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August 18, 2009

Arizona Corporation Commission
DOCKETED

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Kristen K. Mayes, Chairman
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

DOCKETED BY 

Re: Proposed APS Settlement Agreement; Request for Additional Information.
Docket No. E-01345A-08-0172

Dear Chairman Mayes:

This letter responds to your August 5, 2009 letter in the Arizona Public Service Company ("APS" or "Company") rate case docket regarding your inquiries about demand response ("DR"), which are the programs and mechanisms that encourage customers to reduce their demand for electricity during peak usage times. Your letter referenced both APS's *Demand Response & Load Management Program Study* ("DR Study"),¹ which detailed the Company's research on various types of DR programs, and the recently published Federal Energy Regulatory Commission ("FERC") report entitled "*A National Assessment of Demand Response Potential*" ("FERC Report"),² which estimates the DR potential, both nationally and for each state, through 2019.

This letter briefly describes the DR programs proposed in the pending Settlement Agreement in this docket. In response to your question on why other DR programs were not proposed as part of the Settlement Agreement, APS provides a description of a variety of additional DR programs the Company is currently pursuing on its own initiative. Finally, APS provides its comments on the FERC Report's estimates of DR potential for Arizona.

Background

As described by the Settlement Agreement, DR programs include not only customer programs that utilize various energy management devices, but also time-of-use ("TOU") rates, critical peak pricing rates, super peak time-of-uiser rates, and interruptible rates.³ DR can be a

¹ Filed in Docket Nos. E-01345A-05-0816, E-01345A-05-0826, and E-01345A-05-0827 on July 27, 2008.

² Issued June 2009. The Energy Independence Security Act of 2007 required FERC to conduct a national assessment on the potential for DR and report the results to Congress.

³ Proposed Settlement Agreement, Docket No. E-01345A-08-0172 (June 12, 2009) at section 20.1.

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valuable resource because it can reduce the amount of energy at peak times, like hot summer afternoons, when the most expensive generation resources are called into service. Thus, DR serves in peak load conditions – similar to a peaking power plant, such as a combustion turbine – in critical but limited hours each year.

APS's DR Programs Tie to Load Forecast and Resource Need

The value of demand response programs is based on the capacity needs of the utility. Over the last couple of years, APS's load and resource picture has changed significantly due to: 1) the execution of renewable contracts to satisfy Arizona's Renewable Energy Standard;⁴ 2) anticipated increases in energy efficiency programs; and 3) the current downturn in the national and state economies. While the primary goals of renewable energy and energy efficiency programs are energy related (for example, to reduce the amount of kilowatt hours needed from fossil generation, manage carbon emissions and reduce natural gas usage), some renewable resources, like solar, bring with them a sizeable capacity benefit. Therefore, due to the demand related benefits of some renewable resources and increased energy efficiency programs, APS does not expect the need for additional capacity until after 2015. The result is that there is less benefit from DR programs in the near-term; however, DR programs are valuable in the long-term. APS recognizes that it cannot wait until 2015 or later to put new customer programs in place. These programs take several years to develop and implement as evidenced by the preparation and ramp-in time required for the Commercial and Industrial DR program described in more detail below. For these reasons, APS is initiating programs in a justifiable manner.

DR as Part of the Settlement

APS believes that demand response is an important resource that can economically meet a portion of the Company's future peaking resource needs. As part of the current Settlement Agreement, APS is proposing dynamic pricing programs similar to those discussed in the FERC Report. These programs are described below.

Critical Peak Pricing – APS is also proposing a critical peak pricing pilot program for general service and irrigation customers. Critical peak pricing is specifically mentioned as a form of dynamic pricing in the FERC Report.⁵ These programs are TOU rate plans that provide an extremely high price signal during a limited number of critical hours on critical days. Participating customers would be notified a day in advance to alert them that a critical day will occur and the hours that the "event" will cover. During those hours, customers must respond by reducing consumption to avoid paying the increased price. For the general service and irrigation customers, with a minimum 200 kilowatts per hour of usage reduced (the minimum required for customers to participate under this rate), APS has estimated a savings of 60 megawatts for each of the summer months for every 300 commercial and industrial customers that subscribe.

⁴ See A.A.C. R14-2-1801 through 1816.

⁵ See FERC Report at p. 22.

The Settlement Agreement also provides for a residential critical peak pricing pilot program designed to provide participating residential customers with clear price signals that are narrowly focused on a limited number of time-specific hours each year. The Company will notify participating customers of each critical peak period one day in advance of the commencement of the critical peak period. Under APS's analysis, the Company is initially anticipating that for every 300 residential customers that subscribe to this rate, there would be a peak savings impact of approximately 0.27 megawatts for each of the summer months. Without experience, APS is unable to accurately predict the level of customer participation for either of the critical peak pricing rates.

Super Peak Pricing – In addition to those programs specifically addressing “dynamic pricing” as detailed in the FERC Report, APS is also proposing a new residential time-of-use rate that contains a “super peak” period (from 3:00 – 6:00 p.m.) during the most critical summer hours (June through August). During the super peak period, the cost of electricity will be priced substantially higher, but it will be offset by reduced charges for the off-peak period. Under its initial analysis, APS is anticipating that for every 300 residential customers that subscribe to this rate, there would be a similar peak savings impacts the residential critical peak pricing program of approximately 0.27 megawatts for each of the summer months. The amount of customer participation that can be expected in these new rates is unknown. For both residential programs, the peak savings estimate is based on the assumption that actions taken under this rate would reduce a customer's usage by approximately 15% during the critical peak or super-peak period.

Dynamic Pricing Study – To better understand the impact of the super peak and critical peak pricing programs on the overall resource portfolio of power generation resources, air emissions, and energy use by program participants, APS is required under the Settlement Agreement to prepare and file a study on the impact of its super peak and critical peak pricing programs. The study will also identify methods to better integrate DR and energy efficiency programs, and will analyze the benefits of the DR programs. The study will examine actual experience with APS's DR programs over a significant period. The study must be filed with the Commission within two years of the decision regarding the Settlement Agreement.

Interruptible Rates – Additionally, APS, in consultation with Staff and interested stakeholders, will develop an interruptible rate or other DR program for customers with energy loads over three megawatts. Under this rate, customers will receive credits based on avoided capacity costs for firm load reductions during specific periods, when notified by APS. Customers will have options regarding duration, frequency and notice requirements.

Additional DR Programs

While the Settlement Agreement does not call for additional DR programs, APS is fully committed to implementing additional programs and is currently evaluating and, in some instances, pursuing other DR resources. In its DR Study, APS identified four programs that had the potential for implementation in the near-term: Commercial and Industrial Load Management;

Residential Direct Load Control; Standby Generation; and Thermal Energy Storage. APS took early action to implement a Commercial and Industrial Load Management Program and earlier this year received Commission approval to move forward. Details of that program are discussed in more detail below. Since filing the DR Study, the Company has continued its research of the other three programs, as described below.

Residential Demand Response Program – The DR Study identified residential DR program as having potential for high cost-effectiveness. During 2009, APS has engaged numerous market leaders with expertise in residential DR programs to better understand enabling technology offerings, marketing strategies, market penetration, and measurement and verification approaches. As the FERC Report noted, there are a number of new technologies emerging related to the smart grid that may provide opportunities for residential customers.⁶ APS believes the integration of a residential DR program into the broader “smart grid” implementation is in the best interest of the customer and the Company. It is APS’s goal to ensure that any residential DR program offered will be robust enough to meet customers’ needs into the future. APS is currently exploring communications protocols, market participants, and both existing and emerging technologies, such as “smart” thermostats, the ability to access customer energy usage through the Internet, as well as sophisticated in-home displays.

APS believes that there is a potential of between 100 and 200 MW from residential DR programs that may be available in the APS service territory. APS is evaluating whether it will be most effective to contract with an experienced DR provider or to develop an APS residential DR program in-house. In either case, during the first half of 2010, APS intends to formally engage the marketplace for residential DR solutions, after which APS intends to file with the Commission for approval of a residential DR program. The Company expects that it will take three to five years to fully ramp up this program to its full capacity, which aligns with the APS resource plans capacity needs.

Standby Generation – Standby generation programs use customer-owned standby units, typically run on diesel fuel or natural gas, which are called upon by the utility to reduce loads. Standby generation, specifically when located within a load pocket, provides the added benefit of increasing the electric system’s reliability by reducing the stress on grid components, supporting local voltage levels, and increasing the diversity of power supply. There appears to be 50-100 megawatts of available capacity from standby generators located inside the metropolitan Phoenix load pocket.

To implement a standby generation program in APS’s service territory requires additional study to assess the the emissions impacts of these generators, as well as operational considerations, including any limitations on availability due to emissions permit restrictions. APS has been meeting with vendors who specialize in this sector to further understand these issues and more accurately assess the potential of this program.

⁶ See FERC Report at 47.

Thermal Energy Storage – Thermal energy storage programs typically assist customers in acquiring and installing ice or chilled water storage systems that are used to shift air conditioning load to off-peak hours on a daily basis. This is accomplished by using the chiller equipment to either make ice or chilled water in the off-peak hours, and then using this thermal energy to cool the customer site during the on-peak hours in lieu of running the chillers. This effectively shifts the cooling load for a building to the nighttime hours when it is less expensive for the utility to generate electricity. Thermal energy storage is most applicable to large commercial facilities or to district cooling systems; however, smaller systems applicable to small commercial customers are becoming increasingly available.

During 2009, three different departments at APS (the “Project Team”) partnered to develop a potential pilot of thermal energy storage technology on one or more APS facilities (“Pilot Project”). To assist in this endeavor, the Project Team also engaged a consulting firm with extensive experience with thermal energy storage to test the efficacy of thermal energy storage technologies in the Phoenix metropolitan area and, if successful, to determine the appropriate incentive mechanism to stimulate customer adoption. The Project Team targeted an APS-owned facility, intending that once the installation was completed, it could be used as a showcase facility for APS customers interested in these technologies.

After the completion of the efforts related to this potential Pilot Project, the Project Team determined that the Pilot Project does not appear to offer the requisite value proposition to warrant pursuit by APS on behalf of its customers. The costs to install the systems were too great to justify any action. In order to accomplish a full shift of cooling load to the off-peak period, the relative systems must be oversized instead of right-sized, as compared to the original chillign equipment. APS concluded that due to the large investment needed to implement this technology, a thermal energy storage program offers no economic benefits at this point. APS will continue to monitor the technology and reassess a potential program as installed costs decline.

Vehicle-to-Grid – In Decision No. 71104, the Commission ordered APS to conduct and file a vehicle-to-grid (“V2G”) feasibility and cost benefit study, and to propose a V2G program for the Commission's consideration, no later than April 2010. The V2G technology refers to electric vehicles that can both receive power from and transfer power back onto the power grid. The two-way plug capability will allow a utility to potentially take advantage of the extra electrical storage capacity in the vehicle batteries to meet peak demand, provide grid support services, or respond to power outages. To fully understand the future equipment availability, the scope of the study was broadened to include the five key areas of analysis: 1) the current and future state of electric vehicle charging equipment and standards for both plug in hybrid and full electric vehicles; 2) the market uptake of these vehicles and factors that may limit them in the APS service territory; 3) the impacts that the charging of electric vehicles may have on the APS energy delivery system; 4) the current and future state of equipment for V2G technologies and acceptance of the technology by standard communities, manufacturers, and end users; and 5) forecast of the number of vehicles available for a V2G program and model the value of the

energy available to support grid requirements (using data from Steps 2 and 4). From this comprehensive study, APS expects to have the overarching values and analysis to develop a program plan to be presented to the Commission. APS has engaged Navigant Consulting to perform the study, which is currently underway.

In addition to the DR programs that are currently in the research and planning stages, APS has one DR program that has been approved by the Commission and a cost benefit and feasibility study underway in another area, as described below.

Commercial and Industrial DR – In June 2009, the Commission approved a demand program for commercial and industrial customers (“C&I Load Management Program”).⁷ APS has contracted with Alternative Energy Resources, Inc. to provide 100 megawatts of load reduction through this program. The program offers eligible C&I customers financial incentives to reduce their electricity usage during APS’s summer peak periods. Offers to customers will begin starting in September 2009. The system peak reduction will be accomplished through a combination of direct load control and manual load reductions at each customer’s site. APS has contracted with Alternative Energy Resources, Inc. to provide 100 megawatts of load reduction. APS anticipates that up to 10,000 customers may ultimately participate in this program. The program will be phased in over a three-year period (2010-2012), with a ramp-up of approximately 30-35 megawatts per year.

The FERC Report

In June 2009, FERC released “*A National Assessment of Demand Response Potential*” with five and ten year horizons, which fulfilled three of FERC’s responsibilities pursuant to the federal Energy Independence and Security Act of 2007.⁸ As the FERC Report itself states, the analysis reflected in the report was “in fact estimates of **potential**, rather than **projections of what is likely to occur**” (emphasis in the Report).⁹ The FERC Report is clear that the estimates of potential should not be interpreted as targets, goals or requirements and that no specific programs or measures are recommended.¹⁰ Instead, they are intended to serve as a reference for understanding the potential approaches to pursue increased levels of DR.

The FERC Report considered the effect of increasing participation in a variety of DR programs, such as dynamic pricing, direct load control, and interruptible rate tariffs, among others. As part of the analysis, FERC compared four scenarios: Business as Usual, Expanded Business as Usual, Achievable Participation, and Full Participation. The assessment also provided estimates of DR potential for each of the fifty states and the District of Columbia. The

⁷ Decision No. 71104.

⁸ 16 U.S.C.A. § 2621.

⁹ FERC report at 18.

¹⁰ *Id.*

FERC Report is intended to be a working tool in developing DR; the model used to perform the analysis is publicly available on the FERC website.¹¹

The FERC Report states that under a full participation scenario, Arizona could achieve 6,200 megawatts of DR by 2019, or a 27.7% load reduction. Applying this percentage to APS suggests that we could reduce our peak load by 2,383 MW in 2019. The Company estimates that approximately 40% of the DR potential identified in the FERC Report may come from APS's service territory.

However, there are very serious flaws in the data and assumptions, as it relates to APS service territory and Arizona, that significantly impact the FERC Report estimates. For example, in the Business as Usual case, which assumes the same level of DR today will exist over the next ten years, APS's C&I DR program is not included. Neither does it appear that the DR program currently being implemented by Salt River Project has been included. As a result, the data that is compared to the Business as Usual case will be skewed.

Additionally, the dynamic pricing¹² studied specifically excluded TOU rates. TOU rates provide higher prices during peak periods and lower prices during off-peak periods, with a goal of incenting customers to shift their energy consumption patterns to time periods where it is less expensive for the utility to supply the power. Although the FERC Report recognized that TOU rates represent a way of reducing peak demand over the long-run and reducing the need for peaking generation units, they were ignored in the Report because: 1) they allegedly could not be used to produce reductions in peak demand during critical periods; and 2) although TOU rates have been in existence for a long time, their penetration of the market, especially for residential and small commercial and industrial customers, has been limited.¹³

Clearly, the second factor does not hold true for APS customers, as APS currently has the highest customer participation in the nation for residential TOU rates, with over 453,000 participants in four rate plans, or approximately 46% of our residential customers, as of December 2007. Notably, the FERC Report acknowledged that Arizona has the largest residential TOU program in the U.S.¹⁴

The interplay between the TOU programs and customers' already-conditioned behavior rates is unknown at this time. To the extent APS's TOU customers have already reduced their usage during peak hours due to TOU rates, it is likely that the FERC Business as Usual analysis already captured some of the DR potential identified in the study. Thus, additional reductions would be correspondingly limited.

¹¹ Statement of Chairman Jon Wellinghoff on Demand Response Report (June 18, 2009), available on FERC website (ferc.gov).

¹² Dynamic pricing is defined as "a family of rates that offer customers time-varying electricity prices on a day-ahead or real-time basis." FERC Report at 21. The rates are considered dynamic because the prices change in response to events such as unexpectedly hot days, high-priced hours, or reliability conditions.

¹³ *Id.* at 48.

¹⁴ *Id.* at 87.

Addressing another factor, the FERC Report did not take into account “snapback” effect. “Snapback” refers to the amount of energy that was not consumed during the DR event that will still be consumed immediately before or after the event. For example, in an air conditioning cycling scenario, snapback could be from pre-cooling before the DR event or from the additional air conditioning unit run-time after the conclusion of an event needed to restore the space to a preferred temperature level. A snapback sensitivity analysis (which is absent in the FERC analysis) generally demonstrates that the DR program benefits would be dramatically reduced if customers shifted their energy usage to periods before and after the DR event window. APS believes this is a critical factor that must be considered where a significant portion of the DR potential is air conditioning related, as it is here in the southwest desert. APS will be quantifying the snapback effect in its C&I Load Management Program.

The most significant reason the FERC study overstates the DR potential in Arizona is that the intentionally simplistic model fails to recognize the load shape in Arizona, and the fact that DR is a limited resource. The FERC Report assumed that DR can be called upon for the fifteen highest load days of the year, for four hours per day. In reality, DR can only be called upon a limited number of times per season, per month, and only a few hours in a row. But even if you could reduce customer load by 2,383 megawatts for the 60 hours (15 days for four hours per day), Arizona utilities would achieve only a fraction of the demand reduction on their systems. For example, assuming that APS could reduce the peak load on its projected peak day in 2019 for four hours through DR by 2,383 megawatts, resulting in a new peak of 6,220 megawatts in that four-hour period, APS’s load in the fifth hour (immediately outside the DR event window) would be 8,088 megawatts. Therefore, APS would only really achieve a peak load reduction of 515 megawatts, or 6%, rather than the 2,383 megawatts reduction claimed by the FERC Report.¹⁵ Attached is a projected peak day load shape to illustrate this point. (See Attachment A). In addition, for APS to achieve the 2,383 megawatts reduction claimed by the FERC Report, APS would have to declare DR events for far more than the sixty hours assumed in the Report. Also attached is a projected load duration curve for 2019 to illustrate this point. (See Attachment B.) A load duration curve is a plot of a utility’s hourly loads over the course of a year (8760 hours), ordered from highest load to lowest load. From this curve, it can be seen that APS expects its load to exceed 6,220 megawatts for approximately 937 hours in 2019.

¹⁵ For a more detailed description of this form of analysis, please see Section 3.6 of the DR Study. The 6% of peak demand shown in this example is consistent with the independent calculation performed by APS. In that analysis, APS estimated that between 2-5% of its system peak could be met economically with DR while ensuring that – similar to this example – APS did not pay for a demand reduction that did not provide the intended impact to its load duration curve.

Kristen K. Mayes, Chairman

August 18, 2009

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I hope that the information provided effectively responds to your inquiry. APS will present witnesses at the Settlement hearing that will be able to respond to any further questions you may have regarding demand response.

Very truly yours,



Thomas L. Mumaw

TLM/na

Attachments

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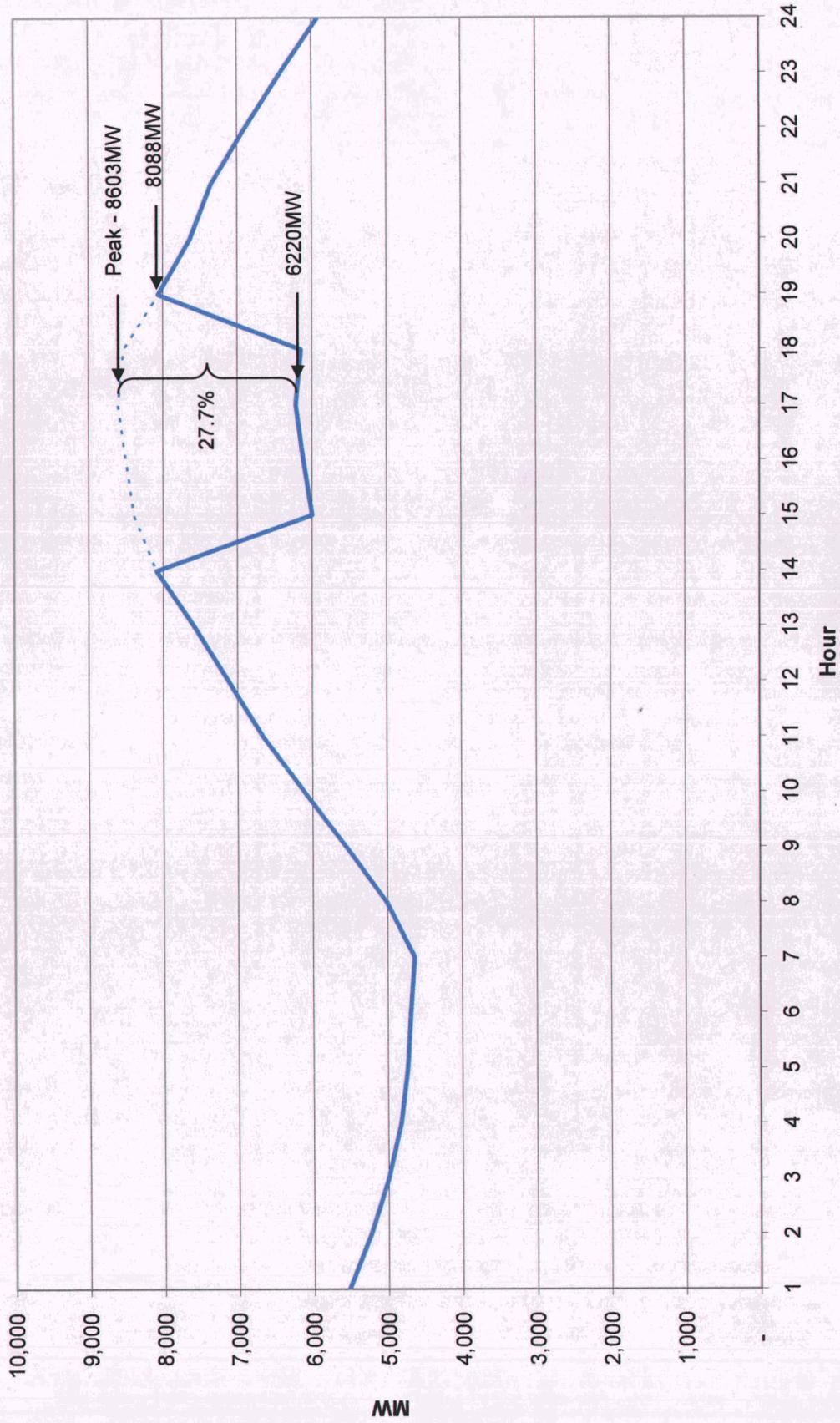
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Attachment A

APS Projected Peak Day Load
in Year 2019



Attachment B

APS Load Duration Curve
Year 2019

