

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

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Reliability Technical Conference)	Docket No. AD14-9-000
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**REMARKS OF BRAD ALBERT
GENERAL MANAGER, RESOURCE MANAGEMENT
ARIZONA PUBLIC SERVICE COMPANY
JUNE 10, 2014**

Good morning Commissioners, staff and fellow panelists. Thank you for the opportunity to address the Commission on this very important topic. My name is Brad Albert. I am the General Manager of Resource Management for Arizona Public Service Company (APS). At APS, my areas of responsibility include long-term resource procurement, fuel supply including commodity and interstate pipeline capacity, all wholesale electric market activities, and resource commitment down to real time operations. I joined APS in 1984 and have worked in a variety of trading, risk management, and planning functions during my career.

APS is a vertically-integrated electric utility and provides electricity to 1.2 million customers in 11 of Arizona's 15 counties. Additionally, APS is an owner and operator of transmission. APS's diverse energy portfolio comprises over 9,100 MWs of electric resources both owned and purchased and transmission and distribution lines covering more than 33,000 miles. Our renewable energy production is expected to meet approximately 12% of our customer energy needs this year.

In the remainder of my remarks, I will offer a few observations on reliability issues created by increases in renewable energy and the challenges due to the misalignment of the gas pipeline business practices with our electric system reliability needs.

APS has seen a tremendous growth in the amount of solar photovoltaic (PV) on our system. We currently have about 500 MWs of solar PV, of which 350 MWs is roof-top solar, sometimes referred to as distributed generation. The remaining 150 MWs is utility-scale, the largest of which is 35 MWs at a single location.

We also have a 250 MW solar thermal plant that began operations last fall. This is much different than solar PV. This solar thermal plant is actually a dispatchable resource due to the incorporation of 6 hours of thermal energy storage into the facility design. This energy storage feature allows it to contribute to meeting our peak customer loads during all times of the year.

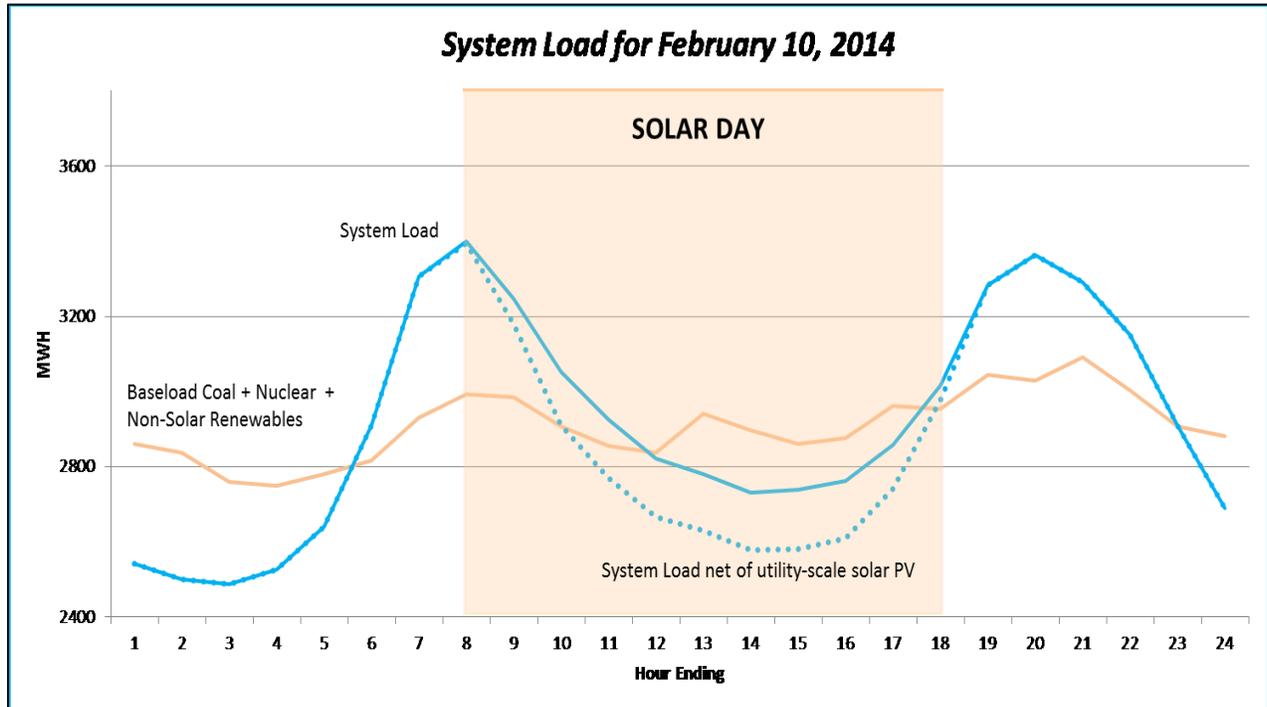
Although the increasing amount of solar PV on APS's system creates a number of challenges, APS continues to operate the system in a reliable manner. However, there are several things that we think are vitally important for the future, especially with the potential for continued growth of distributed generation.

First and foremost, having the right types of generating equipment on our system is essential. The potential growth of renewable energy—particularly in solar-rich areas such as Arizona—is significant and transformative. At the same time, supply intermittency is projected to be a greater factor in day-to-day power operations and will require complementary resources, such as quick-starting combustion turbine natural gas generation, to respond quickly to changes on the electric grid while continuing to reliably meet customer demand.

To manage intermittency, it is important to have flexible assets available which can adjust their output levels quickly to support system generation needs. Ramp rates reflect how fast power plants can increase (ramp up) or decrease (ramp down) generation to balance the system. These flexible assets must be able to start and stop quickly, sometimes more than once a day. The shorter the start-up time, the faster a power plant can supply energy into the grid. Customer demand and renewable generation are both variable and go in opposite directions in the late afternoon and early evening hours when customers increase power consumption as solar power production decreases. Furthermore, the impacts of cloud cover will be magnified with the growth in solar PV generation.

It is important to note that not all gas-fired generation is the same. For instance, we are finding that combined cycle generating units are not as effective in meeting our non-summer system needs due to the changing load patterns caused by solar PV and the characteristics of combined cycle generation. Combined cycle generating units have relatively high startup costs and relatively high minimum loading levels when they are on line. Due to the high startup costs and other operating restrictions, these types of generating units are typically only started once per day. However, this presents a different set of challenges during the daylight hours when solar PV is producing because the relatively high minimum loading level inherent with a combined cycle generating unit oftentimes requires less expensive generation resources to be backed-off. The following graph illustrates this point. This graph shows a typical winter day from February of this year. The graph shows how solar PV penetration has increased our winter operational challenges. Our net system load (solid blue line, note that this includes the impact of roof-top solar PV) decreases during the daylight hours to levels more typically seen during the traditional off-peak hours (early morning). On this day, the net system load drops well below the level that our less expensive base-load generating resources are capable of operating at. This means that

these less expensive resources must be either backed-off or sold into the wholesale electric markets (if market conditions permit) to make room for natural gas generation during the mid-day period.



To address the issue of having the right types of generating equipment on our system, we have undertaken a project to add 500 MWs of quick-start, highly flexible gas peaking units to our generation portfolio. This project is expected to be completed by 2018 and will improve our capability to address the challenges of solar PV.

A second area of focus to manage the challenges of increasing renewable generation is improving our solar forecasting capabilities. For much of the year, solar is a fairly predictable resource in Arizona. We have many days with very little cloud cover and very good predictability of our solar production.

However, accurately forecasting our solar energy production (both utility-scale and customer-sited) has become a much more significant issue for us as our solar energy increases. Our solar production levels are now significant enough to affect everything from our unit commitment decisions, wholesale market activities, natural gas commodity purchases and gas pipeline nominations.

We are devoting significant attention to improving our forecasting techniques and to learning from actual operating experience. Solar production forecasting is a new and evolving field and I expect that we will see much progress made in the coming years similar to what has been experienced with wind forecasting.

In addition to the increasing levels of renewable resources and their potential impacts on reliability, **another area of concern which APS is very focused on are the issues associated with the increasing reliance on natural gas.**

For APS and the Desert Southwest, natural gas generation is a critical part of our generation portfolio and it is critical to providing reliable service to our customers. At peak load conditions on a hot summer afternoon in Phoenix, more than half of our generation is natural gas fueled. APS's standard practice is to enter into long-term firm gas transportation contracts with the pipelines to ensure that we have sufficient pipeline capacity to meet our peak usage needs. At this time, we have already secured sufficient firm transportation rights to meet our expected natural gas needs for the next several years.

Electric loads are largely driven by weather conditions. In addition, there are unforeseen circumstances that may impact the electric system such as a generating unit tripping offline due to mechanical issues, an intermittent renewable resource dropping generation, rapidly changing weather affecting the

customer demand, or other operational needs. These circumstances require action to maintain the balance of the electric system. Even though electric utilities are required to have adequate generation resources online or available within ten minutes to respond to the largest loss on their bulk electric system APS can face challenges accessing fuel supply as the gas transportation may not be accessible when needed to respond to these reliability challenges. While natural gas generation is typically the resource set aside to respond to these unexpected events or contingencies and utilities like APS are contracting for the required amount of firm transportation capacity to address these events, the existing business practices do not guarantee that the pipeline capacity will be available when needed.

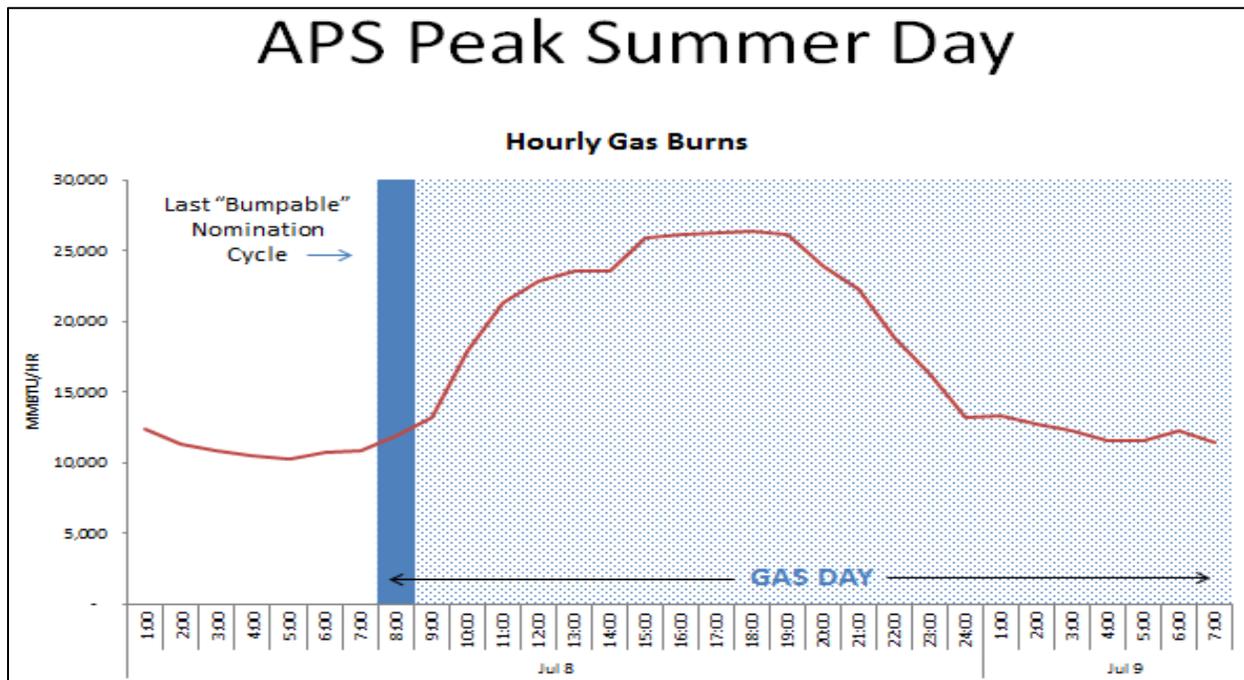
The Desert Southwest, including Arizona, does not have any market area gas storage and we are dependent upon three different natural gas pipelines to service our power plants. While geologically the region may be receptive to salt cavern storage, the demand for and protections associated with water in the desert make the development of such projects very complex and costly. This lack of local market area storage makes it difficult to respond to unexpected changes in demand associated with contingencies such as a unit outage or a change in weather.

To resolve the current misalignment of gas nomination cycles with our customer peak demand periods, we have been actively engaged in the dialogue on gas-electric coordination to develop solutions. We are supportive of FERC's efforts and involvement in this matter.

For APS, this is a key reliability issue. Both the transportation capacity and the natural gas commodity are required to respond to the changing system generation demands.

Existing business practices do not allow shippers to have guaranteed intraday access to the full quantity of their firm transportation capacity to meet their peak demands or any other operating contingencies.

Currently, the last "bumpable" cycle nomination deadline is at 8:00 AM Pacific Clock Time (PCT) in the Desert Southwest. This means that a utility's only opportunity to modify its gas nominations and have guaranteed access to its firm capacity occurs at the beginning of the Gas Day -- which is hours before the beginning of its peak consumption periods. Despite having purchased firm pipeline transportation capacity, the current National American Energy Standards Board (NAESB) Nomination Timeline provides a firm contract holder with no guaranteed ability to be able to respond to operating contingencies (e.g., cloud coverage that reduces solar output, a generator tripping while coming on line, hotter than expected weather) that arise throughout the Gas Day, including the afternoon peak.



The later intraday nomination cycles with firm bumping rights proposed in the FERC NOPR¹ are particularly important to us. In the summer, our peak load does not occur until on or after 5:00 PM local

¹ On March 20, 2014, FERC issued a NOPR to gather public comments on its proposals to revise the natural gas operating day and scheduling practices used by interstate pipelines to schedule natural gas transportation service. The proposed revisions include starting the natural gas operating day earlier, moving the Timely Nomination Cycle later, and increasing the number of intraday nomination opportunities to help shippers adjust their scheduling to reflect changes in demand.

time (or 7:00 PM Central Clock Time). This will improve our ability to deal with real issues like load forecast uncertainty and generating unit performance.

These later nomination cycles will also help us to address the inherent uncertainty of solar energy production by allowing us to adjust our gas nominations based upon what has happened during the solar production day.

It is also worth noting that APS has the capability to transact in the natural gas commodity markets and/or adjust our pipeline nominations on a 24 hour basis. We have staff on-shift at all times with the capability to respond.

I want to thank the Commission for this opportunity to share our views and I look forward to answering any questions.