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Benchmarking Study of Arizona Public Service Company's Operations, Cost, and Financial Performance

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Arizona Corporation Commission
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FINAL REPORT

Presented to:

Arizona Corporation Commission
Utilities Division

Presented by:

The Liberty Consulting Group

February 28, 2011

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I. Executive Summary

The Arizona Corporation Commission (ACC or Commission) commissioned The Liberty Consulting Group (Liberty) to conduct a benchmarking analysis of certain attributes of Arizona Public Service (APS or Company). The need for the study emerged from a recent rate proceeding; a settlement reached among the parties defined the nature and scope of the analysis.

Benchmarking studies are generally conducted to identify opportunities for performance improvement. Such opportunities can arise if the performance of a company in a given area deviates from its peers. Although there can be many good reasons for such a deviation, the initial identification focuses questions on areas of possible anomaly. Liberty has identified a number of such deviations, and has completed a second phase of analysis. The next logical steps are for the Company to validate the Liberty recommendations and to develop actions to bring about cost effective improvements.

This report explains the study's approach and methods, and discusses its results. A companion document to be available on the Commission website provides supporting detail on the analyses that Liberty conducted.

A brief summary of Liberty's high level conclusions is as follows:

1. **Safety:** The Company compares well with its peers and no further action is warranted from this study.
2. **Customer Satisfaction:** The Company compares well based on J.D. Powers data and no further action is warranted from this study.
3. **Reliability:** The Company compares well in the standard measures of distribution reliability. This is as expected given the climate advantages the Company enjoys over the broader panel of companies. APS is experiencing a drifting upwards of restoration times, and the Company may wish to examine that trend, even though its performance remains well above others.
4. **Base Load Coal Performance:** Of the areas studied associated with the Company's coal units, forced outage rates at Four Corners stood out as a major performance opportunity. Other operational attributes of the coal plants were equal or better than other panel members.
5. **Nuclear Performance:** Nuclear unit capacity factors and availability have presented a challenge in recent years. The Company's performance has lagged behind its peers. Similarly, nuclear non-fuel O&M costs have been high in relation to others. These have been two serious issues involving a great deal of cost. On the positive side, there is evidence that the Company is turning around both problems. Further actions are recommended in this report.
6. **Sustainability:** The Company's problems with emissions from its coal-fired units are well-known. NO_x and SO_2 emissions stand at either end of the spectrum, with APS having the worst levels of the former and the best of the latter. CO_2 releases are especially high at Navajo.
7. **Non-fuel O&M Costs:** The dominance of small units in the coal plant portfolio makes for higher than average costs. Costs at the large combined cycle units appear well above industry

averages. Distribution costs have escalated sharply, although levels are not out of line. Customer expenses are well above industry average and have not received a suitable analysis by the Company.

8. **Capital Investment:** Accumulated total investment in distribution plant is the highest in the panels and by a significant margin. This condition seems to be a phenomenon dating back many years. More recent capital expenditures in distribution have been unremarkable. Cumulative investment in nuclear plant is above industry averages, but recent expenditures have been below average. Expenditures for transmission over the last ten years are near the top of the industry.
9. **Management Expenses:** Staffing levels appear high by a considerable amount. Salaries and wages are comparatively high, beyond the effect of high staffing levels. Regulatory commission expenses are high.
10. **Financial Benchmarks:** APS minimum investment grade ratings for long-term debt and commercial paper are uncharacteristic. Key cash flow to debt and interest metrics are improving, but higher debt leverage holds them down. The APS business environment rating and debt leverage have been affecting credit ratings for several years. The debt level needs to improve for credit upgrades to occur. ROAE and ROAA have been comparatively low. A combination of high growth in CAPEX and operating expenses and historical test periods in rate cases contributed to earnings attrition. Negative earnings growth for the 2000-2005 period later improved, approaching panel averages for the 2004-2009 period.
11. **Hedging:** Work performed by Liberty and by an APS consultant several years ago demonstrated sound hedging practices, which, based on examining more recent, publicly available, independent reviews, continue to be comparatively strong.
12. **Payments among Affiliates:** Pinnacle West/APS businesses and reported interactions suggest a comparatively lower risk of customer-affecting cross subsidization. If concern exists about the potential for cross subsidization, it can only be effectively addressed through direct examination of APS affiliate transactions and relationships.

II. Methods

A. Background

Benchmarking has long been a popular pursuit in the electric utility industry. The structure of the industry, a large number of similar companies, and public availability of data made benchmarking a readily usable tool. The practice probably peaked in terms of interest and effectiveness in the 1980s and 1990s. Benchmarking had become more sophisticated, and practitioners linked it to efforts to identify "best practices," which by then had become a major focus of the "quality" movement.

Benchmarking has since become a more difficult exercise. Industry restructuring and many acquisitions have made it harder and harder to find sizeable pools of "similar utilities." Even more problematic has been the significant reduction in industry-data transparency, as more and more information has begun to be considered as proprietary and confidential. The scope and depth of readily obtainable data have been drastically reduced.

Benchmarking retains value despite these changes. Successfully applying it, however, requires new techniques and more creative approaches to counter the less "collegial" atmosphere that now applies to data sharing. Liberty applies three fundamental changes in the historical approach to benchmarking in order to overcome the new handicaps.

FIRST: We Use Multiple Peer Groups

There is a natural trade-off in defining peer groups, or panels of similar companies. The more similar the utilities, the smaller number of peers, meaning we either have (a) similar utilities but too few of them for analysis, or (b) dissimilar utilities with plenty of data for analysis. We deal with this problem by examining multiple peer groups.

Multiple peer groups are created in different ways and for different purposes. One approach was to narrow the acceptable variance around the subject utility. For example:

- Panel A: A narrow set of selection criteria resulting in very similar utilities but amounting to a small population, perhaps 5.
- Panel B: Criteria centered around the target company with the defining parameters having a range of perhaps ± 50 percent of the target. Our experience suggests such a panel might amount to 15-20.
- Panel C: A very liberal criteria producing perhaps 50 or more members of the panel.

We then conduct analysis of all three panels; that analysis balances conclusions based on the variations seen among the three panels.

Another approach, and one widely used in this study of APS, calls upon highly tailored panels; *i.e.*, utilities chosen for their alignment with certain special characteristics of APS. For example, APS is a nuclear utility, a high growth utility, and a southwestern utility. In addition, it has a certain fuel mix and a unique customer density. Panels were created around these characteristics when appropriate.

SECOND: We Define Expectations for the Utility

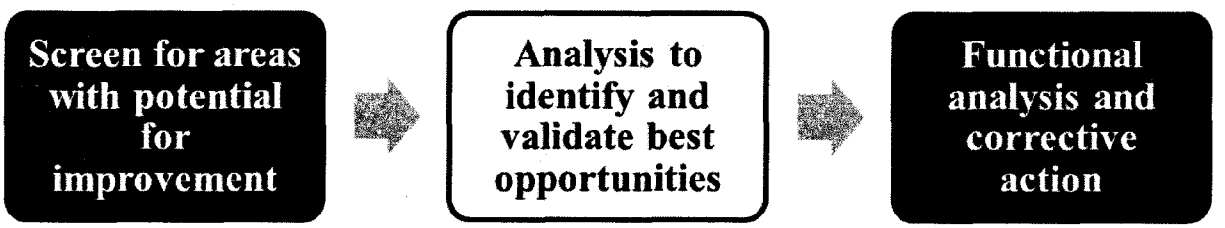
Traditional benchmarking focuses on parameters based on unit rates; *e.g.*, O&M costs per customer. Liberty has featured such calculations as the central part of our analysis. We have supplemented them, however, with what we view as a useful improvement. We first defined where the subject utility falls in the peer group in terms of size, and then defined an expectation for where the utility should fall in terms of the parameters of interest. For example, APS might be the 4th largest in a panel, suggesting that APS should generally rank approximately 4th in terms of certain size-related performance measures (such as number of employees, total O&M costs, distribution investment, for example).

Defining expectations (or the standard) first and then analyzing actual performance versus the standard immediately produces an initial sensitivity to real differences. Traditional analysis alone can mask these differences, given the need to use multiple parameters for each area of investigation.

THIRD: We Gather "Intelligence," not Merely Data

Gathering data is far more difficult today than in the past, notwithstanding the many remarkable new sources via the internet. But good data is available – one must just work harder and more creatively to get it. More importantly, an understanding of panels and the significance of the data associated with various utilities is the key to successful analysis. Most data is indeed "apples and oranges;" the ability to get beyond that and to meaningful comparisons offers the real test.

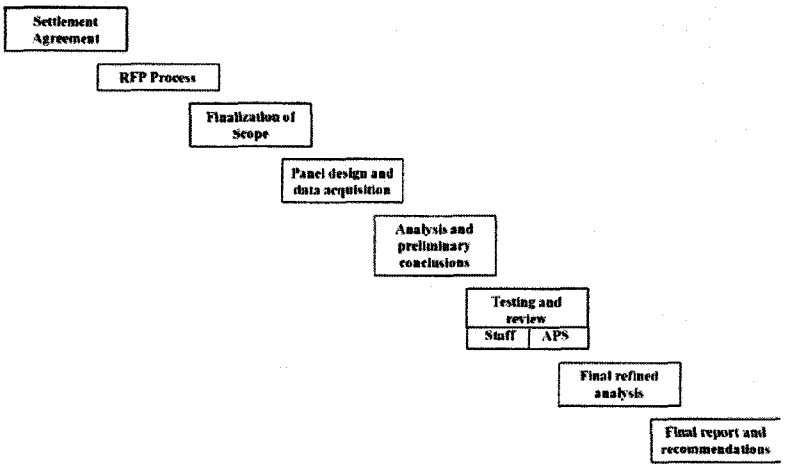
Notwithstanding these improved techniques, benchmarking does indeed have its limits. Consider the following performance improvement process:



In a typical benchmarking study, including this APS project, one seeks to carry the analysis as far to the right of the diagram as practical. At some point, however, the utility of benchmarking often ends and other tools become necessary, such as more focused and detailed functional analysis or even a focused management audit. In those cases, Liberty has recommended suitable follow up analysis.

B. The Process

This project resulted from a recent settlement agreement that mandated a benchmarking study of certain areas within APS. The Arizona Corporation Commission (ACC) solicited proposals and Liberty was awarded the contract. This process and Liberty's subsequent activities are illustrated in the diagram below.



We maintained communication with both the ACC and APS throughout this process. There was a special focus with ACC Staff in the first half of the process in order to assure that the scope of the project, the methodology used and the panels selected were consistent with the settlement agreement, the RFP and staff's expectations. There was a special focus with APS in the second half of the process to seek their input on Liberty's intended methods as well as insights on the extent to which APS felt any of their data was unique or deserved special considerations.

In the latter stages of the process, APS's comments on Liberty observations and conclusions were also sought and have been used where appropriate to refine and strengthen the quality of the analysis. APS had input into the process, and is familiar with many of Liberty's findings and conclusions; however, this is not to suggest that the Company has necessarily bought into all or any of this report. We did not solicit any such agreements.

C. Panel Selection

The settlement agreement and the RFP specified certain requirements for panels, or peer groups. Where practical, peer groups were to meet the following criteria:

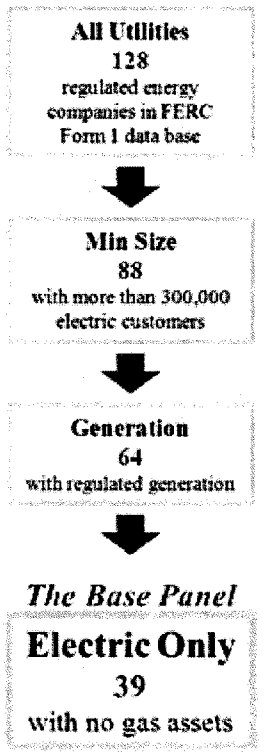
- At least 30 other investor-owned electric-only utility operating companies
- Comparable revenue, customers, nuclear, ownership of generation, customer density, growth and fuel and resource mix
- Include Salt River Project
- A 10 year running period
- Segregation of data where possible between metropolitan and rural areas.

These criteria were not always attainable, but Liberty is confident that the intent was largely met.

We began with a "base panel," but this study also made use of tailored panels and multiple panels. The derivation of those panels will be explained within each discussion area. The more important panels, as required by the RFP, will be summarized here.

1. The Base Panel

The base panel was designed to fulfill the literal requirements of the RFP. Our beginning data base, which corresponds to Federal Energy Regulatory Commission (FERC) Form 1 data, comprises 128 utilities. These were filtered as shown to the right to produce the base panel. SRP, which is not included in FERC Form 1, was then added to produce a final base panel of 40 utilities.



The RFP required "electric only" utilities. Nevertheless, there are some cases where we viewed the electric/gas differentiation as irrelevant. This allowed us to add comparative data in the form of an "expanded base panel." The latter was occasionally used in this study; it amounted to 65 utilities, including SRP.

The public data on SRP is far scarcer than that for APS. SRP no longer reports many parameters to FERC, with the result that we were forced to drop SRP from many comparisons of post 2004 information.

The full list of the 40 base panel members is displayed below.

Base Panel	
Alabama Power Company	Kansas City Power & Light Company
Appalachian Power Company	Kansas Gas and Electric Company
Arizona Public Service Company	KCP&L Greater Missouri Operations
Carolina Power & Light Company	Kentucky Utilities Company
Columbus Southern Power Company	Monongahela Power Company
Dayton Power and Light Company	Nevada Power Company
Detroit Edison Company	Ohio Power Company
Duke Energy Carolinas, LLC	Oklahoma Gas and Electric Company
Duke Energy Indiana, Inc.	PacifiCorp
El Paso Electric Company	Portland General Electric Company
Entergy Arkansas, Inc.	Public Service Company of New Hampshire
Entergy Louisiana, LLC	Public Service Company of New Mexico
Entergy Mississippi, Inc.	Public Service Company of Oklahoma
Florida Power & Light Company	Salt River Project
Florida Power Corporation	Southern California Edison Co.
Georgia Power Company	Southwestern Electric Power Company
Gulf Power Company	Southwestern Public Service Company
Idaho Power Co.	Tucson Electric Power Company
Indiana Michigan Power Company	Virginia Electric and Power Company
Indianapolis Power & Light Company	Westar Energy (KPL)

The expanded base panel consists of the following additional utilities:

Added Utilities in Expanded Base Panel	
Avista Corporation	Public Service Company of Colorado
Consolidated Edison Company of NY	Public Service Electric and Gas Company
Consumers Energy Company	Puget Sound Energy, Inc.
Duke Energy Ohio, Inc.	Rochester Gas and Electric Corp
Entergy Gulf States Louisiana, L.L.C.	San Diego Gas & Electric Co.
Interstate Power and Light Company	Sierra Pacific Power Company
Louisville Gas and Electric Company	South Carolina Electric & Gas Co.
MidAmerican Energy Company	Tampa Electric Company
New York State Electric & Gas Corp	Union Electric Company
Northern Indiana Public Service Co.	Wisconsin Electric Power Company
Northern States Power Company - MN	Wisconsin Power and Light Company
NorthWestern Energy Division	Wisconsin Public Service Corp
Pacific Gas and Electric Company	

2. The High Growth Panel

When examined for growth, APS is second only to Nevada Power in the base panel. We measured growth in terms of MWh sales between 1999 and 2007. More recent years were not considered for this particular measurement because of the anomalous results produced by the

weak economy in those years. APS's annual compound growth in this period was 4.2 percent; *i.e.*, more than double the median growth rate for the base panel.

APS makes frequent use of its high growth position to explain some of its expenditures and capital investments, which often has legitimacy. A full analysis of costs that are somehow related to growth rates therefore indicates use of a high growth panel, or at least supplementing the base panel analysis with a high growth analysis.

We defined the high growth panel as the 10 top growth companies in the base panel, with their growth rates ranging from 2.4 percent to 4.5 percent.

High Growth Panel	Annual Growth
Nevada Power Company	4.54%
Arizona Public Service Company	4.22%
Public Service Company of New Mexico	4.08%
Columbus Southern Power Company	3.72%
Salt River Project	3.64%
Florida Power & Light Company	2.79%
Tucson Electric Power Company	2.69%
Virginia Electric and Power Company	2.45%
Georgia Power Company	2.44%
Appalachian Power Company	2.44%
Gulf Power Company	*2.36%*
Gulf Power used when SRP unavailable	

3. The Regional Panel

Liberty defined the regional panel as all base panel members in Arizona or an adjoining state. Nine companies met this test.

Regional Panel
Arizona Public Service Company
El Paso Electric Company
Nevada Power Company
PacifiCorp
Public Service Company of New Mexico
Salt River Project
Southern California Edison Co.
Southwestern Public Service Company
Tucson Electric Power Company

4. The Nuclear Panel

A total of 18 companies in the base panel have nuclear generation. The relative nuclear position varies widely among these companies, with only 8 falling within 50 percent of APS in terms of generation.

Nuclear Panel	
Alabama Power Company	Florida Power Corporation
Arizona Public Service Company	Georgia Power Company
Carolina Power & Light Company	Indiana Michigan Power Company
Detroit Edison Company	Kansas City Power & Light Company
Duke Energy Carolinas, LLC	Kansas Gas and Electric Company
El Paso Electric Company	Public Service Company of NM
Entergy Arkansas, Inc.	Salt River Project
Entergy Louisiana, LLC	Southern California Edison Co.
Florida Power & Light Company	Virginia Electric and Power Company

5. Fuel Mix

The RFP requires consideration of fuel mix, which Liberty incorporated into our analysis. However, this factor only has significance when looking at data at a summary company level. Much of our analysis took place at a far more detailed level; therefore, overall fuel mix did not play a major role.

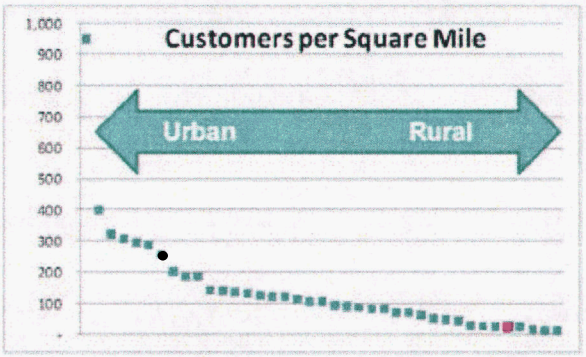
Fuel mix requires numerous parameters to define; therefore, construction of an appropriate panel is not particularly straightforward. Nevertheless, comparing the fuel mix of various panels with APS allows an

	APS	Base Panel	Steam Panel	Nuclear Panel
% Self-generated	80%	73%	74%	78%
% Steam	46%	71%	70%	51%
% Nuclear	33%	16%	16%	37%
% Hydro	0%	3%	3%	2%
% Other	21%	10%	10%	10%

approximation, permitting us to select the closest panel as a frame of reference. The accompanying table shows that the nuclear panel is a fairly close approximation to APS in terms of fuel mix.

6. Urban / Rural Differentiation

Customer density is often a major consideration in benchmarking studies, having a significant impact especially on distribution costs. In the case of APS, the service territory has some unique characteristics. There are many customers in an urban setting, but the overall customer density is one of the lowest in the US, ranking 36th of 40 in the base panel.



Liberty makes use of the density data in our analyses. It must be used with care, however, recognizing that some urban characteristics exist regardless of the extremely low overall density.

7. Special Panels

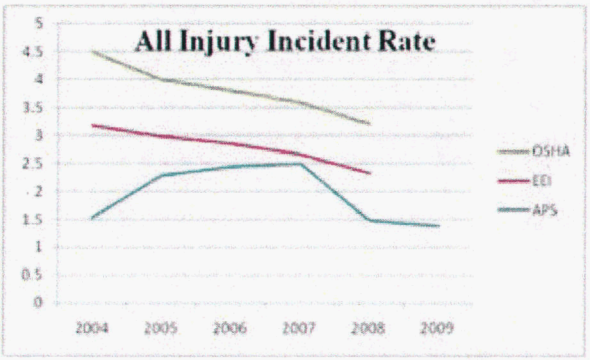
While the above panels represent the fundamental populations of this study, many other tailored panels were utilized by necessity. In each case, the design of the panel and its members are described in the companion document.

III. Findings and Conclusions

A. Cost and Performance

1. Safety

The data available for utility comparisons on safety is limited. The two data bases available (OSHA and EEI) both place APS in a positive position, as illustrated on the accompanying chart.



APS may have experienced a negative trend until 2007; however, it never reached industry levels, and has improved versus the industry since then.

Recognizing that the data is limited, there appears to be no compelling reason from the existing data to search for more information.

2. Customer Satisfaction

The standard measure for customer satisfaction in the electric utility industry and many other

industries is J.D. Powers. Liberty used the J.D. Powers data for residential customer satisfaction. That data considers:

- Power quality and reliability
- Price
- Billing and payment
- Corporate citizenship
- Communications
- Customer service.

The 2010 survey covered 121 firms, of which 35 were members of Liberty's base panel. J.D. Powers parses the data in many ways, including utility size and regional location. APS ranks high in customer satisfaction regardless of the screening criteria.

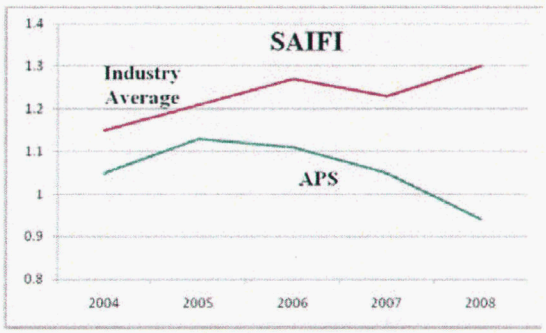
Panel	Utilities	APS Rank
Liberty Base / JDP Nexus	35	4
JDP National	121	19
JDP National - IOUs Only	89	4
JDP National - Large Only	59	8
JDP - West	25	9
JDP - Large, West	13	4

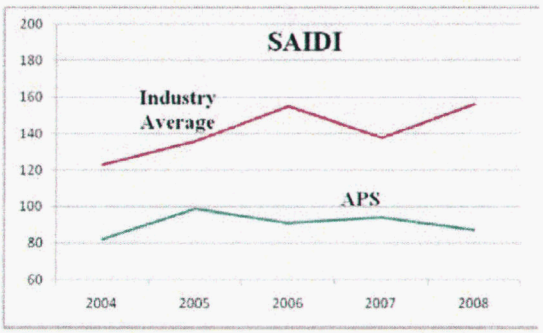
APS's position vis-à-vis other IOUs is particularly interesting; the Company ranks 4th of 89. Also of interest is the trend of performance, which exhibits a steady improvement. APS has risen to mid-top quartile from mid-second quartile just three years ago. The relative performance of APS suggests that further analysis in the customer satisfaction area would not be beneficial.

3. Reliability

Liberty examined four standard industry measures of distribution system reliability:

- SAIFI – Number of interruptions a customer sees in a year
- SAIDI – Number of interrupted minutes a customer sees in a year
- CAIDI – Number of minutes an average interruption lasts
- MAIFI – Number of momentary interruptions a customer sees in a year.



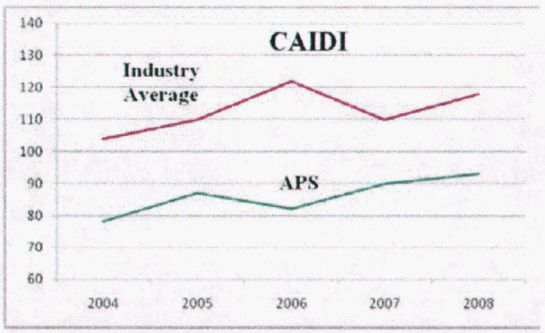


The available data, compiled by EEI using IEEE standards, does not identify individual companies, nor does it parse the data in any interesting ways. Accordingly, major factors affecting distribution reliability (such as geography) are not available. We would of course expect APS to appear very favorably on a bulk, national basis because of its location. That is indeed the case, as the subsequent tables show.

Note that the Company not only rates far better than the industry average, but that the favorable gap is growing with time. The APS frequency of interruptions (SAIFI) has dropped while the industry is in a clear uptrend. The duration of APS outages (SAIDI) has been somewhat steady, but the industry is again in a clear uptrend.

Liberty has examined industry trends in terms of infrastructure investment, and believes today's national reliability trends are a direct result of yesterday's lack of investment. Distribution has consistently been the least preferred area for investment and we are now seeing the results. Fortunately, the industry is accelerating investment in infrastructure at this time. There is no real evidence here that APS has suffered from this industry phenomenon. In fact, the drop in industry performance has allowed APS to rise to the top quartile in all categories

APS performance in minimizing the duration of an outage (CAIDI) likewise is far better than the industry average, coming recently into the top quartile. Note, however, that the Company's CAIDI is drifting upwards. This trend suggests that its restoration performance is slipping. Given its performance versus the industry, it is hard to criticize such a condition, but the Company may wish to examine this trend.



With the proliferation of electronic products, customers are increasingly concerned with even momentary interruptions that might have in the past gone unnoticed. The industry created MAIFI in response. Unfortunately, there is less historical data on MAIFI. More significantly, the available data appears to be less reliable than the other categories. The industry average dropped nearly 50 percent between 2004 and 2008. This result seems more likely linked to reporting practices than to actual performance. In any event, APS remains well below the industry in the number of momentary interruptions.

The relative performance of APS offers no concern justifying further analysis at this time. The results and trends have been comparatively good. Geographic location makes a real difference, but nevertheless, we observed no significant reasons for concern. The drifting upwards of restoration times is typical of industry trends, but nonetheless may merit some consideration by APS.

Recommendation 3.1: Although not an issue of significant concern, APS may wish to examine the upward drift in restoration times, as measured by CAIDI.

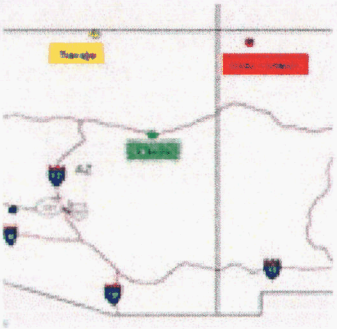
4. Base Load Coal Performance

Liberty examined the following parameters relating to coal unit performance:

- By unit:
  - Capacity factor (CF)
  - Equivalent Availability Factor (EAF)
  - Equivalent Forced Outage Rate (EFOR)
- By plant:

- Fuel costs
- Non-fuel O&M costs

(Note: In these descriptions, the term "equivalent" simply means that de-rates are included proportionately as outage time.)



The accompanying table shows the 11 APS base load coal-fired units. The units fall into two categories: large (750 MW) and small (100-300 MW). The small units are 100 percent owned while APS owns only a small share of the large units. APS operates all but one of these units; SRP runs Navajo. APS has no association with a fourth unit at Cholla.

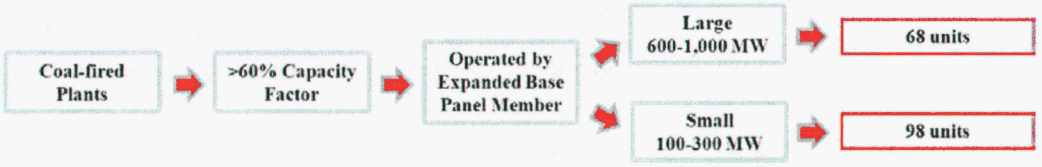
	APS Base Load Coal Units				
	Unit	Capacity	Age	Operator	APS Share
Large Units					
Four Corners	4	750	41	APS	15%
	5	750	40	APS	
Navajo	1	750	36	SRP	14%
	2	750	35	SRP	
	3	750	34	SRP	
Small Units					
Four Corners	1	170	47	APS	100%
	2	170	47	APS	
	3	220	46	APS	
Cholla	1	110	48	APS	100%
	2	260	32	APS	
	3	271	30	APS	

APS recently announced its intentions to retire the small units at Four Corners and to expand its ownership share of the large units there.

a. Panels

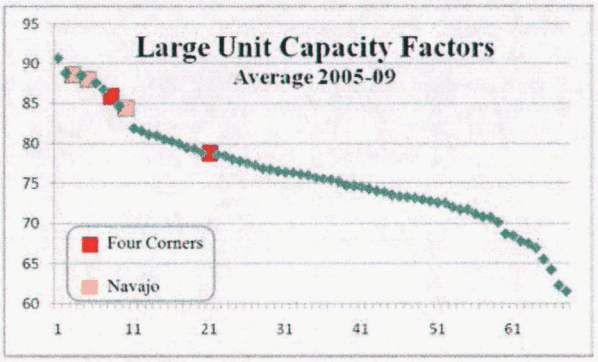
This element of the benchmarking analysis turns from a company-wide focus to a focus on individual power plants. This change enabled us to construct unique panels of power plants that match the characteristics of the APS units as closely as possible. Liberty used two data bases; therefore we also constructed two sets of panels to correspond to the data.

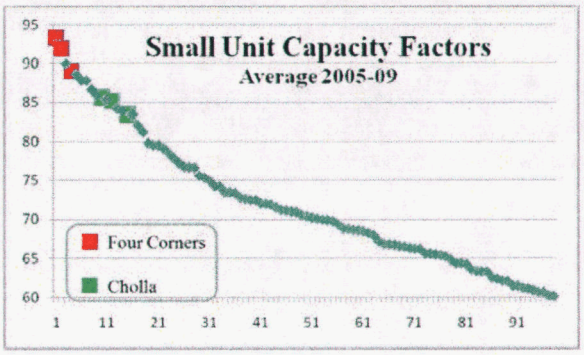
The first data base started with all coal fired power plants operated by companies in the expanded base panel. The base panel includes electric-only utilities while the expanded panel includes combined electric and gas companies as well. The screening process to produce a large and a small panel was as follows:



We were also able to use data from the Generator Availability Data System (GADS), which is sponsored by NERC and which requires all utilities to provide input. We selected coal-fired plant data for the following size ranges: (a) Large (600 – 1,000 MW) – 141 units, and (b) Small (100 – 300MW) – 195 units.

b. Capacity Factor





Capacity factor is best compared over multiple years in order to smooth out the effects of major outages and one-time events. In these charts, we used the five year period 2005-2009. The performance of the APS units is at the top of the industry. Given the Company's relatively low fuel costs, it would seem appropriate that the units run more than their peers. Less apparent is the fact that the rated capacity for the three small Four Corners units appears to be understated by more than 5%, inflating the reported capacity factors by that same amount.

With or without the inflation factor discussed above, APS units have ranked high in the industry, generally in the first quartile in their panels. Further, this performance level has been rather consistent over the time period we examined (2001-2009).

Equivalent Availability		
	10 Year Average	Years under Industry
FC 1	88%	3
FC 2	89%	2
FC 3	86%	3
FC 4	86%	3
FC 5	82%	4
Cholla 1	88%	3
Cholla 2	90%	3
Cholla 3	87%	3
Navajo 1	91%	2
Navajo 2	91%	1
Navajo 3	89%	2
Industry	85%	NA

c. Availability

Equivalent availability of the APS units has generally been better than the industry with the notable exception of Unit 5 at Four Corners. In this case "industry" is defined as the GADS panels. The ten year data for Unit 5 does not seem especially bad, masking very poor performance in 2008 and 2009.

d. Forced Outages

The Four Corners unit forced outage rates, especially Unit 5, and the Cholla units to a lesser extent, stand out as higher than their industry counterparts. The APS responses to Liberty's data requests on the forced outage rates for the coal units noted that its coal-fired generation has "an overall lower EFOR than the industry." This may be correct literally, but is misleading and not relevant to Liberty's primary observation regarding the consistently high EFORs at Four Corners. The APS analysis used all APS units, including the lower than average EFORs at Navajo, and it compared them to units of all sizes. Liberty's conclusion results from a focus on Four Corners and each unit being compared to units of similar size. The result is that all of the Four

Equivalent FO Rate		
	10 Year Average	Years over Industry
FC 1	8.1%	8
FC 2	8.8%	7
FC 3	8.7%	8
FC 4	8.3%	8
FC 5	12.5%	9
Cholla 1	7.8%	5
Cholla 2	5.1%	2
Cholla 3	6.4%	3
Navajo 1	3.1%	0
Navajo 2	4.4%	2
Navajo 3	4.6%	1
Industry	6.3%	NA

Corners units have consistently experienced EFORs higher than the industry's over the last ten years.

APS also indicated that the age of the APS units is greater than that of the corresponding industry sample, implying that some element of the higher EFORs can be attributable to age. The FC units are indeed older than their industry counterparts by about 5-8 years. It is reasonable to postulate that age does have some negative impact on EFORs. We do not believe that difference is substantial, however, given that the average industry unit is quite old.

More significantly, the Company also explained that the high EFORs are due to the very low quality coal burned at Four Corners. They emphasized that this is a trade-off between the consequences of low quality coal and the benefits of low cost coal. The Liberty analysis confirms that FC fuel costs are indeed well below industry average. They rank in the best quartile when compared with our expanded base panel. It is interesting to note that Navajo fuel costs are even lower than FC (see below in Paragraph e), but the Navajo units have a superior forced outage rate compared to the panel utilities.

The Company reports that bad coal has affected unit reliability through aggravated slagging and fouling of the boilers. In addition, a relatively new phenomenon (scaling in the scrubber ID fans) is now hurting the smaller units (1, 2, and 3). Also new are increased quantities of certain clays in the coal, which make the slagging challenge greater. For our purposes, these "new" phenomena are not particularly relevant. They primarily affect 2010, which was not part of our study. In this regard, the material presented by APS was not particularly helpful in addressing the broader question of ten years of high EFORs.

The Company dismissed Liberty's concern based on qualitative and anecdotal explanations, as was true in some other cases on this benchmarking project. The bad coal explanation makes sense, but it deserves a quantitative analysis to assure that it is indeed fully responsible for the units' operating problems. With this in mind, Liberty produced its own analysis, using the two worst performing units (2 and 5). We compared boiler-related outages, a portion of which could be fuel-related, to outages from other, non-fuel causes. The key conclusions are:

- The deviation versus industry for balance of plant caused outages was significant, more so than boiler outages
- For Unit 2, the percentage of outage time attributed to boiler issues was identical to the industry
- If boiler-related outages are excluded from the data, Units 2 and 5 still have higher than industry EFORs
- It is likely that some boiler-related outages are not due to fuel, so this analysis should be considered conservative.

The Liberty analysis indicates that it is premature to dismiss the EFOR issue at Four Corners solely on the basis of bad coal.

In subsequent discussions with the Company, it was revealed that an extensive benchmarking study of APS power plants had just been completed by a third party consultant. An initial cursory

review of selected material from that study seems to support the notion that the "bad fuel" explanation is not enough.

Another variable here is the Company's practice of reporting all outages other than planned as forced. GADS requires use of a "maintenance outage" category that APS has apparently never employed in its reporting. It is therefore reasonable to assume that APS-reported EFORs may be artificially inflated to some degree. Liberty estimated the potential impact of correcting this issue and found that it could make Four Corners EFORs more competitive, with the exception of Unit 5, which trails the industry by any measure.

In summary, the data suggests performance problems at Four Corners, and the Company's response does not fully explain those problems. Liberty believes further action on the Company's part may be beneficial, although the pending retirement of Units 1, 2 and 3 should preclude any serious work there. With respect to the large units:

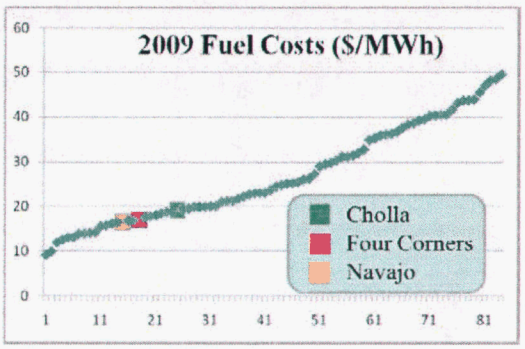
Recommendation 4.1: APS should consider the implementation of a continuing program for the analysis of outage causes.

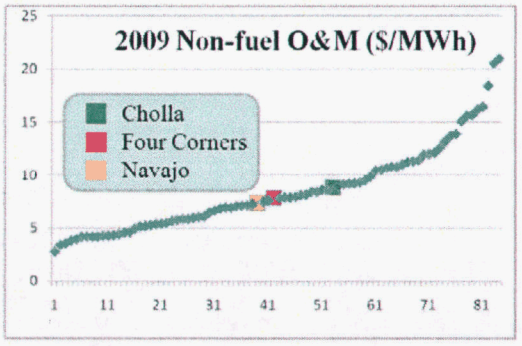
Recommendation 4.2: APS should align its reporting practices with NERC (GADS) requirements and the rest of the industry, including the classification of maintenance outages.

Recommendation 4.3: A specific analysis of Four Corners 4 and 5 should be completed to:

- Define the contribution of low quality coal to EFORs
- Define the contribution of maintenance outage hours
- To the extent that non-fuel causes are also contributing to the negative comparisons, develop mitigating strategies as cost effective and appropriate
- Determine why the Navajo results, with slightly lower fuel costs, are so much better.

The details of the Company's outside consultant study may successfully answer these questions, negating the need for a new study.





e. Fuel Costs

Fuel costs at all APS coal units are well below average industry levels. There is nothing remarkable in the data that would suggest further examination of coal costs.

f. Non-fuel O&M Costs

In analyzing cost data in this section, it is critical to note that all of the data is presented by the *individual power plants without regard to APS's ownership share of each plant*. The data is therefore valid for measuring station performance, but not for judging the economic effects or other impacts on APS. The

results presented in this way will differ considerably from the O&M costs to be discussed later in Section 7. This results because:

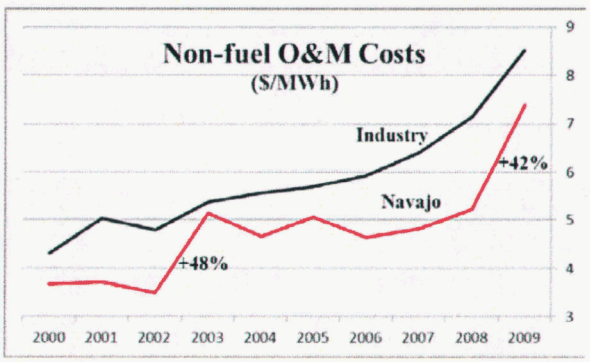
- APS has a very small share in the big units
- APS has a very big share in the small units.

As a result, the costs shown here, which have a power plant focus, will be much lower than the results shown later, which have a company focus. For APS, the Company focus allows domination by the smaller, more expensive units.

In addition, the cost data is by power plant; it is not available by unit. It is therefore impossible to maintain our large unit/small unit panel differentiation since the Four Corners units are all blended together.

None of these qualifications matters much at the bottom line, in that the APS cost data on a power plant basis is unremarkable. The above chart shows all of the stations as middle-of-the-pack with the smaller Cholla station being most expensive as should be expected. A different story will be told when we examine power production costs on a company basis in Section 7 later.

The analysis of cost trends also raised the question of escalation at Navajo, which seemed well above industry and other APS units. This issue was discussed with APS and the Company explained that Navajo has a six year cycle for major outages, and that cycle started anew in 2009. An examination of the Navajo cost trends confirms this observation, with the gap up in 2009 being almost identical to the prior gap up six years earlier. Note that costs were generally constant during the six year period.



5. Nuclear Performance

Liberty examined the following parameters relating to nuclear unit performance:

- By unit:
  - Unit capacity factor (CF)
  - Equivalent Availability Factor (EAF)
  - Equivalent Forced Outage Rate (EFOR)
- By plant
  - Fuel
  - Non-fuel Operating costs
  - Maintenance

a. APS Nuclear Units

APS operates the Palo Verde Generating Station, three PWRs producing nearly 4,000 MW. The station is 29 percent owned by APS. In discussing the performance of the Palo Verde units with

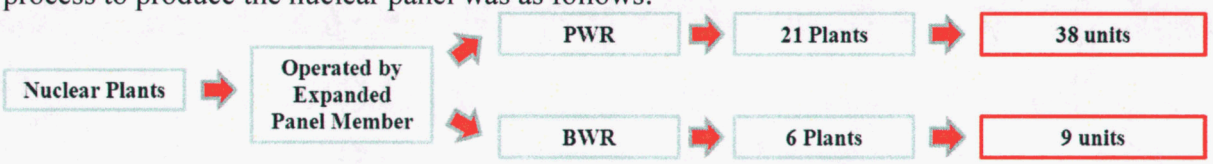
the Company, APS described a station that has changed character several times. Although we do not accept the presented notion that a nuclear station naturally passes through up and down performance cycles, there seems to be a basis for saying that this station has indeed endured different levels of performance for sustained periods. But the variations appear to be the result of management actions, for better and for worse, rather than some overall set of forces affecting the industry as a whole.

Plant management suggests that Palo Verde was a good performer in the 1990s and that perhaps efforts to control costs led to some level of under investment. There was a period of under-performance, starting perhaps in 2003. It was followed by a difficult 5-6 year period in which station performance was well below the industry and in which costs escalated sharply. The Company now claims such performance is behind it, and the station is already well on the path to much improved performance.

Such a conclusion would argue that the weak performance of the recent past should not be the basis for any significant conclusions, because the underlying problems have already been solved. As our analysis will show, Liberty is not ready to agree with that position. On the other hand, there are signs that the plant has indeed entered a new period of improved performance. Our review did verify that there are good things happening. Our analysis seeks to balance the hard data of the difficult past with the early signs of new directions. In some cases, however, a "wait and see" approach is appropriate.

b. Panels

Similar to the coal panels, Liberty used two data bases here. We therefore constructed two sets of panels to correspond to the data. The first data base started with all nuclear power plants operated by companies in the expanded base panel. The base panel includes electric-only utilities while the expanded panel includes combined electric and gas companies as well. The screening process to produce the nuclear panel was as follows:



We were also able to use data from the Generator Availability Data System (GADS), which is sponsored by NERC and which requires all utilities to provide input. Here we selected nuclear units of greater than 1,000 MW, of which there were 51 units.

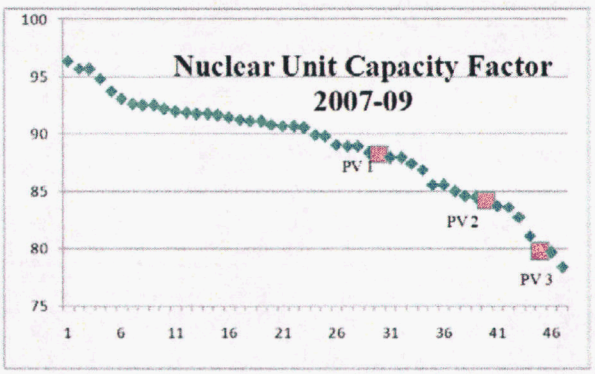
c. Capacity Factor

The improvement in nuclear capacity factors over the last 30 years is one of the most notable, yet little known, success stories in American industry. This success story has its share of gimmickry in the form of capacity factors that are artificially inflated by low plant ratings. The magnitude of the industry improvement is real however, despite these anomalies, which at times have been very significant. Capacity factors have moved from the high 50s to more than 90 in that period, in effect creating many thousands of MW of free new capacity and associated low cost energy. Further growth is obviously constrained, but performance continues to be well above anything

that could have been expected in the earlier nuclear days.

Against this backdrop, the weak performance of the Palo Verde units appears especially disappointing. In the seven year period of 2003-2009, the units consistently underperformed the industry by a wide margin. On a seven-year average basis, all three units were in the bottom quartile of the 47 unit panel, with Unit 1 the worst of the panel and Unit 3 next to last.

Looking at a more recent period, the three year average of PV capacity factors during 2007-09 are similarly near the bottom of the panel. Unit 1 rose to third quartile in this case because of a very good year in 2009.



The data compiled by Liberty compares quite well with the annual publication of capacity factors by *Nuclear News* (May 2010). The author also uses a 2007-2009 average and rates Palo Verde as follows:

PV 1 – 82nd of 104
PV 2 – 96th
PV 3 – 102nd.

For multi-reactor sites, the author ranks Palo Verde as 34th of 36. Also of interest in this study is that the median capacity factor for the industry has been 90 percent for each of the three 3-year periods dating back to 2001.

The Company indicates that performance has improved since 2006. It has, even through 2010. But even the 2010 value for station capacity factor remains below the values achieved in the late 1990s and at about the median for the industry as a whole. This fact does not diminish the positive trend that the Company has established and that trend suggests there is hope for further gains ahead.

From a dollars and cents perspective, and impact on the customer, Palo Verde capacity factor and its associated parameters (such as availability) stand at the top of the list in importance. Liberty recognizes that the issue already has high visibility in the annual Nuclear Performance Reporting Standard (NPRS) process, and a continuation of such special efforts is appropriate.

From a company perspective, however, the NPRS should not be viewed as a performance goal. While the current definition of "top tier" in NPRS is logical for oversight, monitoring, and reporting purposes, the Company should be aiming higher, certainly at least to industry median levels. We will emphasize that, considering where Palo Verde has been in recent years, achievement of median levels sustained over a few years would represent a significant accomplishment.

Recommendation 5.1: Notwithstanding the NPRS tiers, APS should establish a more aggressive goal of achieving at least industry median capacity factors sustained over a multi-year period.

Plans to accomplish this goal, including the specific tactics to be employed, should be shared with the ACC on an annual basis.

d. Equivalent Availability

Palo Verde has also trailed the industry (in this case, the "industry" is all nuclear units greater than 1,000 MW as reported in GADS) in equivalent availability, lagging by 5-7 percent for the time period studied (2000-2009). This percentage of nearly 4,000 MW represents a considerable loss. The Company has explained that it experienced major capital and maintenance improvements in this period, such as steam generator replacements. There is no indication provided however that such issues were unique to Palo Verde.

Equivalent Avaliability Factor		
Unit	10 Year Average	Years Under Industry
Palo Verde Unit 1	82%	7
Palo Verde Unit 2	84%	8
Palo Verde Unit 3	83%	7
Industry Average	89%	

Liberty has observed that recent refueling outages at Palo Verde have been well over the industry average of about 40 days, and that has surely played a large role in lowering availability. On the positive side, the Company has focused on improving outage times, including capital investment in rapid refueling equipment. We were advised that the station is planning to target its next refueling outage at 29 days.

Recommendation 5.2: As a supporting component to Palo Verde's capacity factor goals, the Company should continue its efforts to aggressively reduce the duration of refueling outages, which in the past have been well beyond the industry average of about 40 days.

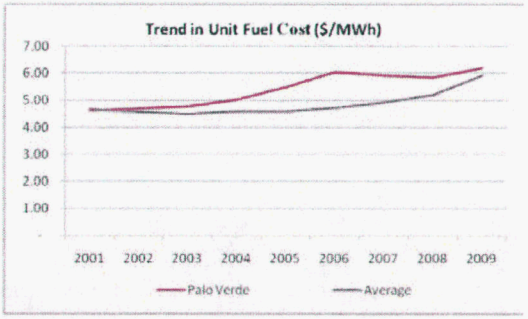
e. Forced Outages

Forced outages at Palo Verde have not been an issue to the extent the diminished availability would suggest. This further suggests attention to planned outage durations, as noted above. Palo Verde does compare unfavorably with the industry, but this is due to the exceptional problems during the four year period 2004-07. Excluding those problem years, PV is actually a little below the industry in terms of forced outage rates.

Equivalent Forced Outage Rate		
Unit	10 Year Average	Years over Industry
Palo Verde Unit 1	6.78%	5
Palo Verde Unit 2	3.30%	4
Palo Verde Unit 3	5.04%	5
Overall Industry	3.40%	

f. Fuel Costs

The plant's fuel costs have been above average for many years, but by an unremarkable amount. In the last six years, the Company dropped into the worst quartile and just recently returned to a borderline third quartile condition. Notwithstanding the negative comparisons, fuel costs have been reasonably constant for the past several years as the



industry increased. As a result, APS is near the bottom of the third quartile but the gap in terms of absolute cost is minimal.

g. Non-fuel Operating and Maintenance Costs

i. Power Plant versus Ownership Data

As in our analysis of fossil plant costs, we examined the data both on a power plant basis (Section 3) and on an owning company basis (Section 7). In the case of the coal plants, there were real differences when the data was examined on a power plant basis versus an owner basis. We explained that those differences were due to the varying ownership shares held by APS, which could be characterized as "small share of large plants and large share of small plants." This made APS's costs appear much higher when viewed on an ownership basis because of its greater ownership of the smaller, higher cost plants.

In the nuclear analysis, we again see major differences in the data when presented on a power plant (Palo Verde) basis versus a company basis, but the reasons are different. The power plant data is quite straightforward; however, the ownership data is not. Specifically, the ownership data is based on FERC Form 1 reporting. We would normally have examined it in our Section 7 with the other non-fuel O&M analyses. But numerous characteristics make such a comparison of limited value, including:

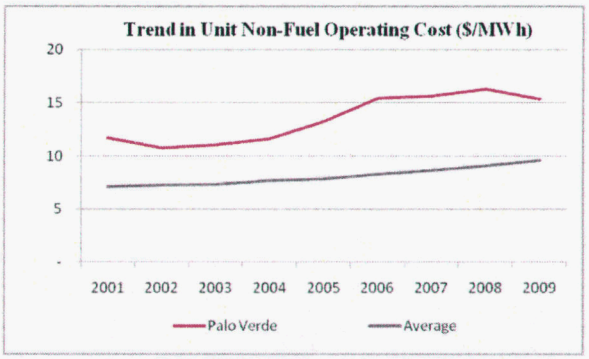
- APS Form 1 costs include "rent" charges associated with the sale and leaseback of Unit 2, thus artificially inflating Palo Verde costs versus others.
- FERC Form 1 reported costs, unlike the power plant costs, exclude pensions and benefits, A&G charged by operating agents and other costs.

Coincidentally, the costs in the above two bullets approximately offset one another, making the power plant and owner based costs about the same. But these differences tend to make any comparisons with others difficult. The Company provided a good reconciliation of these costs, which makes the differences for APS clear.

The owner-based data is problematic; however, the power plant data seems to offer clearer results. Liberty therefore concluded that it makes no sense to pursue an analysis based on the Form 1 data for nuclear O&M.

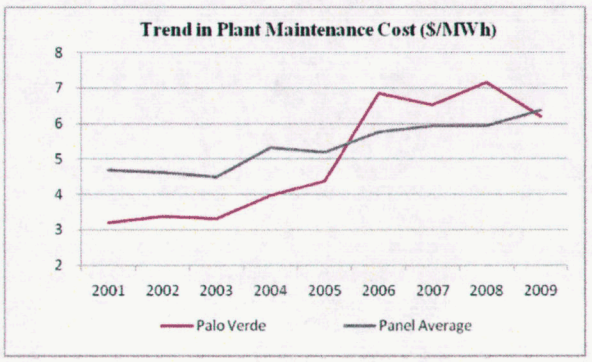
ii. Operating Costs

The accompanying chart makes clear that APS non-fuel operating costs do not compare well with the industry. In 2009, the deviation was more than $5/MWh, or over 50 percent. In prior years, the deviation was even greater. Considering 2007-09 average costs, only two of the 27 plants in our panel exceeded Palo Verde's costs. And Palo Verde has been in the worst quartile for costs in every year of our study (2001-09).



iii. Maintenance Costs

Palo Verde maintenance costs compare more favorably with the industry, although the trend over the study period is of concern. At the start of our study period (2001), APS was in the best quartile. Costs doubled in the intervening years and the Company's ranking bumped against the worst quartile only five years later, settling into the 3rd quartile since that time.



iv. Discussion of Results

On the surface, one should be concerned by both the amount and trend of Palo Verde costs. In the earlier nuclear days, such deviations were often dismissed in the mistaken belief that "excellence" required higher costs. But it is now generally accepted in the industry that the best run plants can and do boast both operational excellence and competitive costs.

The significance of these cost deviations for APS and its partners is massive. A $5 deviation equates to more than $150 million per year (about $44 million for APS's share). An understanding of the company's performance and what, if anything, can be improved should be a high priority. Accordingly, Liberty had extended discussions with APS in an effort to gain as much insight as possible on this issue.

The Company's initial feedback took the form of the many differences at Palo Verde that make it somewhat unique in the industry, all of which the Company indicated would produce higher costs. The phenomenon of a utility in a benchmarking study believing "we are different" and further believing itself to be the victim of those differences is neither unusual nor dishonest. In fact, some of Palo Verde's characteristics are unique, and do drive up costs. Some of the more important Company explanations included:

- Funding levels prior to 2004 "were not consistent with maintaining the historically high capacity factors beyond 2003." APS believes that under spending in prior years contributed to the operating problems and maintenance increases after 2003.
- APS believes nuclear costs are elevated by the "large footprint and remote location" of Palo Verde, particularly as this impacts security and fire protection. Liberty believes that a large footprint and remote location are not necessarily unique characteristics for a nuclear plant.
- The design of the plant (Combustion Engineering System 80) has more equipment, which presumably was intended to "lead to greater reliability." Note from the EAF analysis earlier that Palo Verde does not appear to experience greater reliability. Also, the design of the three units does not have the same degree of shared facilities as other multi-unit plants.
- Palo Verde has an extensive operation to manage cooling water supply and reclamation, in addition to being required to purchase cooling water from others. The Company reports that these factors add about $1/MWh to operating costs that will not be experienced by other plants. This appears to be a unique factor that does indeed add operating costs to the station.

The above illustrate just some examples; however, they are typical of the Company's response to our initial questions on high operating costs. Liberty believes that these answers are incomplete and "too easy." We expressed our concern to the Company over the dismissal of such a huge issue without more analytical support.

APS responded with a second set of dialog in which a more positive approach to cost issues at Palo Verde was put forth. Specifically, an aggressive program of cost management and efficiency improvement was described. At the center of the program were benchmarking data from the Electric Utility Cost Group (EUCG). Liberty recognizes EUCG as a solid data source, and had been troubled by APS's apparent lack of attention to that data. Liberty was incorrect in this "lack of attention" conclusion, although we believe it would have been appropriate for APS to offer this data much sooner.

APS explained many of the elements of the Palo Verde program, as well as providing copies of various analyses and tools. We have considerable experience in cost management approaches, particularly at nuclear plants, and we found the Palo Verde material in these limited discussions to be as good as we have seen.

The final, and perhaps most important, question here is how the EUCG data compares to the results presented earlier by Liberty. Although there is a significant difference in the benchmarks, the overall conclusion does not change significantly.

On the basis of EUCG data, Palo Verde has been above industry averages for the recent past, and seems to have "come back" to the average. This is similar to the Liberty panel above, except that the degree to which costs are returning to average is far less in the Liberty analysis. This results because the averages in the EUCG data are much less than those in the Liberty analysis, a difference that we are not able to reconcile because of limited access to the EUCG data. (Specific comparisons to EUCG data have not been included because of confidentiality restrictions.)

The degree of Palo Verde's overage is therefore subject to debate; however, the fundamental conclusion that the station does not compare well is intact. Note the disparity with the EUCG median (which is the boundary between 2nd and 3rd quartiles), which amounts to about $4. It is not unreasonable to assume that the station is in, or very near, EUCG's 4th quartile.

Notwithstanding Palo Verde's position, the recent cost decreases suggest something positive is underway. It should be noted, however, that most of the reduction in the last two years is due to higher generation (the denominator) and not lower costs (the numerator). The relative amounts are shown in the accompanying table.

Palo Verde Cost Improvement 2008 - 2010		2010 versus 2008
Generation	Change in MWh	6.8%
Non-fuel O&M	Change in $/MWh	-8.5%

v. Conclusions on Non-fuel O&M Costs

Liberty makes two major conclusions regarding operating costs: (1) by any measure, Palo Verde costs are high versus its peers, and (2) recent cost management initiatives by APS, bolstered by higher capacity factors, seem to be having a positive effect. We believe the Company is on the

right track, but also believe that those efforts would be enhanced by an improved understanding of why Palo Verde stands where it does versus other plants. It would therefore appear that a more analytical approach to operating cost benchmarks, and the EUCG data in particular, would be both appropriate and beneficial. This is especially important considering the large amount of annual costs involved.

Recommendation 5.3: APS should incorporate into its cost management program, an ongoing analysis of its cost performance versus other EUCG companies with the specific objectives of (a) identifying the reasons for deviations; (b) quantifying the impact of those reasons; and (c) developing mitigation schemes if and as appropriate.

6. Sustainability

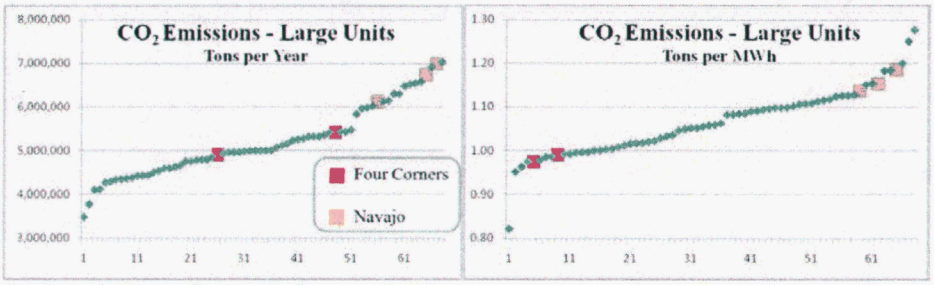
This section of the analysis is defined by the emissions levels at the APS coal fired power plants. We examined CO_2, NO_x, and SO_2. The absolute quantity of emissions was analyzed as well as emissions on an MWh of generation basis. The power plant panels used are based on the expanded base panel, the same as used in the coal plant performance section. This resulted in 68 large units and 98 small units in the sample, all of which are operated by expanded base panel members.

For benchmarking purposes, emissions are a moving target. NO_x and SO_2 emissions are down about 50 percent for large units in the study period (2001-09) and a lesser, but still substantial, amount for small units. CO_2 levels have remained about the same.

a. CO_2

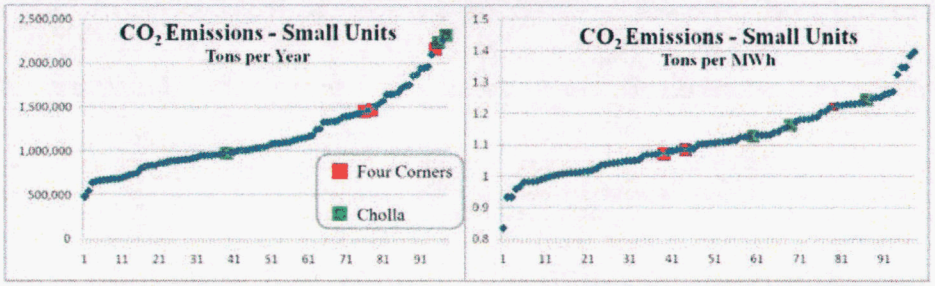
The Navajo units stand out as several of the largest CO_2 emitters in the panel. Navajo accounts for 2 of the top 4 large plant emitters on an absolute basis (tons per year) and 3 of the top 10 spots on a tons per MWh basis.

CO_2 Emissions – Large Units
3 year average – 2007- 09



The small APS units are far superior to the large units, but lie nonetheless in the upper half in most CO_2 measures. We do not view this data as of major concern in that: (1) the absolute data is somewhat misleading in that the worst performers (FC3 and Cholla 2 and 3) are larger than the average panel unit size, and (2) the data is not so compelling when normalized for MWh of generation.

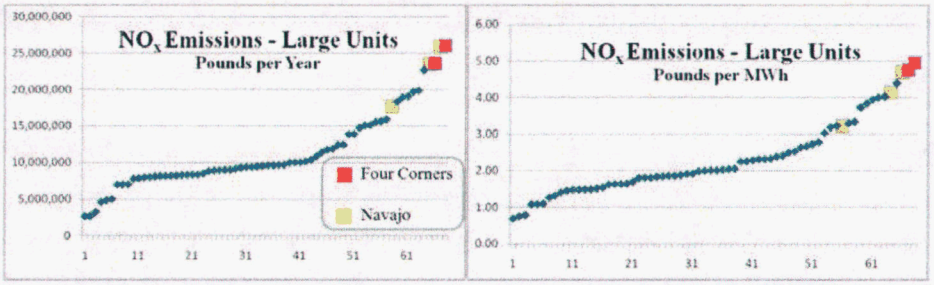
CO_2 Emissions – Small Units
3 year average – 2007- 09



b. NO_x

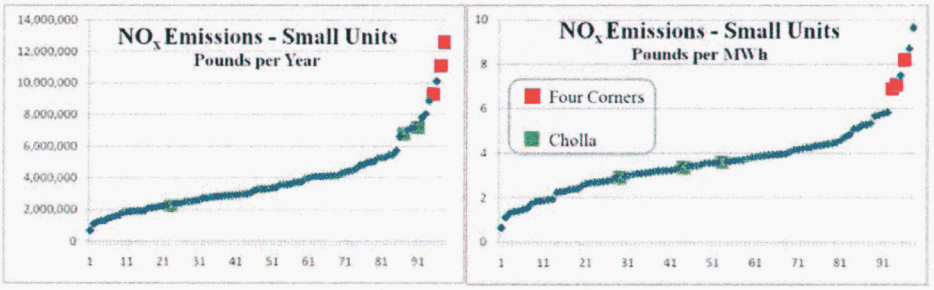
NO_x emissions from the large APS units are the highest in the panel, to the extreme. Note that in addition to their relative rank, emissions levels are far above the rest of the plants in the panel, more than double typical plants. In addition, this ranking applies whether viewed as absolute emissions or normalized for generation.

NO_x Emissions – Large Units
3 year average – 2007- 09



The small Four Corners units are similarly positioned as the worst in the panel.

NO_x Emissions – Small Units
3 year average – 2007- 09

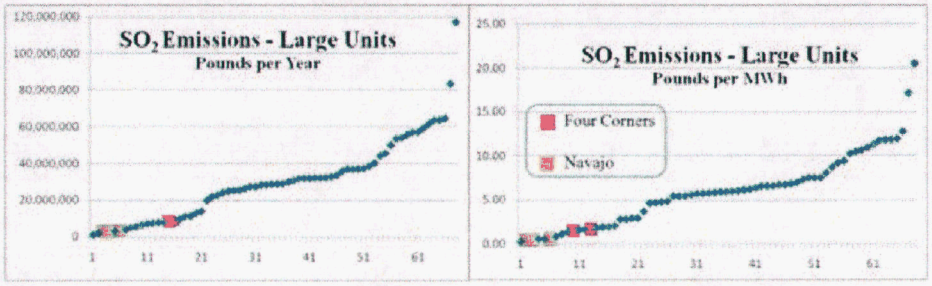


c. SO_2

The story is quite different for SO_2 with all of the APS units among the best performers.

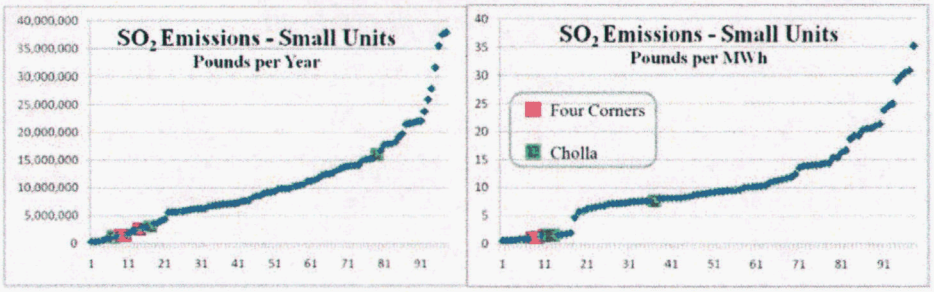
SO_2 Emissions – Large Units

3 year average – 2007- 09



SO_2 Emissions – Small Units

3 year average – 2007- 09



d. Sustainability Conclusions

It is obvious that APS is in a comparatively poor position in terms of CO_2 and NO_x emissions. The deviations versus industry are extreme. Nevertheless, Liberty offers no suggestions for further action as a result of this benchmarking study. Our position is based on the following:

- APS's problems here are already highly visible and well-known. Our study has merely restated what most already know.
- There are numerous actions underway on emissions-related matters, including Company and EPA actions.
- The Company plans to retire the small Four Corners units and reduce emissions at the large Four Corners units.

We therefore do not believe further analysis of benchmarking data for emissions would be beneficial.

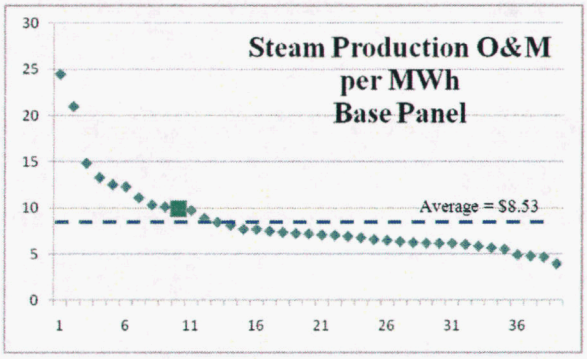
7. Non-fuel Operating and Maintenance Costs

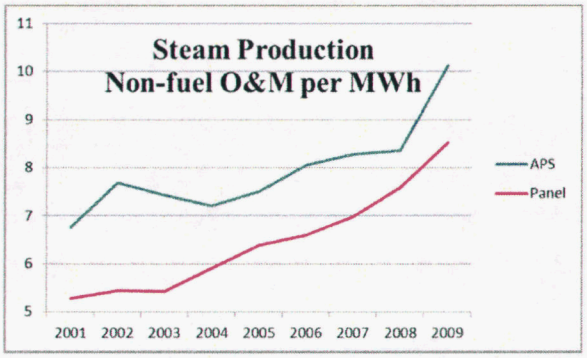
O&M Expenses ($000)	O&M	Fuel	Non-fuel O&M
Steam production	363,915	-235,898	128,017
Nuclear production	252,555	-61,765	190,790
Hydro production	2		2
Other production	618,768	-495,804	122,964
Other power supply	440,540		440,540
Sub-total - Power Production	1,675,780	-793,467	882,313
Transmission	46,453		46,453
Distribution	95,644		95,644
Customer expenses	108,316		108,316
A&G expense	166,961		166,961
Sub-total - other	417,374		417,374
Total	2,093,154	-793,467	1,299,687

The accompanying table lists APS's O&M costs for 2009. The cells highlighted in green represent the specific costs that will be examined in this section. The major exclusions are fuel and purchased power ("other power supply"), which are not included in the scope of this study, and nuclear, which was examined in detail in Section 5 – Nuclear Performance.

Steam production costs (coal fired plants) are analyzed here as well as in Section 4. We look at costs here on a company basis, compared with the power plant analysis presented in Section 4. APS's ownership share is characterized as large for the small units and small for the large units; therefore, the coal fired plant costs in this section will appear higher than when viewed on a total plant basis.

a. Steam Production (Coal fired)





The non-fuel operating costs associated with APS's coal-fired plants are above the industry average. The Section 4 analysis concluded such costs were "middle of the pack." Therefore, slightly above average performance here, given the APS ownership bias towards the smaller units, is not unexpected.

The trend of APS costs is similarly not surprising. The gap with the industry has somewhat narrowed, but not because of any lower APS costs. Many coal-fired plants suffered lower capacity factors in 2008 and 2009 due to economy-related load reductions. APS did not experience this situation, thereby improving its relative position in the industry.

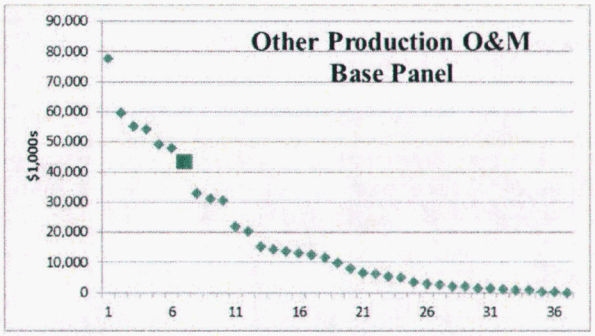
Liberty believes that the weak relative position here of APS is not related to cost management issues but rather is due to the characteristics of the APS portfolio, which is concentrated towards small, less cost effective units. The portfolio issue is likely to be mitigated considerably as APS retires the small Four Corners units and increases its share of the large Four Corners units. It

would be appropriate for APS to conduct a suitable analysis, normalized for size, to validate that the seemingly weak APS performance is based solely on unit size and not any deviations from industry cost performance.

Recommendation 7.1: APS should review its deviation from industry costs and verify if such deviation is due to a bias to small units in its portfolio, in which case no further action would be appropriate. If such is not the case, APS should determine the cause of the deviation.

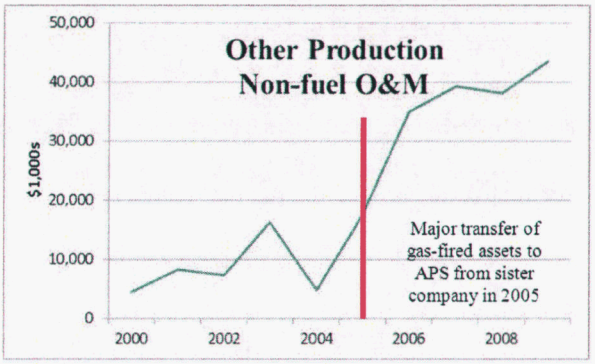
b. Other Production (Gas fired)

This category is particularly difficult to analyze. It includes numerous forms of generation, each of which has unique characteristics. For our purposes, we are particularly interested in gas-fired combined cycle plants, since those make up much of these costs for APS. But the category also includes other forms of generation, most notably gas-fired peaking units. Needless to say, comparison of peaking units with combined cycle units is not an appropriate pursuit.



Also contributing to the uncertainty here is the APS practice of including renewable energy costs in this category. The high amounts of RES costs at APS make the APS data incomparable. Accordingly, Liberty removed all APS RES costs from the data for this analysis.

With RES costs removed, APS still ranks 7th largest in the panel for other production non-fuel O&M costs. On the surface, this seems high, particularly when most of the data points are 75 percent less than APS. But, again, the "apples and oranges" nature of this account make such a conclusion tentative at best.

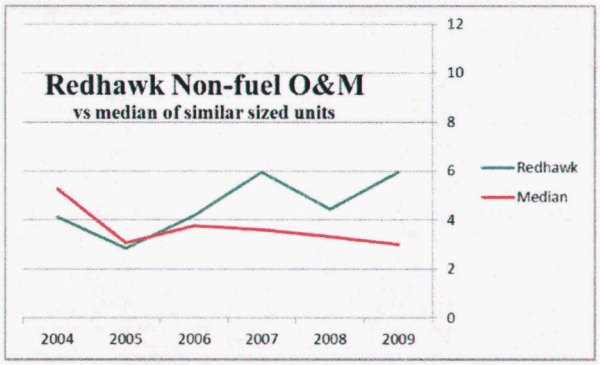


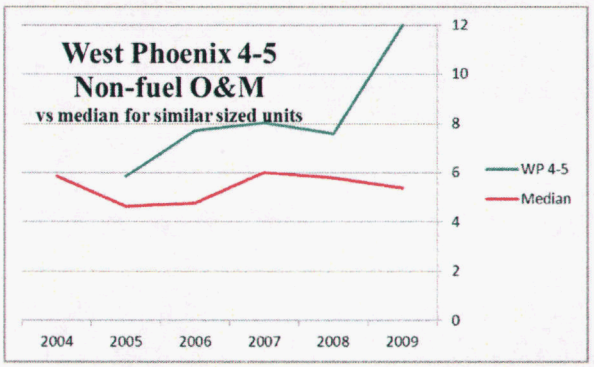
Adding to the concern are sharp cost increases over the last few years. These increases give us no firm conclusions but again raise concern.

In an attempt to determine if there really are concerns associated with other production, Liberty constructed a new panel consisting of gas-fired combined cycle units owned by regulated utilities. We sought to examine how APS's large CC plants compared. The APS plants used in the analysis were: (a) Redhawk:1,007 MW, and (b) West Phoenix 4 and 5: 626 MW.

We compared the costs associated with these units to the median for similar sized plants, where "similar size" was defined as within ±30% of the APS plant. The median value was chosen instead of average because costs can vary widely, producing an average that is far above the median and hence of little use as a benchmark.

It seems clear that there is indeed a basis for the suspicions voiced above. The APS plants were double the median in 2009 and were more typically greater than 50% over median in prior years. The reasons for these wide deviations should be identified by APS, leading to corrective actions as appropriate.



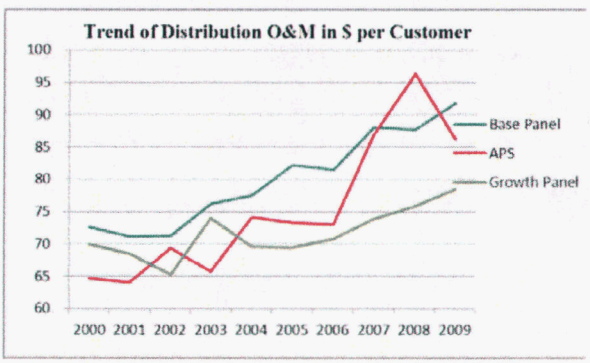


Recommendation 7.2: APS should analyze non-fuel O&M costs associated with the combined cycle plants to determine:

- Why these units are well above similar units in cost
- Why the trend in operating costs is upwards, contrary to the industry trend
- Appropriate corrective measures to reduce operating costs

c. Distribution O&M

On a per customer basis, APS's distribution O&M costs are competitive versus the base panel, falling consistently in the 2nd quartile. Oddly, costs for the growth panel are well below those of the base panel; therefore, APS does not compare as well. The Company has hovered around the median (50 percent) line for many years and it is essentially on that line for 2009.

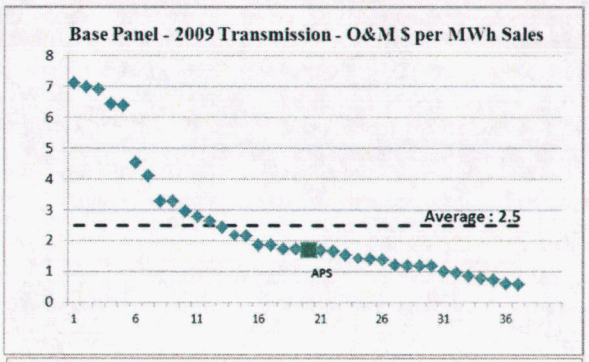


The situation remains similar on a per unit sales basis, although performance is slightly worse, hovering around the median for the base panel and now reaching just inside the 3rd quartile.

The overall level of distribution costs is unremarkable, but the spikes in 2007 and 2008 raise questions. Note that performance versus the growth panel was in line as recently as 2006, but is now well above the average for that panel. The drop in 2009 provides some hope that the prior years were temporary, but the Company should nevertheless address this trend.

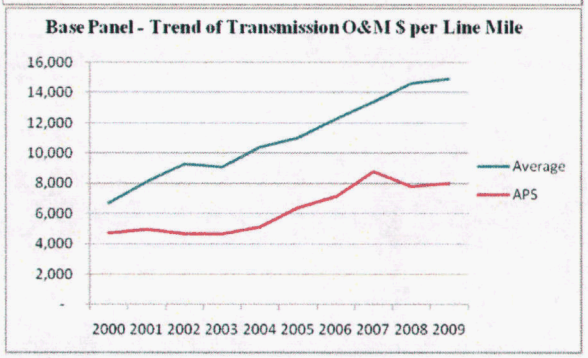
Recommendation 7.3: APS should analyze distribution O&M costs to determine the reasons for the sharp increases in 2007 and 2008 and expectations for relative performance in the future.

d. Transmission O&M



Base panel costs have a very unusual distribution, with seven utilities having costs much higher than their peers. As a result, average costs have little meaning in this panel. APS is well below average, but this performance only produced a near-median ranking.

On a cost per mile basis, APS is also very competitive, falling well beneath the industry average and improving in nearly every year of our study. This rating produced mid-2nd quartile performance.

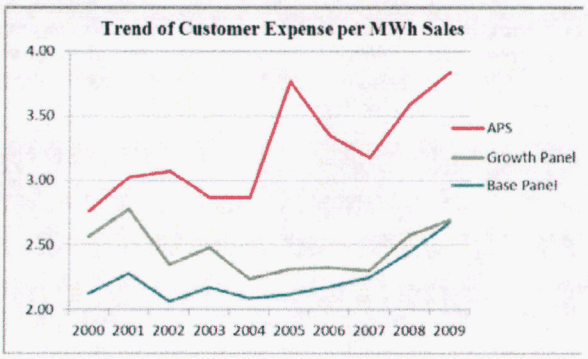


The APS results for transmission O&M suggest that no further actions are warranted as a result of this benchmarking study.

e. Customer Expense

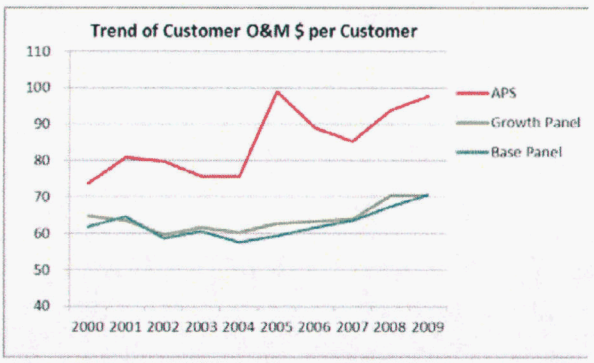
Customer expense is defined as the sum of:

- Customer accounts
- Customer service
- Sales expense



APS acknowledges it has exceptionally high customer expenses. In initial discussions, the Company attributed this to: (1) high customer growth, (2) high customer turnover, and (3) a more complex rate structure leading to more customer questions and more time-consuming rate conversations. APS offered no quantitative analysis on any of these factors, making it impossible to judge the validity of these "causes" or the magnitude of their impact.

Note that 2009 customer expense was about 43 percent over both the base panel and high growth panel. The explanation that customer expense is higher than others due to higher customer growth would therefore not seem valid. APS performance is 4th quartile versus both panels.



Comparing on a per customer basis, which is probably more appropriate, does not change the outcome. APS remained at 39 percent over both

the base and growth panels, and again this resulted in 4th quartile performance.

The similarity between the base and high growth panels makes apparent the error of dismissing cost deviations without suitable analysis. APS believes their high growth rate explains higher costs, and this does seem rational. But the data proves otherwise, as high growth does nothing to change APS's relative position. We saw a similar example above when distribution O&M costs were actually lower for high growth utilities, a counter-intuitive result. This means that the causal factors cited by APS do not fully explain the cost deviation. And if some of those causes are legitimate, their magnitude remains unknown in the absence of an analytical approach. While anecdotal evidence or general observations may be enticing, they are inadequate, and can be misleading.

i. Other Factors Affecting Customer Expense

In later discussions, the Company reported that the customer expense levels were not comparable in that APS data included unique attributes not found in other companies, or at least not found to the same extent. These attributes are:

- The Competition Rules Compliance Charge (CRCC)
- Demand side management initiatives (DSM).

These two factors added about $32 million to customer expenses, or about 30 percent of total 2009 customer expenses. The question is whether they should be deducted from APS's costs in order to provide for a fair comparison. Liberty notes that many utilities have had adders to their customer costs to facilitate the transition to competition. We suspect that these charges are less than in the past, because we are so late in the competition game; however, data on these amounts is not readily available without a detailed utility-by-utility analysis.

Regarding DSM, all utilities have such programs and the associated costs are included to some degree in customer expenses. APS's claim here is that the amounts it experiences are higher than typical. Again, determining the amounts charged by others would require a detailed utility-by-utility analysis.

While it is not possible at this time to definitively answer this question, we can bracket the results by removing all of the CRCC and DSM costs from the APS data. Liberty does not believe this approach is sound because other utilities still have some of these costs in the panel data. This gives us a "best case" for APS, however, and a very conservative result. With all CRCC and DSM costs removed from APS only, the Company's position in terms of customer expense becomes average.

ii. Conclusions on Customer Expense

On the surface, customer expense is one of the most out-of-line comparisons versus our industry panels. APS has offered many potential explanations, some of which have been proven wrong, others which seem to have some merit and most others which simply do not have quantified supporting analysis. Again, the use of general explanations and anecdotal observations frustrates the process. The bottom line seems to be that APS is above the industry by whatever amount that CRCC-like and DSM costs are included in industry costs.

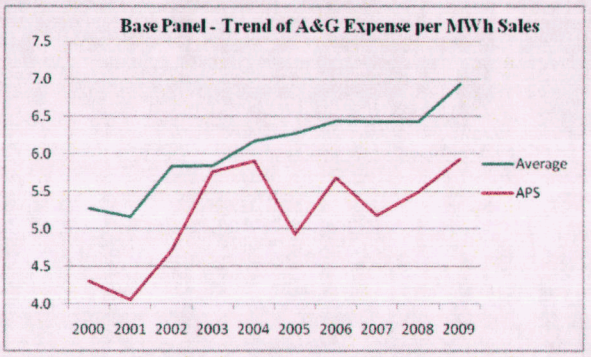
We are concerned about the Company's lack of quantitative analysis in this regard; but do not suggest that the Company has not attempted such efforts. Several years ago, a UMS study analyzed customer operations. This work gave credence to the high growth and turnover issues, and recommended further study of them. It also cautioned, however, that there were other factors that might contribute to higher costs, and offered specific examples. More recently, the Company commissioned another analysis, this one of the revenue cycle, by The Hackett Group.

The magnitude of the potential cost impact merits a more studied analysis by the Company. The existence of various prior studies, such as UMS and Hackett, suggests that there is a starting point for quantifying the Company's position.

Recommendation 7.4: APS should determine, on a quantified basis, the specific reasons for its deviation from other utilities in the categories of customer expense. Such an analysis should include, at least, consideration of the UMS work, the Hackett work and the impact of the AMI project.

f. A&G Expense

APS has been under the average for A&G expenses for the study period when viewed on a cost per unit MWh sales basis. Except for a brief time in the middle of the study period, this has resulted in 2nd quartile performance.



Liberty also examined A&G on a per unit revenue basis and the results were similar.

g. Total Electric O&M (excluding power production)

In gauging improvement prospects, it is appropriate to look at the details of APS costs. In developing an overall scorecard, however, it can be useful to look at the bottom line. In the case of APS, this indicates that O&M costs in all of the big accounts outside of power production add up to a generally middle of the pack performance level. The largest category (A&G) is also the best.

The results are better on a per customer basis; APS falls in the 2nd quartile. The comparison worsens on a per MWh sales basis, enough to push into the 3rd quartile.

	Versus Panel Average	Quartile 1 best 4 worst	Weight
A&G expense	Low	2	40%
Customer expenses	High	4	26%
Distribution	Middle	2-3	23%
Transmission	Low	2	11%

8. Capital Investment

Liberty analyzed capital investment at APS by considering total plant account, changes in plant account and variations in plant account due to different variables. Plant account is defined as capital investments prior to any deductions for depreciation. Accordingly, the amounts are cumulative investments that are reduced only when facilities are retired. The following table describes current plant account and the changes since 2000.

	Steam Production	Nuclear Production	Other Production	Transmission	Distribution	Sub-total	Other	Total Electric Plant
EOY 2000	1,233	2,346	171	892	2,645	7,287	747	8,034
2001	22	-3	17	82	193	312	61	374
2002	41	9	14	71	173	309	89	397
2003	42	161	1	111	175	490	-79	411
2004	38	-18	2	52	196	270	130	399
2005	41	59	1,089	119	235	1,543	98	1,641
2006	31	2	18	81	279	411	94	505
2007	62	5	10	110	287	474	255	729
2008	77	45	77	88	245	532	91	623
2009	186	51	22	147	141	548	-30	517
							0	
9 year total	539	312	1,251	861	1,924	4,888	708	5,596
	44%	*13%*	*730%*	*97%*	*73%*	*67%*	*95%*	*70%*
EOY 2009	1,772	2,658	1,423	1,753	4,569	12,175	1,455	13,630

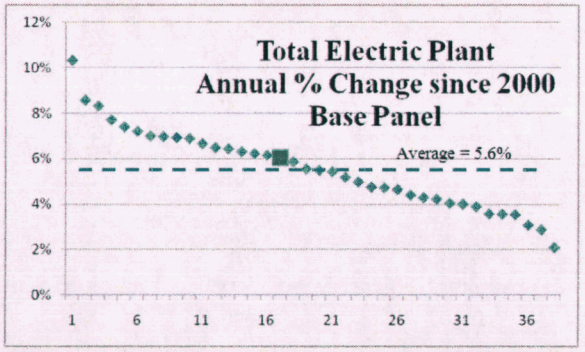
We examined:

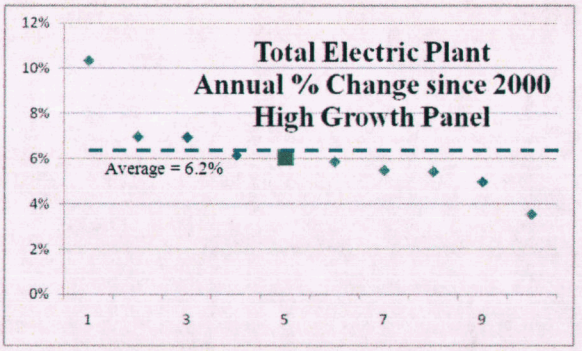
- Total electric plant
- Steam production plant
- Nuclear production plant
- Other production plant
- Transmission plant
- Distribution plant, including investment per new customer.

In evaluating production plant, it is helpful to understand a company's generation mix, and match that to the panel as appropriate. Please refer to Section C.5 in which we demonstrated that the fuel mix of APS is best approximated by our nuclear panel.

a. Total Electric Plant

We examined total investment in plant to present a "big picture" perspective. It is the individual categories of investment that are more important and are necessary in any event for any meaningful analysis.

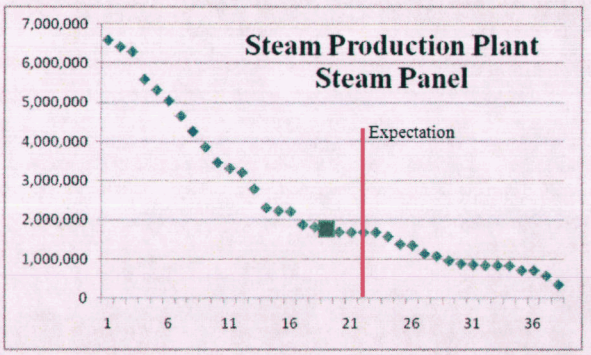




In summary, investment in plant at APS is generally a little higher than it is at the typical base panel utility. Annual capital expenditures have also exceeded those of the base panel by a small amount. This result should be expected, given that APS is a high growth company that should require above-average investment. When we compared APS to the high growth panel, the Company matches that panel's average for annual percent growth of electric plant account. At the summary level, it therefore appears that the Company's capital expenditures are reasonably aligned with what a benchmarking analysis would expect.

b. Steam Production Plant

APS ranks 22nd in the panel in terms of steam generation. Our expectation for its level of investment would therefore be around 22nd. The chart shows that APS actually ranks 19th, which might suggest over-investment; however, note that the curve is flat in this region and 19th through 23rd are all about equal. We can therefore conclude that APS investment in steam production plant is roughly what we would expect.

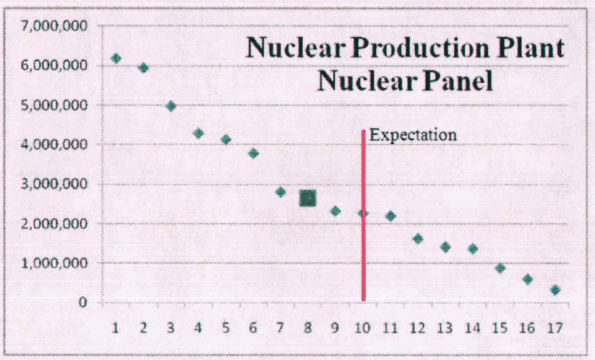


When plant account is measured on a per-MWh of generation basis, APS is about equal to the panel average. APS investment in steam production plant therefore does not appear remarkable.

On an annual basis, APS has been adding to plant account at a rate of about 4% per year. This compares to a panel average of 4.7 percent. In summary, this study raises no issues regarding steam production investment and annual additions to steam production plant.

c. Nuclear Production Plant

APS ranks 10th in the panel in terms of nuclear production. Our expectation for its level of investment would therefore be around 10th. The chart shows that APS actually ranks 8th, which indicates a slightly higher actual investment than expectation.



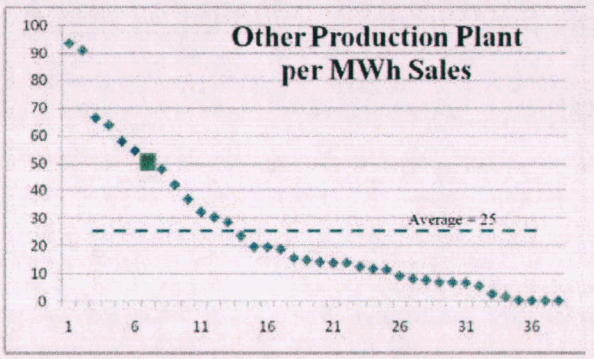
When plant account is measured on a per MWh of generation basis, APS is about 30 percent higher than the panel average, confirming the hint that perhaps APS has a relatively higher investment versus similarly situated nuclear companies.

Earlier, we discussed how a sale/leaseback of Palo Verde 2 artificially inflated the unit's operating costs. It should be obvious that the very same transaction would have artificially decreased plant account, yet APS nuclear plant account is still above expectations.

On an annual basis, APS has been adding to plant account at a rate of about 1.3 percent per year. This compares to a panel average of 2.0 percent.

In summary, the study suggests that nuclear investment is somewhat higher at APS than similar companies, but that the rate of plant additions is less than the industry.

d. Other Production Plant



We discussed above in Section 7 the difficulty in benchmarking this category. Assessing plant investment is even more problematic. There are numerous causes for this difficulty:

- Because the plants include both peaking units and combined cycle, capital costs vary widely.
- Because capacity factors can vary from near zero to base load levels, normalizing to output is not possible.
- Combined cycle plants are relatively new, such that "additions" to plant account are distorted with new units.
- The APS data is distorted by a "new" investment of more than $1 billion that is not really new; it reflects a transfer of ownership from a sister company.

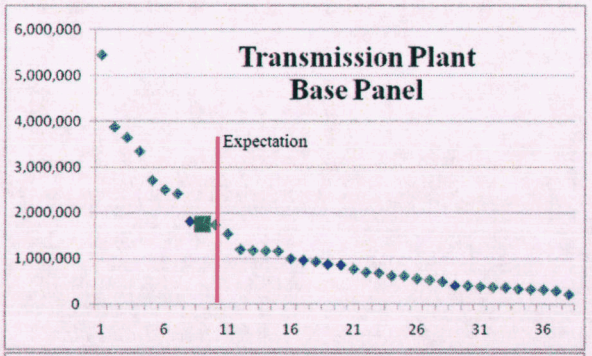
These are all reasons why it is difficult to see any patterns or draw any conclusions from this data. On the other hand, neither is there any indication that APS is out of sorts with the rest of the industry. Consider the accompanying chart as a "sanity check." Recall from our earlier fuel mix data that APS relies on "other" slightly more than twice as much as the typical base panel company (21 versus 10 percent). On a per MWh sales basis, APS investment is slightly more than double the panel average, precisely where one would expect.

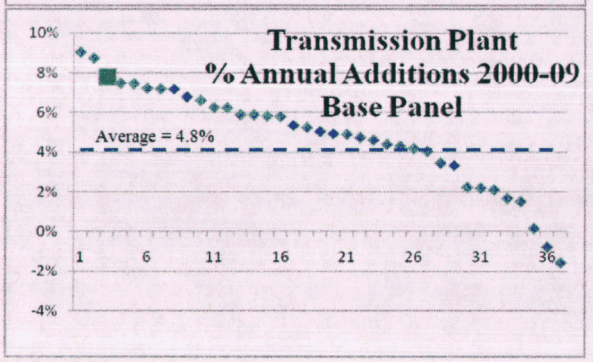
The lack of any questionable deviations as well as the difficulty in making comparisons in the first place, suggest that no further analysis is appropriate for his benchmarking study.

e. Transmission Plant

Based on the number of miles of transmission lines, we would expect APS to rank 10th in the base panel in terms of transmission investment. The Company's investment level has been consistent with the expectation.

The growth rate experienced by APS, however, is well above the base panel. Only two utilities from the base panel have invested more in transmission in the study period. Recent, robust investment in transmission is not a surprise across the industry. Lack of investment in prior years, numerous opportunities from important transmission constraints, and government incentives have combined to strongly encourage new spending. One would expect a utility like APS to be an active investor in this environment. Its location would suggest an above-average level of participation.





Accordingly, we are neither surprised nor concerned to find APS near the top of the new investment list. Nevertheless, APS should provide a rational explanation for why it lies so far above the other panel companies, and how its strategy relates to its customers' needs.

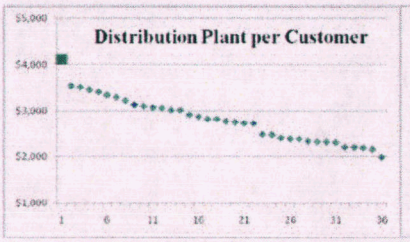
Recommendation 8.1: If it has not already done so, APS should submit to the ACC the rationale for its aggressive transmission investments as well as an analysis of the impact on APS and regional consumers.

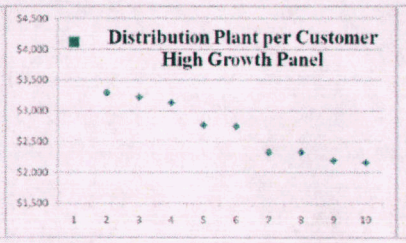
f. Distribution Plant

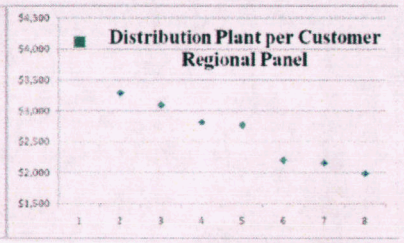
i. Plant per Customer

The levels of APS investment in distribution tell a surprising story. By any measure, and versus any panel, APS has the highest plant account in the US and its deviation from even the next highest utility is substantial.

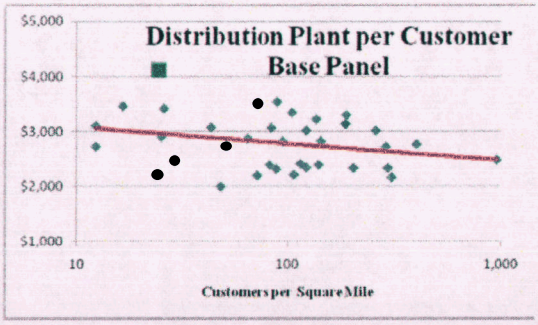
The three following charts, which measure APS investment on a per customer basis versus the base, growth and regional panels respectively, paints a clear picture of this unusual situation. In the base panel, APS is 16 percent above the next highest company (Duke – Carolinas), while in the growth and regional panels, APS is 25 percent above the next (Nevada Power).



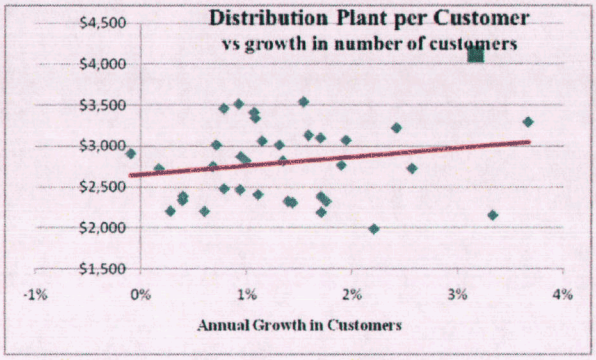




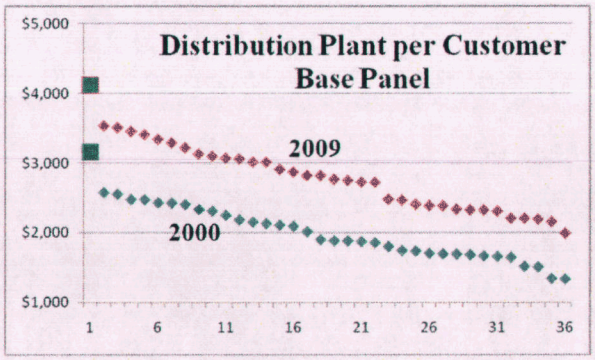
Liberty also examined this parameter as a function of customer density. The data suggests that less dense territories require slightly greater investment, but APS remains the outlier, well above firms with equal or even less dense service territories.



We have already concluded that high growth is not the cause of this phenomenon, but we nevertheless examined investment as a function of growth, to consider whether there is some level of contribution. Again the data suggests that higher growth does indeed require slightly higher investment, but the APS level remains well out of any reasonable comparative range.



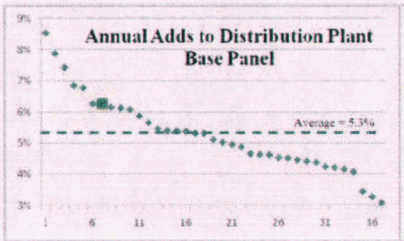
The data offers no reasonable explanation for the position of APS versus other utilities. Note, also that, if we compare 2009 data to 2000, we can see that this situation has existed for a long time. In fact, it has improved in that APS is now 16 percent above the second ranked company, compared to 38 percent in 2000.

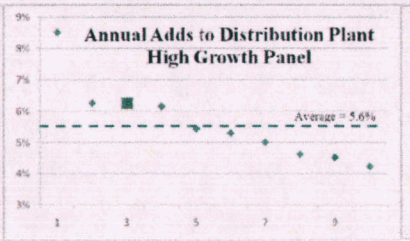


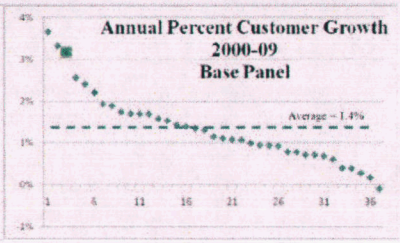
Unfortunately, the data can take us no further for the present. Discussions with APS did not help produce an explanation. It is very likely that whatever condition caused this situation occurred many years ago. It is further likely that it no longer exists, since APS is narrowing the gap in the last 10 years.

On the positive side, this matter seems to be of academic interest only. There is no evidence of recent over-investment and there are no reasonable actions that can be taken to reduce plant account in any event. For purposes of this study, the matter is moot.

ii. Capital Expenditures in the Study Period (2000-2009)







APS annual investment is growing a full percentage point a year greater than the base panel rate. Surprisingly, investment by the high growth companies is not much greater than the base panel's, but APS is still way over the high growth average.

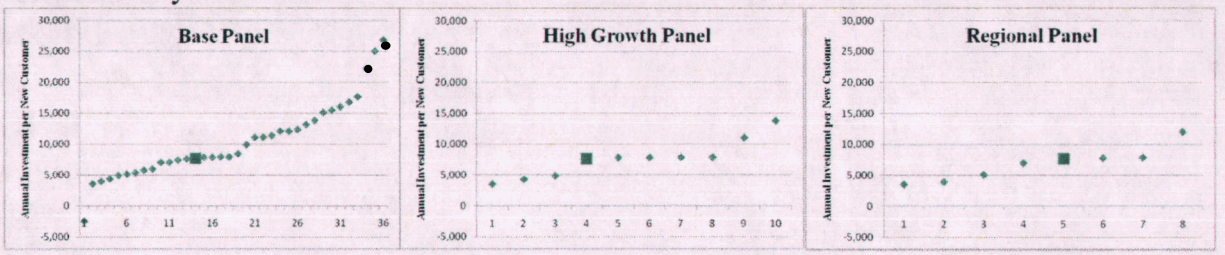
The growth in APS's customer base makes it clear why additional distribution investment is necessary. As can be seen on the accompanying chart, APS is the third fastest growing utility in the base panel in terms of customer growth over the study period. The annual growth rate is more than double the panel average.

iii. Investment per New Customer

New investment in distribution plant was a specific direction from the settlement agreement, which called for consideration of "distribution additions to plant per new customer." Liberty completed a full analysis of distribution investment, including the review of investment on a "new customer" basis. We caution, however, that the significance of costs per new customer is suspect, simply because new customers are not the only, or even the most dominant, driver of investment, particularly in recent years. Consider that:

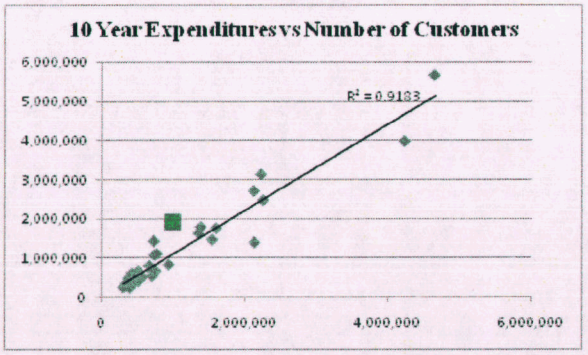
- Aging infrastructure is a national issue, and not just in the electric industry. Distribution investment nationwide is picking up in response to this common need.
- Distribution investment lagged the other spending categories (generation and transmission) for decades. The industry is now in a "catch up" mode as the consequences of that under-spending becomes more apparent.
- New technologies, such as Smart Grid, are taking off, necessitating major new investments.

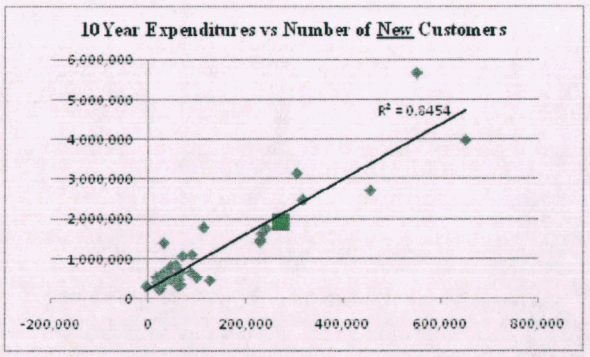
These factors, and not the number of new customers, comprise the primary drivers of distribution investment. The three charts below show APS's investment in distribution per new customer to be unremarkable. APS is middle of the pack and within 10 percent of the median in all three panels. This data averages results for all years between 2000 and 2009. That APS lies so close to the median, when the spread of this distribution is quite wide, demonstrates that APS is not out of the ordinary.



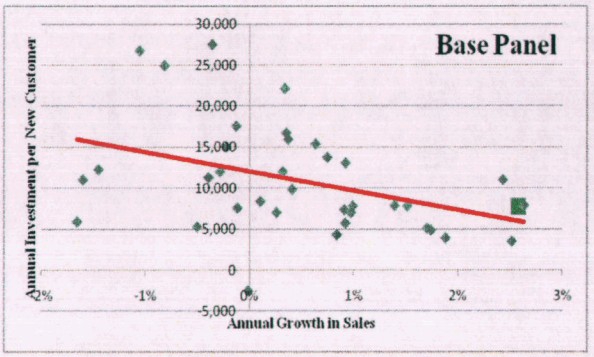
We believe, however, that the data is misleading; the level of investment may not be fully a function of new customers. If that is correct, then the APS numbers are artificially low because we divided by a larger number of new customers than the others. We tested this hypothesis by examining capital expenditures as a function of all customers (not just new). The next tables show the results of those comparisons. The correlation of expenditures to total customers is better than the correlation to new customers. Note also that APS has higher unit costs (above the trend line) when measured against total customers and lower unit costs (below the trend line)

when measured against new customers. This appears to confirm that the new customer analysis artificially lowers APS costs.





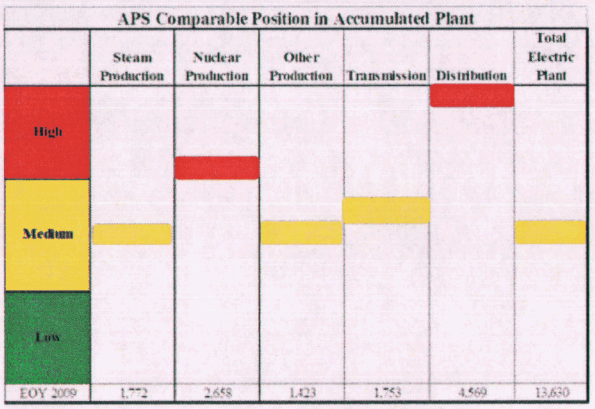
We also examined investment per new customer as a function of sales growth. The next chart shows that annual investment per new customer is lower for the highest growth companies. APS is one of the highest growth companies, and falls where one would expect.

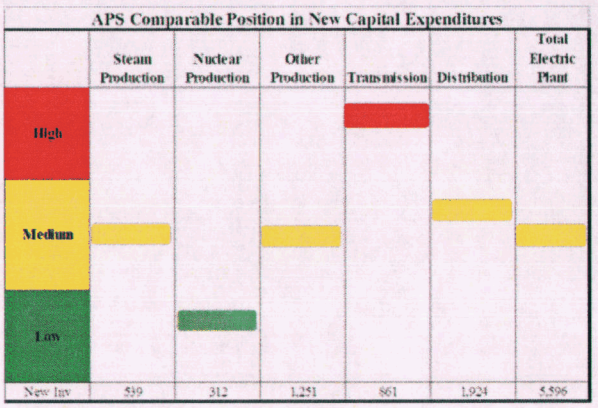


We should address why costs for the high growth companies should be lower. Liberty reiterates that plant investment is driven by other factors, and the APS-type growth companies have a lower cost per new customer simply because similar plant investment levels are being divided by a larger number.

g. Summary of Plant Investment Results

The charts below illustrate the relative APS positions in total plant account (left) and additions to plant account over the last ten years (right).



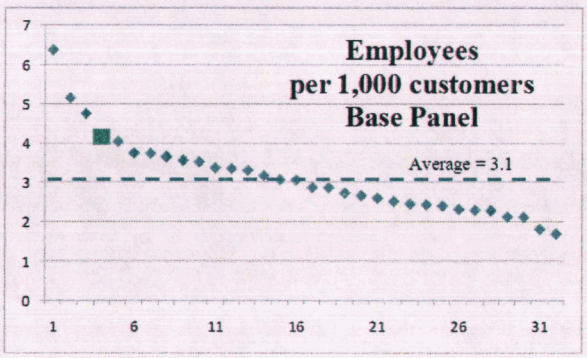


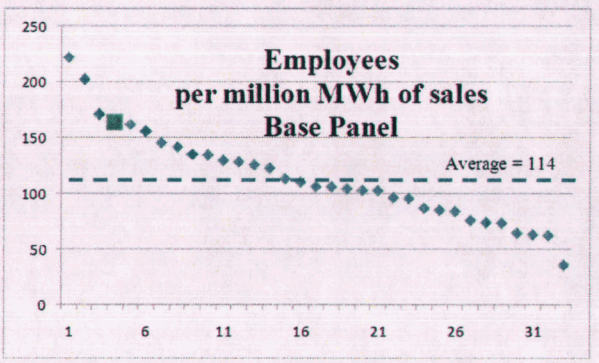
9. Management, Labor and Regulatory Expenses

a. Employee Costs

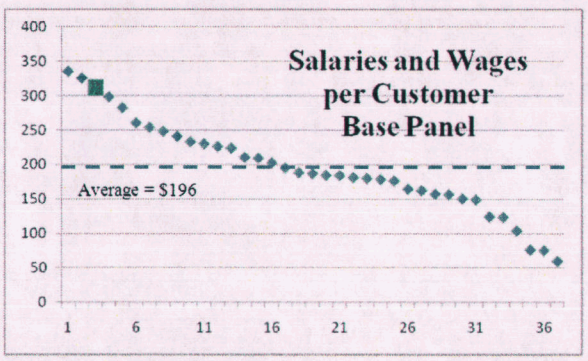
APS has about 6,800 employees, which include a very large contingent at Palo Verde. APS, however, bears only 29 percent of Palo Verde costs. The Company completed a reconciliation that defines an equivalent staffing level of 4,600. Liberty used this figure in this analysis.

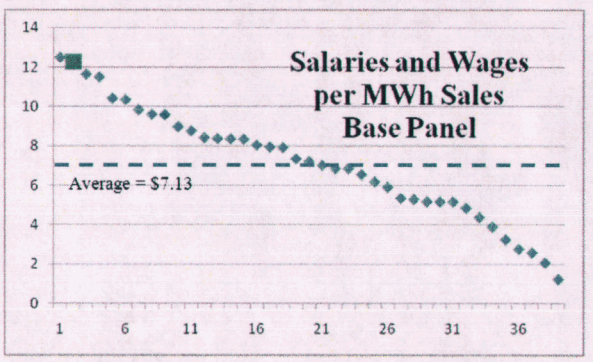
Our analysis indicated that, regardless of which measure is used, the 4,600 employee level is well above expectations as defined by the panel staffing levels. APS personnel numbers run about a third higher than the base panel average on a per customer basis. APS is about 40 percent higher on a sales basis.





These higher levels would create the expectation that salaries and wages (S&W) at APS would likely be high as well, probably in the 30-40 percent range. S&W are actually much higher than these levels. The per-customer cost exceeds average by about 60 percent and the cost per sales is higher by about 70 percent. This obviously demonstrates that higher S&W are not simply the result of more employees.

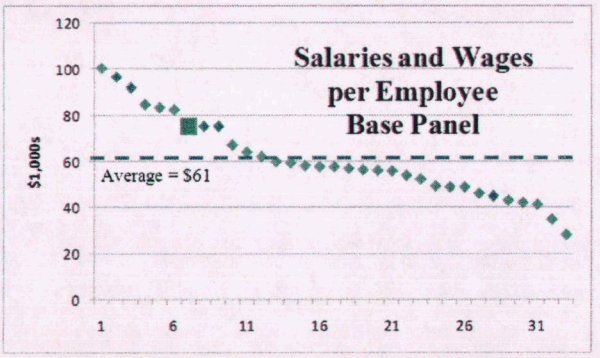




Pensions and benefits (P&B) are about 30 percent higher than those of the base panel average when measured on either a per-customer or per-MWh sales basis. P&B as a percentage of S&W, however, runs below the panel average.

On a bottom line basis, costs per employee in terms of S&W are well over the base panel, while P&B is about average. APS has advised us that "salaries were within 5% of market median in 2009." Note that median levels for the panel are lower than the averages. This factor makes the

APS conclusion significantly inconsistent with our data. We understand that salary surveys can use many different assumptions and different panel definitions. It is not possible for Liberty to reconcile this difference with the available data.



b. Analysis of Staffing

Our initial review concludes that:

- The number of employees at APS is significantly higher than other panel companies (even after removing 2,200 employees for the nuclear adjustment)
- Salaries and wages are also high versus the panels, by an amount more than would be expected by the theorized staffing overage
- Pensions and benefits appear to be average
- The latter two points are confirmed by analysis showing cost per employee is:
  - High for S&W
  - Average for P&B.

APS offered that capital spending could explain some of this variation. APS has a large internal construction department; many others companies do not. There may be other explanations as well; however, the degree of the deviation and its consistency across multiple parameters indicate the need for more definitive analysis. The degree of the potential improvement opportunity suggested by raw numbers justifies a significant follow up APS effort.

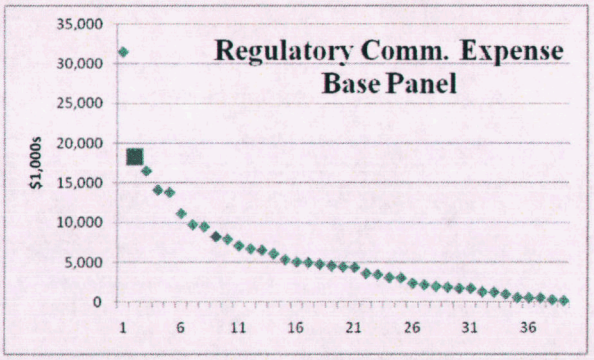
It should be remembered that any cost overages identified earlier in this report likely have a significant staffing component to them. Accordingly, any staffing issues are best addressed as a part of those efforts and not necessarily as a stand-alone and potentially duplicative staffing analysis.

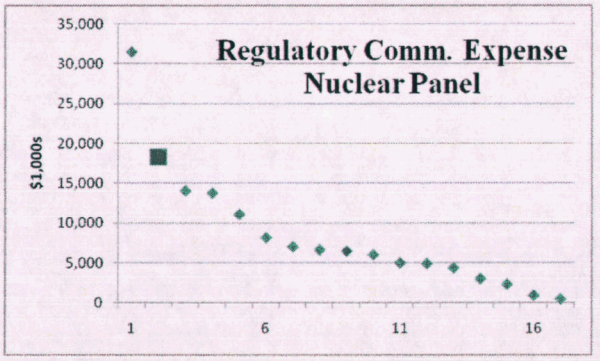
Recommendation 9.1: APS should complete an overview of its staffing levels to determine the approximate overage, if any, and reconcile its deviations from industry data.

Recommendation 9.2: APS should conduct a detailed staffing analysis in those areas where it concludes costs, as discussed in this report, are out of synch with industry levels. This might include at least nuclear O&M, combined cycle O&M and customer expense.

c. Regulatory Commission Expenses

APS ranks 2nd highest in federal/state regulatory commission expenses in both the base and nuclear panels. The total amount, less than $20 million, is not as great as some of the other accounts we examined, but the amount at issue may be in the range of $10 million. Such a large amount, while it may prove to be outside the utility's control, dictates that its sources be understood and validated. Discussions with APS identified a number of charges that might contribute to the overage, but none of them were significant enough to make a difference.





Recommendation 9.3: APS should audit all payments for "Regulatory Commission Expenses" and determine the reasons why this account is inconsistent with other utilities.

B. Financial Benchmarks

1. Summary

Liberty found APS long-term debt and commercial paper credit ratings to be comparatively low; *i.e.*, at minimum investment grade levels since late 2005; its current long-term debt rating is currently 1.5 rating levels below the base panel average. Key cash flow to debt and interest metrics map to BBB/A-2 levels. They are improving, but higher debt leverage is holding them down. The APS business environment rating and debt leverage have been affecting credit ratings for several years. APS' business environment has recently been upgraded, but S&P advises that the debt level needs to improve for credit upgrades.

APS' earned ROAE and ROAA have fallen below those of the comparative panels from 2002-2009. High growth in APS' CAPEX and operating expenses combined with historical test periods in rate cases have contributed to earnings attrition during this period.

APS earnings growth rates were negative and below those of comparative panel members for 2000-2005, but have been at near the panel averages for 2004-2009. APS as an investment for its parent was negative for the first half of the period and average for the past five years.

2. Methods

Liberty began its APS financial benchmarking from the RFP parameters, and made additions and adjustments to provide the most meaningful financial metrics possible. The final metrics selected for year 2000-2009 benchmarking included:

Financial Performance

- Earned Return on Average Equity ("ROAE")
- Earned Return on Average Assets ("ROAA")
- Earnings Growth Rates
- Equity Investment Performance

Credit/Cash Flow Metrics

- Funds Flow from Operation ("FFO") /Average Debt

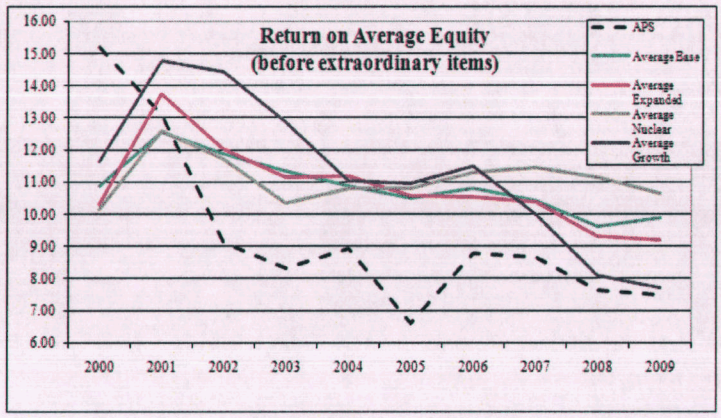
- FFO Interest Coverage
- Total Debt/Capitalization Ratio
- Debt and Commercial Paper Ratings

Other Financial Measures

- Net Cash Flow/CAPEX
- Dividend Payout Ratio to Parent
- Construction Work in Progress ("CWIP")/Net Property Plant &Equipment.

3. Financial Performance Measures

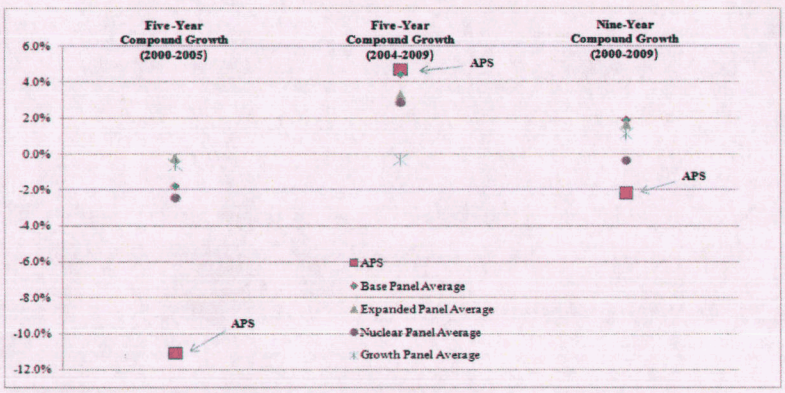
ROAE measures the annual return on equity capital invested in the APS utility versus the benchmarking panels. The graph below shows APS ROAE falling consistently well below the average returns of each of the base, expanded, growth and nuclear comparative panels from 2002-2009. This performance also translated to lower third or fourth-quartile performance as compared to the benchmarking base panel for 2002-2009. APS experienced similar comparative performance results for ROAA (the return on the total asset investment of the utility). The numerator of the ROAE and ROAA metrics are the same, which makes similar comparative performance expected.



Several factors have driven APS ROAE and ROAA performance:

- The combination of high APS capital expenditure and operating expense growth and the use of historical test periods for ratemaking has contributed to some earnings attrition
- APS had fuel recovery issues from 2002 through 2006, which historic fuel-price increases magnified
- APS wrote off plant assets of $139 million in 2005
- Substantial APS marketing and trading profits experienced in 2000 and 2001 were not repeated in subsequent years.

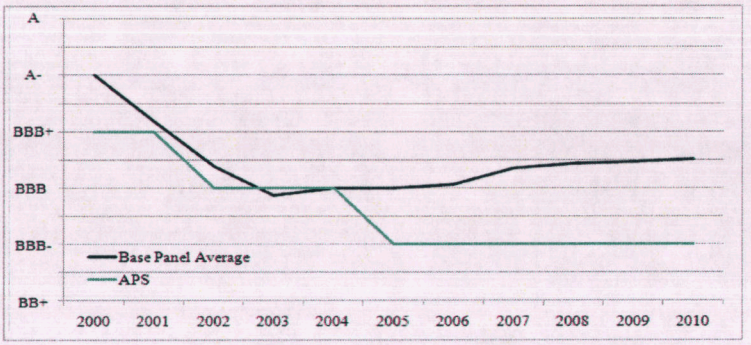
Two other financial performance parameters compared APS earnings growth and total return to the parent, Pinnacle West Capital ("PWC") against the benchmarking panels. Total return to the parent includes dividends and retained earnings growth. A large APS 1999 write-off led Liberty to



examine utility earnings growth and total return in three ways: (a) 2000-2005 five-year compound growth rates, (b) 2004-2009 five-year compound growth rates, and (c) 2000-2009 nine-year compound growth rates. The graph above shows the results for earnings growth.

The APS earnings growth rate fell well below those of each panel for the 2000-2005 period. APS's negative growth during this period proved an outlier compared to all panels. The 2005 write-off played a significant role in this result. In contrast, APS had a comparative earnings recovery in the second five-year period. This recovery placed compound nine-year results nearer to, but still below, panel averages. The total return to parent benchmarking comparisons resulted in very similar comparative results for both of the five-year and the nine-year comparisons.

4. Credit and Cash Flow Metrics



Credit ratings and cash flow metrics produce important indicators of the financial health of capital-intensive electric utility companies. The chart maps the APS credit rating against the average rating of the benchmarking base panel. The gap between the credit rating of APS and the base panel average began after an APS credit downgrade in 2005. The gap widened to about one and one-half credit notches in 2010. Electric utilities have generally experienced improved credit ratings since 2006; APS has not.

S&P downgraded the APS issuer credit rating to BBB- and its commercial paper rating to A-3 late in 2005. S&P cited fuel cost recovery and its effect on cash flow and liquidity as key issues causing the downgrade. The BBB- rating level for APS subsequently formed an issue in the 2006 and 2008 APS rate cases, as the possibility of a further downgrade, to below investment grade, and its related consequences formed subjects of debate. No ratings level improvement has occurred to date despite rating agency recognition of APS' more recent improved financial strength. The chart shows the current APS credit ratings with the three major rating agencies.

	S&P	Moody's	Fitch
Long Term Issuer	BBB-	Baa2	BBB-
LTI Outlook	OP	OS	OS
Senior Unsecured	BBB-	Baa2	BBB
Short Term Commercial Paper	A-3	P-2	F3

FFO/Debt, FFO/Interest and Debt/Capitalization metrics comprise the three most important metrics that rating agencies use to determine credit ratings. Business environment evaluations and more subjective qualitative factors complement these three metrics. FFO/Debt measures cash flow adequacy relative to debt obligations. FFO/Interest determines cash flow adequacy relative to interest requirements. Debt as a percentage of capitalization provides an indicator of the financial risk embedded in a company's capital structure.

The agencies adjust each company's cash flow, debt, and interest for the effects of non-debt financial commitments such purchased power agreements, operating leases, and pension/OPEB obligations on these metrics. Such adjustments reflect the increased financial risk caused by

these obligations. S&P, Moody's and Fitch ratings services all make adjustments. S&P is by far the most transparent rating agency in reporting the adjustments and their ratings impacts. Liberty has performed the benchmarking analysis of each of these ratios using Standard and Poor's published information for APS and electric utility rating groupings for 2007-2009.

S&P imputes additional debt of over $1 Billion to APS in each year from 2007-2009 for its very substantial purchased power agreements, leases, and pension/OPEB obligations. The adjustments reduce the APS FFO/Debt ratio for the three years 2007-2009 from 21.7 percent (pre-adjustment) to 17.8 percent. The 17.8 percent level corresponds with BBB rated electric utilities as indicated by this particular metric. The adjustments reduce the APS FFO/Interest coverage ratio for 2007-2009 from 4.65 times (pre-adjustment) to 4.07 times, also corresponding to BBB rated electric utilities. These adjusted metrics indicate an APS rating level that is one notch higher than the Company's current BBB- level at S&P and Fitch.

The adjustments for non-debt financial instruments increase the APS average Debt/Capital ratio from 52.3 percent (pre-adjustment) to 58.3 percent for 2007-09, corresponding to a sub-investment grade level of BB for this metric.

5. Recent Credit and Cash Flow Developments

The APS rate case Settlement in 2009 was viewed as positive from a credit status perspective. Principal reasons were:

- Commitments to reduce the APS adjusted Debt Ratio and issue $700 million of new equity
- Commitment to reduce operating expenses by $30 MM per year
- Securing the ability to recognize post-test year plant additions
- Securing an adjustor related to solar projects.

S&P's report in April 2010 noted that *"... recent rate activity indicates that the Company's management of regulatory risk may have improved."*

APS subsequently prepared and filed with the Arizona Corporation Commission a Finance Plan that proposed streamlined rate case processes to reduce regulatory lag. The APS Finance Plan also proposed to mitigate the negative credit effects of purchased power agreements and leases where economic opportunities exist. S&P noted that *"We could raise the rating if the Company continues to improve its management of regulatory relationships and the balance sheet is deleveraged."*

S&P and Fitch raised APS' credit outlook to positive in 2010, with S&P commenting that:

> *The positive outlook reflects our assessment of an improving business profile exemplified by management's recent success in regulatory filings combined with progress in the disposition of remaining non-utility assets. The strengthened business profile may lead to higher ratings in the 12- to 18- month time frame, provided the Company is able to manage service area growth and costs prudently and sustain financial metrics consistent with our forecast expectations of adjusted FFO to debt of more than 17 percent and adjusted debt to capital of less than 56 percent.*

APS is currently focused on debt and capital structure management, operating expense reduction and rate case efficiency.

6. Other Financial Measures

Net cash flow as a percentage of Property, Plant and Equipment measures a utility company's ability to fund its capital expenditures with internal funds. APS' internal funding ratio has compared favorably to the benchmarking panels, with the exceptions of 2004 and 2006. The volatility of cash flow and periodic reliance on capital markets is deemed a slight negative factor in APS' overall credit picture.

Dividend payout ratio can be an important financial metric if sufficient equity capital is not retained in the utility capital structure. Dividend payout ratios tend to be extremely volatile when measured annually; therefore, Liberty compared the APS average payout ratio over the entire 2000-2009 period to the benchmarking base panel. APS' average dividend payout of about 69 percent fell very near the base panel average for the 10-year period.

Higher percentages of CWIP as a percentage of utility property, plant, and equipment may indicate cash flow and liquidity issues. APS' CWIP percentage has been lower than that of each of the benchmarking panels from 2003-2009, indicating rate case re-sets of CWIP.

7. Conclusions

Liberty's primary conclusions were that:

1. APS' long-term debt and commercial paper credit ratings have been at minimum investment grade levels since late 2005; the long-term debt rating is currently 1.5 levels below the base panel average.
2. Key cash flow to debt and interest metrics map to BBB/A-2 levels and improving.
3. Business environment rating and debt leverage have been a drag on APS credit ratings for several years. APS' business environment has recently been upgraded; the debt level needs to improve for credit upgrades.
4. APS' ROAE and ROAA are below all of the comparative panels from 2002-2009.
5. High growth in APS' CAPEX and operating expenses combined with historical test periods has exacerbated earnings attrition.
6. APS earnings growth rates were negative and below other panels for 2000-2005, and near averages for 2004-2009.
7. APS as an investment for the PWC parent was negative for the first half of the period and average for the past 5 years.

8. Recommendations

The following are areas that may merit further study to determine the root cause or potential solutions for some of the more important conclusions:

Recommendation 10.1: Evaluate specific drivers and causes for consistently low APS rates of return.

Recommendation 10.2: Determine how the credit rating effects of PPAs, operating leases and pension/OPEB may be economically mitigated.

Recommendation 10.3: Determine whether the APS' targeted adjusted debt level of 52 percent will provide improved credit rating results.

C. Hedging

1. Summary

Public information about hedging is limited. Liberty chose to examine APS practices for conformity with prevailing practices of a group of utilities whose hedging programs have undergone independent examination in recent years. Work by Liberty for the ACC and another firm for APS found about five years ago that APS hedging programs and practices were generally appropriate. Comparing them to those of the 12 other companies, they remain so. Liberty encourages continuing APS dialogue and efforts to: (a) establish strategies and practices that align with stakeholder needs and objectives, segmented as appropriate for different customer groups, and (b) inform the commission of strategies, practices, goals, and targets at the level necessary to provide a foundation for examining recovery of costs affected by hedging activities.

2. Methods

Data availability and comparability significantly constrains the ability to benchmark hedging practices and results. Market participants (utilities and others) consider hedging information to be highly proprietary. There is minimal public reporting of hedging information and what is available is not in any standard format. Geographic location (*e.g.*, location with respect to physical trading points) also makes strategies (and therefore methods and results) different.

These factors make examinations of best practices a more effective method of examining APS hedging performance. In this regard, there have been two studies within the past five years:

- Liberty's audit for the ACC of APS fuel and purchased power procurement practices and costs assessed hedging and energy risk management practices and activities (report dated August 31, 2006)
- R. W. Beck work required by Commission Decision No. 68685 provided an assessment of APS hedging, with specific focus on natural gas (report dated November 1, 2006).

Using the practices described in those examinations as a baseline, Liberty examined the practices and activities of twelve other utilities as described in independent third party audit reports of their hedging programs. The goal was to examine APS practices against a group of largely more recent studies, in order to determine whether APS continued, as had been found in the prior Liberty and Beck work, to conform with prevailing practices. Liberty summarized the practices identified in those reports, and compared APS practices with them.

3. Findings and Conclusions

1. APS performance is strong with respect to policy level best practices and governance and operational parameters.

2. This conclusion is consistent with the findings of the previous Liberty and RW Beck reviews, which are now about five years old.
3. The parameters examined here should be viewed as minimal requirements for a sound, effective hedging program.
4. The industry, with a criterion that Liberty has consistently applied in its examinations of electric and gas utility hedging, favors programmatic trading, rather than attempts to anticipate or respond to normal market variability.

4. Recommendations

Recommendation 11.1: As Liberty recommended in its last audit of APS hedging practices some five years ago, the Company should continue to periodically discuss with a broad range of stakeholders their needs and objectives as they relate to hedging and seek alignment of its strategies and practices with those needs and objectives, segmented as appropriate for different customer groups.

Recommendation 11.2: APS should also inform the commission of strategies, practices, goals, and targets at the level necessary to provide a foundation for examining recovery of costs affected by hedging activities.

D. Funds Paid Among Affiliates

1. Summary

The lack of public information underlying payments among affiliates makes structuring a meaningful benchmarking of those exchanges very difficult. Liberty chose to examine general parameters affecting the risk of cross subsidization that might affect utility costs of service. The nature of Pinnacle West operations produce a lower risk of cross subsidization that exists at other large U.S. utility holding companies. Particular reasons include the winding down of many of the holding company's non-utility operations and the lack of multiple utility operations in multiple states. While cross-subsidization risk is comparatively smaller, it cannot be concluded that cross subsidization does not exist; such a conclusion would require, as some states conduct, periodic examination of affiliate cost assignment and allocation systems, methods, and other details.

2. Methods

It is difficult to conduct a straightforward comparison of payments among affiliates among utility holding companies. They vary widely according to the nature and the structure operations (*e.g.*, is there a common service company, and, if so, does it provide only A&G services or extensive operations services as well) and the nature of operations (*e.g.*, how large and complex are non-utility operations). There is not an available source of data on affiliate costs. The best, FERC Form 60, only applies to some holding companies with service companies operating in multiple states. Pinnacle West/APS do not file Form 60, and use no service company in any event. Liberty has performed more than 20 affiliate cost and relationship assessments and audits; none has exposed to us any non-public source of benchmarking of affiliate costs either.

A lack of available, comparable data led liberty to consider rate risk (*e.g.*, cross subsidization) to identify benchmarking opportunities. Such risks are most customarily driven by:

- Significant levels of common services to multiple utility affiliates
- Significant utility common costs across state borders
- Significant levels of common services to utility and non-utility affiliates
- Significant purchases/sales (e.g., power) between utility entities or from/to non-utility affiliates.

The first two risks do not exist at Pinnacle West because there is only one utility (electricity) operating in one state. Absent significantly sized non-utility operations, any common services (the third risk) present a low cross-subsidization threat. Absent significant levels of purchases/sales between APS and non-utility affiliates, the fourth risk also presents a low cross-subsidization threat.

We compared the size of Pinnacle West's non-utility operations against those of other single-state holding companies and we sought to determine whether APS purchases/sales to affiliates are at levels sufficient to create significant cross-subsidization risk. Only four percent of Pinnacle West's total revenues are derived from non-utility sources, which place the Company at the low end of the range of the panel members in terms of non-utility revenues. The same is true for Pinnacle West's six percent share of total assets that are non-utility assets and its six percent share of total employees who are non-utility employees.

3. Scale and Scope of Pinnacle West's Non-APS Operations

Non-utility operations or multiple utility operations (particularly in different jurisdictions) are generally considered as creating the principal risks of cross subsidization. APS has four principal ongoing non-utility affiliates: SunCor Development Company, APS Energy Services Company, El Dorado Investment Company, and Pinnacle West Marketing & Trading:

- SunCor develops real estate projects in Arizona, Idaho, New Mexico and Utah. Pinnacle West reports attempting to sell SunCor's assets. Remaining assets include land with improvements, commercial buildings, and golf courses, and remaining projects include master-planned communities, and commercial and other residential. SunCor had about 260 employees and revenues of about $103 million in 2009.
- APSES provides energy-related products and services, has about 70 employees, and (combined with El Dorado below, because the two do not report revenues separately), had 2009 operating revenues of about $45 million.
- Pinnacle West Marketing & Trading is winding down. By the end of 2008, substantially all the contracts were transferred to APS or had expired.
- El Dorado owns minority interests in several energy-related investments and Arizona community-based ventures; it has no reported employees, and experienced a net loss of $7 million in 2009.

4. Conclusions

1. The Pinnacle West/APS profile suggests a comparatively lower general risk of cross subsidization:
   a. There are no other utility operations or jurisdictions to create a risk of misallocation of costs among utility operations

b. Pinnacle West has comparatively low levels of non-utility operations and has been phasing them down; therefore, there is comparatively low risk of misallocation of costs between utility and non-utility operations.

2. There are no 10-K reported principal affiliate goods/services interchanges involving APS; however, even if there were, assessing the propriety of any interchanges of goods and services involving APS and affiliates would not be particularly informed by benchmarking.
3. Publicly available information does not provide sufficient detail to inform further the assessment of risk of cross-subsidy associated with common (if any) employee/labor misallocation, for example.

5. Recommendations

Recommendation 12.1: Benchmarking does not shed much light on issues involving payments among affiliates. If concern exists among stakeholders or the commission about cross subsidization potential, the merits of a direct examination of the nature, extent, and pricing of any interchanges among Pinnacle West enterprises to verify their propriety and benefit for utility customers should be undertaken.

IV. Recommendation Summary

Note that the recommendations beginning with the numbers "3" through "9" follow the numbering of the nine sections of report Sections II.A. For recommendation numbering consistency, recommendations related to Section II.B use the following numbering

- *Financial Benchmarks* recommendations begin with "10"
- *Hedging* recommendations begin with "11"
- *Payments Among Affiliates* recommendations begin with "12."

Recommendation 3.1: Although not an issue of significant concern, APS may wish to examine the upward drift in restoration times, as measured by CAIDI.

Recommendation 4.1: APS should consider the implementation of a continuing program for the analysis of outage causes.

Recommendation 4.2: APS should align its reporting practices with NERC (GADS) requirements and the rest of the industry, including the classification of maintenance outages.

Recommendation 4.3: A specific analysis of Four Corners 4 and 5 should be completed to:

- Define the contribution of low quality coal to EFORs
- Define the contribution of maintenance outage hours
- To the extent that non-fuel causes are also contributing to the negative comparisons, develop mitigating strategies as cost effective and appropriate.
- Determine why the Navajo results, with slightly lower fuel costs, are so much better.

The details of the Company's outside consultant study may successfully answer these questions, negating the need for a new study.

Recommendation 5.1: Notwithstanding the NPRS tiers, APS should establish a more aggressive goal of achieving at least industry median capacity factors sustained over a multi-year period.

Plans to accomplish this goal, including the specific tactics to be employed, should be shared with the ACC on an annual basis.

Recommendation 5.2: As a supporting component to Palo Verde's capacity factor goals, the Company should continue its efforts to aggressively reduce the duration of refueling outages, which in the past have been well beyond the industry average of about 40 days.

Recommendation 5.3: APS should incorporate into its cost management program, an ongoing analysis of its cost performance versus other EUCG companies with the specific objectives of (a) identifying the reasons for deviations; (b) quantifying the impact of those reasons; and (c) developing mitigation schemes if and as appropriate.

Recommendation 7.1: APS should review its deviation from industry costs and verify if such deviation is due to a bias to small units in its portfolio, in which case no further action would be appropriate. If such is not the case, APS should determine the cause of the deviation.

***Recommendation* 7.2:** APS should analyze non-fuel O&M costs associated with the large combined cycle plants to determine:

- Why these units are well above similar units in cost
- Why the trend in operating costs is upwards, contrary to the industry trend
- Appropriate corrective measures to reduce operating costs.

Recommendation 7.3: APS should analyze distribution O&M costs to determine the reasons for the sharp increases in 2007 and 2008 and expectations for relative performance in the future.

Recommendation 7.4: APS should determine, on a quantified basis, the specific reasons for its deviation from other utilities in the categories of customer expense. Such an analysis should include, at least, consideration of the UMS work, the Hackett work and the impact of the AMI project.

Recommendation 8.1: If it has not already done so, APS should submit to the ACC the rationale for its aggressive transmission investments as well as an analysis of the impact on APS and regional consumers.

Recommendation 9.1: APS should complete an overview of its staffing levels to determine the approximate overage, if any, and reconcile its deviations from industry data.

Recommendation 9.2: APS should conduct a detailed staffing analysis in those areas where it concludes costs, as discussed in this report, are out of synch with industry levels. This might include at least nuclear O&M, combined cycle O&M and customer expense.

Recommendation 9.3: APS should audit all payments for "Regulatory Commission Expenses" and determine the reasons why this account is inconsistent with other utilities.

Recommendation 10.1: Evaluate specific drivers and causes for consistently low APS rates of return.

Recommendation 10.2: Determine how the credit rating effects of PPAs, operating leases and pension/OPEB may be economically mitigated.

Recommendation 10.3: Determine whether the APS' targeted adjusted debt level of 52 percent will provide improved credit rating results.

Recommendation 11.1: APS should continue to periodically discuss with a broad range of stakeholders their needs and objectives as they relate to hedging and seek alignment of its strategies and practices with those needs and objectives, segmented as appropriate for different customer groups.

Recommendation 11.2: APS should also inform the commission of strategies, practices, goals, and targets at the level necessary to provide a foundation for examining recovery of costs affected by hedging activities.

Recommendation 12.1: Benchmarking does not shed much light on issues involving payments among affiliates. If concern exists among stakeholders or the commission about cross subsidization potential, the merits of a direct examination of the nature, extent, and pricing of any interchanges among Pinnacle West enterprises to verify their propriety and benefit for utility customers should be undertaken.

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