Partner at E3, as the moderator for the panel presentations and discussion. For context, Olson shared his experience with time-of-use programs and rate design, referencing a recent paper he co-authored on the subject ([Rate Design for the Energy Transition](#)). Olson then introduced the four panelists and the range of perspectives represented on time-of-day programs: environmental, power systems and engineering; research and academia; regulatory; and utility.

In their presentations, panelists touched on some common themes around time-of-day programs. They described increasing integration of renewable resources on the system and the infrastructure that will need to be built. Panelists also highlighted tradeoffs, such as higher loads due to electrification coupled with increased opportunities to manage that load through flexible demand. Several panelists noted the role of management technologies and automation in managing load and helping align retail pricing to real-time prices. Each panelist noted the role of the customer and the need for education, communication and gradual shifts to minimize bill impacts.

### Aligning Pricing with Grid Needs

Debra Lew, Associate Director at Energy Systems Integration Group (ESIG), spoke from a power systems and engineering perspective about aligning pricing with grid needs. She described how climate change is contributing to decarbonization goals and greater electrification. Because wind and solar resources have lower variable costs, they will likely dominate the future energy system. However, these resources have higher fixed costs and will require greater flexibility from the grid to enable their integration. The system will also have to be “overbuilt” in terms of MW capacity relative to peak load and more transmission and distribution infrastructure will be needed as well. She explained that this future system, with higher fixed costs and lower variable costs, will have intervals of low and high prices.

Lew next explained how retail pricing can act as a grid resource to balance the system. For resource planning, electrification can stress grid infrastructure but also has potential for flexible demand, which can be managed with enabling technologies such as automated control and communications. She described how ESIG convened a task force to examine options and developed [seven white papers](#), noting that no single option solves for how to design rates. Key points from the white papers included the need for flexibility, the difference between wholesale and retail prices, how pricing and programs can be complementary, and that customers need options.

Commenting on retail pricing, Lew noted that better retail pricing can reduce total system costs that are ultimately borne by ratepayers. Evolutions in retail pricing can also support renewable integration and electrification. Lew concluded by sharing three key points about the future,

including how large customers with energy intensive needs can submit price curves to express their price sensitivity. Although she admitted that this sounds futuristic, the Electric Reliability Council of Texas (ERCOT) is doing this today. She also described distribution pricing and the example of how Denmark has been using retailers and apps to work with real-time pricing.

### Advancing Time-Varying Rates

Mark LeBel, Senior Associate from the Regulatory Assistance Project (RAP), provided a research and academia perspective on ratemaking. He began by reviewing public policy goals and principles for setting rates, noting that managing tradeoffs is the hard part of utility regulation. LeBel illustrated a simplified ratemaking process for an investor-owned utility and then described the data inputs and other factors influencing the grid of the future, such as high penetrations of variable resources and electrification of transportation and heating. The grid of the future may look different from the grid of the past in being both decarbonized and decentralized.

On the generation mix, LeBel explained how it will vary based on location. In Arizona it is understandable that solar is a large part of the generation mix, but there's a question of degree and he described how the composition of the resource portfolio will influence cost and system operations. LeBel noted that it's important not to look at resources in isolation but rather to consider overall patterns and generation portfolios over time.

LeBel also described how utilities determine customer classes (e.g., residential, commercial, industrial) and plan for every hour of every year, not only peak times. He pointed to the distinct cost drivers of each function (generation, transmission and distribution) and the tradeoffs between capital, labor, fuel and other expenses. Traditional demand and energy classifications lead to questions about how to define these terms and fail to reflect time-varying energy costs. RAP has suggested eliminating demand energy classifications and moving to time assignment for cost allocation. This approach would build a cost-based time-of-day rate for shared elements of the system.

For designing programs, LeBel described the importance of making programs understandable to customers and making gradual transitions. He commented on tradeoffs in the length of pricing periods, their timing and how to offer customers choices as well as minimizing bill impacts. He presented examples from Burbank, California and Hawaii to illustrate peak pricing and ended by highlighting the virtues of gradualism and thinking ahead.

### California Time-of-Use Rates and Pricing Designs for the Grid of the Future

Paul Phillips, Supervisor of the Electric Rates Energy Division at the California Public Utilities Commission (CPUC), presented the regulatory perspective based on the ongoing evolution of time-of-day rates in California. He first provided an overview of California electric rates and

affordability, highlighting how forecasts of rates increasing faster than inflation are helping inform future rate designs. After outlining some geographic considerations and the role of electrification, he discussed the Flexible Unified Signal for Energy (CalFUSE) as a rate reform effort.

Phillips described wildfire expenses and transportation electrification as the current main cost drivers for revenue requirements and rates in California. As electrification increases, so will the load with a 60% increase in the evening ramp up of power use anticipated in 2030. Curtailment also continues to grow with both advanced time-of-day and CalFUSE seen as critical tools to solve this problem. Phillips presented the default residential time-of-use summer schedules for California’s investor-owned utilities, explaining that this structure was legislated with baseline credits. He noted that in the past California has taken a cautious approach to time-of-use and equity considerations with investment in outreach and marketing. The time-of-use rates have helped close the gap between wholesale and retail prices, setting a successful foundation for the future grid. Phillips cited shifts in EV charging and load reduction as evidence of positive impacts.

On rulemaking, the CPUC is in the process of adopting an Income Graduated Fixed Charge. In explaining the choice of CalFUSE over the status quo, Phillips described how integrating all components allows for scalability in the future, consolidation of the multiple time-variant rates, and improved capacity utilization at lower costs. He compared real-time pricing (RTP) to time-of-use, indicating how RTP can save customers money and result in greater demand flexibility. Finally, he presented the CalFUSE conceptual framework, outlining its pillars and elements and describing the proposed income graduated fixed charges. Phillips explained how CalFUSE would reform current statutes and streamline the income thresholds.

### Sacramento Municipal Utility District’s Time-of-Day Rate

Alcides Hernandez, Revenue Strategy Manager at the Sacramento Municipal Utility District (SMUD), presented the utility perspective. He first introduced SMUD as the sixth largest community-owned electric service provider in the United States and then shared their eight guiding principles for designing a rate structure.

Hernandez described SMUD as an early adopter of residential time-of-day rates, showing a timeline beginning in 2009. Next, he presented the residential time-of-day summer and non-summer rates, highlighting the simple rate design. About 3% of customers are on the alternative fixed rate plan, which allows for customer choice. Results from time-of-day programs have exceeded expectations for carbon reduction, residential peak load reduction, financial benefit and customer participation. Hernandez said that the time-of-day rates continue to reduce the residential peak. He showed a graph of a record-breaking heat event from summer 2022 where programs and messaging were key in helping SMUD meet the load.

Hernandez concluded by sharing lessons learned, including the role of customer communication and education and “test drive” opportunities for SMUD staff ahead of rollouts and pilot programs. He concluded by explaining how SMUD continues to assess and evaluate programs and how it must comply with Load Management Standard (LMS) regulation from the California Energy Commission. This encourages load flexibility and creates a database to support automated responses to time-of-use.

## Q&A

Participants in the facilitated discussion included external panelists Debra Lew, Mark LeBel, Paul Phillips and Alcides Hernandez. Arne Olson from E3 served as the moderator. Discussion topics included how to gain efficiencies in the system through pricing signals, the potential for reducing future resource builds through advanced time-of-day programs, the role and perspective of customers, how to deploy default rates, and customer education.

Olson first asked panelists to respond to the question of how evolution of time-of-day price programs could impact the ISP, encouraging them to consider rate design as a tool and how programs might affect resource decisions. Panelists commented on how time-of-day programs could potentially avoid the need for additional resources and infrastructure, noting how the example from SMUD showed cost savings. One consideration, however, is the difference in timescales, with a mix of long- and short-term benefits depending on the regulatory structure. Olson pointed to the [2025 California Demand Response Potential Study](#) with its categorization of varying load shapes based on customer behavior and other factors. In addition to learning how advanced time-of-day rates can impact load, panelists commented on creating greater value from distributed resources and gaining more efficiency in the system.

Panelists next addressed the topic of the scale of savings with time-of-day programs. Panelists explained that 130-140 MW of load reduction translates into the capacity of a power plant and helps achieve decarbonization goals. Given estimates that electrification may double future loads, this reduction becomes even more significant, especially if additional storage is not needed. One example is the target of 7,000 MW of load reduction set by California. Another factor is that time-of-day programs may offer benefits that are not yet recognized because they represent a significant shift in rate design and more possibilities may open up.

Olson commented on how customer response is a resource that can be drawn on in the ISP. Customer response becomes a relevant part of the planning process as it helps determine the load that must be served and how it might be reduced, which could result in avoided costs. In response, panelists noted that time-of-day programs are not a limitless resource, and that it’s possible the peak is simply shifted out of the peak window with some snapback effects. Panelists said it remains a tool in the toolbox to make best use of all other resources.



Tradeoffs with rate design were addressed next. A panelist described how guiding principles are revisited and updated to reflect different considerations, noting recent focus on decarbonization, equitable distribution of costs, simplicity, meeting the needs of low-income families, and providing flexibility and options with an emphasis on progress over perfection. Participation is important as customers become part of the solution, emergencies occur, and the climate continues to change. Other panelists commented on using gradual rate increases, offering peak use rebates and slowly adopting default time-of-use rates. Another idea was segmenting residential customer classes by income.

Conversation then shifted to principles of efficient rate design and pricing signals that would benefit the grid and reduce emissions while remaining understandable to customers. The customer perspective was raised as an important consideration, such as the ability to compare rate options and see how behavior influences costs. One approach would be for utilities to calculate the cheapest rate option for customers each month. Panelists noted the complexity of different baseline credits based on geography, tiers and other factors. Energy efficiency was cited as a factor that could be redefined, as was communication of time-of-day pricing, although a priority is avoiding overly complicated rate structures.

Education of customers was another topic with choice and broad communication cited as important factors. Panelists noted that when customers are more aware of time-of-year, time-of-day and pricing they are able to respond when asked to reduce usage, as was seen in summer 2022 when California residents reduced power use during a peak event. It was also described that windows for residential peak pricing were established using focus groups and pilot plans.

On default rates, panelists talked about differences between states and gave examples where programs started with very small differences in rate structures (i.e., pennies per kilowatt-hour). Given these small price differences for the customers, few people opt out of the time-of-day pricing. However, the point was raised that customer choice must be limited by what is best for ratepayers as a whole. Panelists commented on the potential of moving away from flat volumetric rates and moving toward sharper differentials between peak and non-peak rates. The idea would be to nudge behavioral change by setting default rates and giving fewer options but also communicating about saving money and reducing emissions. Enabling technology and interest in reducing carbon emissions were discussed as potential levers.

A final topic was how to involve people who are unable to respond to change and how to consider issues of equity. Panelists mentioned income-based customer charges, segmentation of residential classes on simpler rates, the challenges when a large proportion of the population is eligible for low-income programs and differential peak pricing. Other approaches include communication to households with medical needs, consideration of situations when temperatures are critical and smart pricing pilots. It was noted that customers are sensitive to price and utilities can make changes as they learn more.



## Closing Remarks

Bond-Simpson thanked the panelists and Olson for their presentations and discussion. In response to an earlier question of how time-of-day programs would impact the ISP, she explained that SRP is proposing to evolve programs using pricing signals and the feedback from today will help inform that evolution. She noted how important it is to consider the whole system and all the tools available to meet customer needs in the future. After describing upcoming Advisory Group meetings, she reminded attendees that the ISP study will be wrapping up in the next few months and will culminate in a recommendation to the SRP Board. Bond-Simpson concluded by expressing appreciation to all for attending.

## Appendix

### Meeting Attendance

Large Stakeholder Group and Advisory Group Organizations (groups represented on 7/12/2023 are shown in **bold**)

#### **AARP**

Advanced Energy Economy  
AEPCO  
AES Clean Energy  
Air Products  
American Lung Association

#### **AMPUA**

AMWUA  
Apache County  
Apache County Economic Development  
Apex Clean Energy  
Apple Inc.

AriSEIA

Arizona Cattle Growers Association

#### **Arizona Center for Law in the Public Interest**

Arizona Chamber of Commerce  
Arizona Commerce Authority  
Arizona Competitive Power Alliance  
Arizona Cotton Growers Association  
Arizona Energy Policy Group  
Arizona Farm Bureau  
Arizona Hispanic Chamber of Commerce  
Arizona Lodging and Tourism Association  
Arizona Power Authority  
Arizona Public Service  
Arizona Residential Utility Customer Office  
Arizona Solar Deployment Alliance  
Arizona Solar Energy Industries Association  
Arizona State Land Department

#### **Arizona State University**

Avangrid Renewables  
Atlas Renewable Power

#### **AzCPA**

AZ Thrives  
AZ PIRG  
AZ Strategies  
AZ Sustainability Alliance  
Balanced Rock Power  
Basha's  
Beatitudes Campus  
Boeing  
Building Owners and Managers Association (BOMA)

#### **Bureau of Land Management**

Calpine  
Candela Renewables  
Casa Grande  
Chicanos Por La Causa  
Christian Care Inc., Mesa District  
City of Apache Junction  
City of Chandler  
City of Mesa

#### **City of Phoenix**

City of Tempe

#### **CMC Steel, AZ**

CommonSpirit Health  
ConnectGen, LLC  
Coolidge  
Copper State Consulting Group  
Cushman & Wakefield  
Cyrus One

#### **Digital Realty**

DMB  
East Valley Chamber of Commerce  
East Valley Partnership

#### **Enel Green Power North America, Inc.**

Energy Exemplar, LLC  
Environmental Defense Fund  
EPRI

Facebook  
Forest Service U.S. Department of  
Agriculture  
Fort McDowell Yavapai Nation  
Freeport-McMoRan Copper and Gold  
Gamage & Burnham Attorneys at Law  
**General Electric**  
Gila Bend  
Gilbert  
Glendale  
Google  
Greater Phoenix Economic Council  
Greater Phoenix Leadership  
Greenlots  
Home Builders Association of Central  
Arizona  
Hospice of the Valley  
Innergex  
Intel  
Interwest Energy Alliance  
Invenergy  
JKL Consulting Services, LLC  
Kroger Co. (Ralphs and Food4Less)  
Kyl Center for Water Policy  
Local First Arizona  
Mercy Gilbert Medical Center/Dignity  
Health  
Mesa Community Action Network  
Mesa Gateway Airport  
Mesa Public Schools  
Microchip Technology  
Mitsubishi Hitachi Power Systems  
Americas, Inc.  
Navajo County  
New Leaf/Mesa-CAN  
New Life Christian Center, Coolidge  
NextEra Energy Resources  
Northern Arizona University  
NREL  
Onward Energy  
Origis Energy  
Orsted Onshore North America

PAC Worldwide  
Page  
Pattern  
Phoenix Chamber of Commerce  
Pinal County  
Profile Precision Extrusions  
Queen Creek Chamber of Commerce  
Queen Creek Unified School District  
Roosevelt Water Conservation District  
Salt River Pima-Maricopa Indian  
Community  
**SRP Customer Utility Panel**  
Scottsdale  
Seguro Energy  
Sierra Club  
**Southwest Energy Efficiency Project**  
Southwestern Power Group  
St. Johns  
St. Paul Church, Randolph  
Starwood Energy Group Global, Inc.  
Sustainable Energy Power Alliance  
The Nature Conservancy (Arizona  
Thrives)  
**Tierra Strategy**  
Tormoen Hickey, LLC  
Town of Florence  
Town of Springerville  
Tucson Electric Power  
United Dairymen of Arizona  
University of Arizona  
Valle Del Sol Strategic Initiatives: The  
Real Arizona Coalition  
Valley Partnership  
Veregy  
**Vote Solar**  
Walmart  
Wärtsilä North America, Inc.  
West Marc  
Western Grid Group  
**Western Resource Advocates**  
**Wildfire**

### Other Organizations in Attendance

Arizona Corporation Commission  
BayWa Renewable Energy  
HDR, Inc.  
Sacramento Municipal Utility District  
Strata Clean Energy  
Strategen

### Key SRP Staff

Adam Peterson, Director of Corporate Pricing  
Angie Bond-Simpson, Senior Director of Integrated System Planning & Support  
Domonique Cohen, Integrated System Plan Communications Lead  
Duncan Kraft, Planning Analyst for Integrated Planning  
Kyle Heckel, Senior Engineer for Integrated Planning  
Maria Naff, Manager of Integrated Planning

### Integrated System Plan Consultants

Arne Olson, E3  
Joe Hooker, E3  
Brisa Aviles, Kearns & West  
Jennifer Vazconcelo, Kearns & West  
Joan Isaacson, Kearns & West  
Michael Ding, Kearns & West

### Board & Council Observers

Chris Dobson, SRP District Vice President  
Anda McAfee, SRP Board Member  
Larry Rovey, SRP Board Member