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Arizona Corporation Commission

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Docket Control
Arizona Corporation Commission
1200 W. Washington St.
Phoenix, AZ 85007

DOCKETED BY 

Re: *AEPCO's Compliance Filing of the Apache Station Study and Notice of Delivery of the Apache Station Study to the Director of the Utilities Division; Decision No. 74173 (the "Decision"); Docket No. E-01773A-12-0305*

Dear Sir or Madam:

Pursuant to the Second Full Ordering Paragraph at page 22 of the Decision, enclosed are the original and 13 copies of the non-confidential Executive Summary of the results of AEPCO's SRPG study ("Apache Station Study").

Notice is also given that this date a copy of the complete Apache Station Study has also been hand-delivered to Steve Olea, Director of the Commission's Utilities Division.

Very truly yours,

GALLAGHER & KENNEDY, P.A.



By:

Michael M. Grant

MMG/plp
10421-67/4297701
Enclosure

cc (w/enclosure) (mailed): Mike Patten and Russ Jones, Attorneys for Trico
Jeff Crockett, Attorneys for SSVEC
Mike Curtis and Bill Sullivan, Attorneys for MEC

Original and 13 copies filed with Docket Control this 30th day of June, 2014.

1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

Arizona Electric Power Cooperative, Inc. (AEPCO) is a generation and transmission (G&T) cooperative serving five distribution cooperatives in Arizona and one in Southern California. Three of the distribution cooperatives are all requirements members (ARM or ARMs) and three are partial requirements members (PRM or PRMs). Aside from the power required to be purchased to meet retail net metering regulatory requirements, the ARMs contract with AEPCO to provide the resources necessary to serve their load. The PRMs satisfy their load through their respective Allocated Capacity (AC) in AEPCO Resources and must obtain supplemental resources on their own behalf to meet any of their additional requirements. AEPCO expressly is not obligated to plan for or meet any PRM supplemental resources, but AEPCO and each PRM may agree to joint planning. These arrangements between AEPCO and each of its members are set out in wholesale power contracts, which have been approved by the Arizona Corporation Commission (ACC) and are in effect through 2035.

Currently, AEPCO's power supply comes primarily from the Apache Generating Station (Apache Station) in Cochise County, Arizona. The Apache Station consists of three steam units and four gas turbines with a combined nominal generating capacity of 555 MW (net). AEPCO also has a Federal hydro allocation and, from time to time, enters into purchase power contracts to supplement its generation. For purposes of this report, hydro allocations and purchases account for 32.6 MW (net) of additional AEPCO capacity.

In mid-2012, AEPCO was advised by the Environmental Protection Agency (EPA) that, under the Clean Air Act's regional haze rules, AEPCO would need to install Selective Catalytic Reduction (SCR) technology on ST2 and ST3 by the end of 2017 if AEPCO intended to continue to operate them as coal-fired units. Due to the high capital costs of this SCR approach (estimated to exceed \$200 M in 2012\$), AEPCO initiated processes to address this "Federal Implementation Plan" (FIP) as prescribed by the EPA, one of which was an internal study of potential outcomes for these units considering various alternative solutions to regional haze and potential future environmental regulation of coal-fired resources. In late 2012, representatives of AEPCO's member cooperatives joined in the study effort.

As a result of these efforts, AEPCO – working with EPA staff through the Arizona Department of Environmental Quality (ADEQ) – in early 2013 proposed an "AEPCO SIP Alternative." It has been now published and publicly aired by ADEQ as a SIP revision. EPA has also agreed to process it through a

revised SIP procedure. This AEPCO SIP Alternative consists of retaining one coal-fired unit (ST3), modified to enable its operation with Selective Non-catalytic Reduction (SNCR) technology, as well as modifying the gas firing infrastructure of the other coal-capable unit (ST2) to be fired on natural gas which delivers an improved emissions profile. In addition, the AEPCO SIP Alternative includes capital projects to improve the emissions profile of ST1, a 72 MW natural gas-fired unit at Apache. The capital costs of this plan are estimated at less than \$32 M, as opposed to the more than \$200 M cost of meeting the initial EPA FIP.

The EPA's release of its FIP came shortly after AEPCO had filed a rate case (Docket No. E-01773A-12-0305) at the ACC. To address ACC Staff's concerns with respect to the continuing viability of Apache in the face of, without limitation, the EPA FIP, other expected future environmental regulations and conditions affecting the operation of ST1, ST2 and ST3, AEPCO agreed to continue its alternatives analysis so as to produce this Apache Station Study (Study). AEPCO would also confirm its assumptions with respect to the costs of replacement assets or PPA alternatives through a Request for Information (RFI), which is a process similar to a Request For Proposal (RFP). This report documents the results to date of both the technical studies and the RFI process that AEPCO used to confirm the validity of the market prices used in the Strategist models of the Study.

The Study analyzes the operational and investment costs and other relevant factors associated with the ongoing operation of coal and gas-fired facilities at Apache Station compared against other power supply alternatives. Alternatives considered include:

- capacity and energy purchases;
- purchase of existing supply resources;
- different operating configurations of the two steam turbine units;
- construction of new natural gas-fired resources; and
- replacement purchased power agreements (PPA) with associated transmission upgrades.

The Study captures the effects of, *inter alia*, existing debt obligations, new capital investment, changes to operations and maintenance (O&M) practices, and capital and associated O&M costs that may be required at Apache. The Study also considers the potential availability of a "distressed asset" based on the recent trend of certain efficient combined cycle generating units being purchased by electric utilities in Arizona at prices of 50 percent or less of new build costs.

The Study examines alternative resource configurations for compliance with EPA Regional Haze rules under two potential load scenarios¹ and under two different power market, natural gas and coal forecasts (Wood Mackenzie and ACES). The Study also takes into account potential costs of resolving current constraints on the capacity of the Southwest Transmission Cooperative, Inc. (SWTC) transmission system to accommodate both the spot market purchases required in the event of the outage of the remaining coal-fired unit as well as delivery to member loads of the output of any newly acquired replacement resources. Finally, the Study examines what would be an economically viable resource plan under a hypothetical load scenario (Scenario 3) that assumes the PRMs join with AEPCO in acquiring additional resources to supplement existing Apache resources to serve expected PRM future load growth.

The results, as summarized in Section 1.2, indicate that the AEPCO SIP Alternative together with the consent of AEPCO's members to continue operation of the other gas-fired resources at Apache beyond 2020 through 2035, is the most economically viable resource plan. The results show the primary driver of energy rates will be future market and natural gas prices. They also show that under the AEPCO SIP Alternative, AEPCO's fixed capacity and O&M costs are not expected to rise to any noticeable degree over the long term. Further, the Study shows that the AEPCO SIP Alternative represents a solid foundation from which to plan for the hypothetical PRM load growth of Scenario 3.

Also, the results of the RFI associated with the Study suggest there are distressed assets currently available, although not necessarily in the sizes assumed in Strategist, that AEPCO and its PRMs could purchase economically as a replacement for the base load portion of ST2's historic operation (which is approximately 100 MW). However, larger portions could also be used to satisfy future load growth. In either case, ST2 operated on natural gas would be a summer season peaking resource. If such a distressed asset resource could be found in proximity to member loads, AEPCO could avoid additional transmission for serving load growth and limit the need for incremental transmission capacity to ensure backup of ST3. AEPCO and its members are continuing to explore among themselves and with RFI bidders the possibilities of acquiring a correctly sized portion of such resources and related transmission capacity to realize such an opportunity. Thus, the planning efforts of AEPCO and its members on these issues are ongoing.

¹ Load Scenario 1 reflects AEPCO's current wholesale contract obligations to the ARMs and PRMs. Load Scenario 2 reflects amending the wholesale contract obligations to retain the operability of existing gas-fired units at Apache Station beyond their current end of 2020 commitment.

Finally, it is noted that on June 2, 2014, the EPA released its draft of a proposed regulation of greenhouse gas emissions from existing generating units (Clean Power Plan). The draft proposal, which includes state-specific goals for reductions in CO₂ emission rates, appears to have a potentially serious impact on coal-fired resources in Arizona, but it is a long way from being a final rule. Because the impact to existing resources will not be known until a formal rule is adopted and states then develop their individual plans, AEPCO and its members cannot determine at this time what ultimate impact the final rule and its implementation will have on Apache Station's operations under the AEPCO SIP Alternative. However, we are confident that the flexibility afforded the states under the Clean Power Plan, changes likely to arise out of the public notice and comment period, and the diversity of Apache Station's dual-fuel capability and favorable location on a major interstate natural gas pipeline indicate Apache Station will remain a viable power source for the foreseeable future.

1.2 SUMMARY OF ANALYSIS AND CONCLUSIONS

In order to analyze the previously discussed compliance and other long range planning factors, several resource planning models were developed to study the period 2015 through 2035.² Development of the resource planning models requires use of a variety of data regarding future costs of resource options, capacity, energy and fuels, financial parameters, and load growth.

BMcD used Strategist, a production cost modeling and investment optimization software program, to perform the Study analysis. The Strategist model is a resource portfolio optimization tool that provides an analysis of multiple resources with a variety of performance and cost characteristics. The model analyzes the resources available for selection under all possible resource portfolio combinations. The resource portfolio made available for selection in Strategist included new construction generation options, short and long term PPAs, purchase of portions from 75 MW to 150 MW or more of a distressed asset, economy market purchases, as well as conversion of ST2 and ST3 to natural gas, installation of SCRs on both ST2 and ST3, and the AEPCO SIP Alternative. The net present values of the portfolios are calculated for all feasible combinations and timings of resource portfolios, based on unit specific performance and operating/capital costs parameters. The portfolios are then sorted and ranked by net present value from lowest to highest cost.

² The study period of 2015 through 2035 represents the remaining term of the wholesale power contracts between AEPCO and its members.

The Study uses forecasts from Wood Mackenzie and ACES Power Marketing (ACES) for market energy prices, natural gas and coal fuel costs. The market and natural gas prices are significantly different in the longer term. Wood Mackenzie fuel and market energy prices are referenced as the 'A' forecast; ACES fuel and market energy prices are the higher of the two and are referenced as the 'B' forecast. The forecast case and associated source is summarized in Table 1.1 Each alternative resource and load scenario and sensitivity case is evaluated using both forecasts to reflect resource portfolio costs under this wide range of fuel and market price assumptions.

Table 1.1: Forecast Definition

Forecast Reference	Forecasting Company
A	Wood Mackenzie
B	ACES Power Marketing

The overall Study methodology and analysis focused on relevant factors affecting the long-term viability of Apache Station resources. Conceptually, the analysis was developed around two key Study questions:

1. What is the most cost effective means to provide the resource capacity currently provided by the natural gas-fired combined cycle and gas turbines at Apache Station beyond 2020 through 2035?
2. What is the most cost effective means to provide the energy currently provided by the coal-fired ST2 and ST3 at Apache Station over the study period?

Multiple scenarios were developed to analyze these resource questions. The parameters defining each scenario are as follows:

- **Scenario 1**
 - Assumes current member contractual commitments for the use of CC1, GT2, and GT3 expire at the end of 2020 – the current contract end date.
 - Assumes PRM load associated with the allocated capacity in the gas units is covered by the PRM members rather than AEPCO once the associated contractual commitments expire.
- **Scenario 2**
 - Rather than expiring at the end of 2020, the contractual commitments associated with CC1, GT2, and GT3 are extended through 2035.

- The PRM load associated with the allocated capacity in the gas units is served by AEPCO through the new contract end date of the end of 2035.
- **Scenario 3**
 - Assumes AEPCO serves all current and expected load requirements of the PRMs through 2035.
 - Gas units CC1, GT2, and GT3 continue to be available through 2035.

These scenarios are summarized in Table 1.2.

Table 1.2: Scenarios Outline

Scenario	ARM Load	PRM Load	Gas Unit Extension
1	Total	Allocated Capacity	No
2	Total	Allocated Capacity	Yes
3	Total	Total	Yes

The first Study question addresses ongoing use of the peaking units at Apache Station and the cost effectiveness of extending operability of those units beyond their currently scheduled contract end date. In relation to this question, resource plans with and without the gas units extended were developed and compared. In order to compare the resource plans on the same load basis, AEPCO member load requirements presented in Scenario 2 were used in both analyses. Scenario 1 resources (1R) were combined with Scenario 2 load requirements (2L) to present the scenario in which availability of these gas units ends at the end of 2020. This analysis compares the cost of replacing the gas units' capacity with the cost of extending the availability of these gas units through 2035.

The results of this comparison are shown on Table 1.3.

Table 1.3: Scenario 1R/2L NPV Summary, 2015\$

	A		B	
	% Diff	NPV (\$M)	% Diff	NPV (\$M)
Scenario 1R/2L: Gas Contracts Terminated	4.57%	\$ 2,366	3.28%	\$ 2,375
Scenario 2: Gas Contracts Extended	0.00%	\$ 2,263	0.00%	\$ 2,300

The results support extension of the peaking resources to 2035 as the lower cost option for AEPCO members. As shown, allowing the contractual commitment to expire and replacing the capacity and energy of those resources would result in a more than 3 percent higher cost to AEPCO members, and that is before including any transmission costs that may be associated with the replacement of the units' capacity at locations other than Apache Station.

With the gas units' extension supported, the second Study question of determining the preferred compliance option for ST2 and ST3 at Apache Station was explored under Scenario 2. A 'Base' scenario was compared against both the 'A' and 'B' market and fuel price forecasts and tested for sensitivities to (1) the existence of a hypothetical carbon tax (Carbon Tax), (2) removing the ability to sell resources into the market (No Market Sales) and (3) removing from Strategist the distressed asset model as an available resource in 2018 (No Distressed Asset). These sensitivities were designed to test how each compliance alternative might perform under different market and regulatory hypotheticals. Table 1.4 shows the low cost compliance plan identified by Strategist under the Base and the other identified sensitivity assumptions for both the 'A' and 'B' market and fuel price forecasts.

Table 1.4: Scenario 2 NPV Summary, 2015\$

Sensitivity	Scenario 2A		Scenario 2B	
	Low Cost Plan	NPV (\$M)	Low Cost Plan	NPV (\$M)
Base	AEPCO SIP Alternative	\$ 2,263	ST2 Inoperable, 100 MW DA 2018	\$ 2,300
Carbon Tax	AEPCO SIP Alternative	\$ 2,622	ST2 Inoperable, 100 MW DA 2018	\$ 2,669
No Market Sales	AEPCO SIP Alternative	\$ 2,263	ST2 Inoperable, 100 MW DA 2018	\$ 2,306
No Distressed Asset	AEPCO SIP Alternative	\$ 2,263	AEPCO SIP Alternative	\$ 2,345

Under the lower market prices of the 'A' forecast, the AEPCO SIP Alternative option is identified as the low cost compliance approach under all Scenario 2 sensitivities. Under the higher market prices of the 'B' forecast, more efficient resources are necessary to avoid the cost of market purchases; a portfolio where ST2 is rendered inoperable, rather than retrofitted to operate on natural gas, was identified as the low cost compliance approach under the Scenario 2B Base, Carbon Tax and No Market Sales sensitivities. However, the AEPCO SIP Alternative was the next lowest compliance alternative under these three sensitivity cases. Under the No Distressed Asset sensitivity (which assumes no distressed asset is available for purchase in the 2018 timeframe, with sufficient transmission capacity for delivery of the

energy to member loads, and at the pricing assumed), the AEPCO SIP Alternative is the low cost compliance approach.

Based on the analysis for the various approaches in order to achieve environmental compliance at Apache Station, it was determined that use of SNCR on ST3 and conversion of ST2 to operation on natural gas, i.e., the AEPCO SIP Alternative, was the lower cost and most flexible of the approaches identified. This approach balances Apache Station fuel diversity; minimizes additional system investment such as replacement capacity or additional transmission; and results in the lowest risk of stranded cost associated with the units.

Another attribute of the AEPCO SIP Alternative considered is the reduction in carbon emissions at ST2 when compared with keeping it on coal, i.e., SCR Retrofit.³ As shown in Table 1.5, ST2's CO₂ emissions are approximately 237 lbs/MMBtu on coal versus approximately 120 lbs/MMBtu on natural gas. This roughly 49 percent reduction on a lbs/MMBtu basis for ST2 results from its conversion to natural gas.

Table 1.5: Carbon Emissions Comparison

	CO ₂ Emissions lbs/MMBtu
Apache ST2 SCR Retrofit	237
Apache ST2 NG Fuel Switch	120

Another consideration in Apache Station's future compliance decisions is the potential load requirements of the PRMs above the Scenario 1 or Scenario 2 forecasts. Scenario 3 assumes AEPCO's future load requirements to be the total requirements of both the ARMs and PRMs. Under Scenario 3, the Study evaluates AEPCO's ability to serve a higher load obligation under the AEPCO SIP Alternative versus a variety of resource portfolio alternatives, including distressed asset availability in 2015. Because of existing transmission constraints, this analysis incorporated summer season must run parameters that apply to ST2 on natural gas in order to cover the potential unscheduled outage of ST3. Table 1.6 shows the NPV of the low cost resource portfolio identified by Strategist under various distressed asset options.

³ The carbon reductions achieved in practice will depend upon unit dispatch and related considerations.

Table 1.6: Scenario 3 NPV Summary, 2015\$

Sensitivity	Scenario 3A		Scenario 3B	
	Low Cost Plan	NPV (\$M)	Low Cost Plan	NPV (\$M)
No Distressed Asset	AEPCO SIP Alternative	\$ 2,757	AEPCO SIP Alternative	\$ 2,876
100 MW Distressed Asset ¹	AEPCO SIP Alternative	\$ 2,725	AEPCO SIP Alternative	\$ 2,778
150 MW Distressed Asset ¹	ST2 Inoperable	\$ 2,710	AEPCO SIP Alternative	\$ 2,728

¹Distressed asset acquired in 2015 if selected

Under both the 'A' and 'B' market and fuel price forecast cases in Scenario 3, the AEPCO SIP Alternative for compliance at Apache Station results in the low cost resource portfolio for AEPCO members in all but one sensitivity analysis. The results of Scenario 3 support the flexibility and preference of the AEPCO SIP Alternative at Apache Station as the foundation for the most economic solution for AEPCO members. Given the additional AEPCO load obligation under Scenario 3, the analysis suggests augmenting its existing resources with procurement of an appropriately priced distressed asset, if possible and agreeable to the PRMs.

1.3 CONCLUSIONS

Based on the analysis performed, the following general conclusions are provided.

1. In response to the first Study question, maintaining the existing portfolio of resources, including continuing the availability of certain Apache gas units beyond 2020, provides the lower cost approach to peaking capacity for AEPCO's member cooperatives.
2. In response to the second Study question, the AEPCO SIP Alternative is the lowest cost and most flexible alternative over the study period and under market/fuel price options considered under the Strategist modeling for Scenario 2, in which AEPCO's load obligation for PRM member cooperatives is satisfied through 2035 at existing Allocated Capacities (AC).
3. As determined by Strategist modeling for Scenario 3, in which AEPCO's load obligation includes existing AC plus the future load growth of its PRM member cooperatives, the AEPCO SIP Alternative in combination with the procurement of distressed asset capacity, if possible and agreed to by the PRMs, is the lowest cost and most flexible alternative over the study period under the market and fuel price options considered.

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