



0000068914

ORIGINAL

JOHN F. MUNGER  
MARK E. CHADWICK \*  
MICHAEL S. GREEN  
KATHLEEN DELANEY WINGER  
EVELYN PATRICK BOSS \*\*  
LAURA P. CHLIASSON  
\* Also Admitted in Colorado  
\*\* Also Admitted in Washington State

MICHAEL M. RACY (NON-LAWYER)  
GOVERNMENT RELATIONS DIRECTOR  
DIRECT LINE: (520) 906-4646

MEREDITH LEYVA (NON-LAWYER)  
PUBLIC RELATIONS MANAGEMENT

**MUNGER CHADWICK, P.L.C.**

ATTORNEYS AT LAW  
A PROFESSIONAL LIMITED LIABILITY COMPANY  
NATIONAL BANK PLAZA  
333 NORTH WILMOT, SUITE 300  
TUCSON, ARIZONA 85711  
(520) 721-1900  
FAX (520) 747-1550  
MungerChadwick.com

PHOENIX APPOINTMENT ADDRESS:  
5225 N. CENTRAL  
SUITE 235  
PHOENIX, ARIZONA 85012-1452  
(602) 230-1850

LAWRENCE V. ROBERTSON, JR.  
ADMITTED TO PRACTICE IN:  
ARIZONA, COLORADO, MONTANA,  
NEVADA, TEXAS, WYOMING,  
DISTRICT OF COLUMBIA

OF COUNSEL  
MILLER, LA SOTA AND PETERS, P.L.C.  
PHOENIX, ARIZONA

OF COUNSEL  
OGARRIO Y DIAZ ABOGADOS  
MEXICO, D.F., MEXICO  
(LICENSED SOLELY IN MEXICO)

March 28, 2002

E-00000A-02-0051  
E-01345A-01-0822  
E-00000A-01-0630  
E-01933A-98-0471  
E-01933A-02-0069

Nancy Cole, Supervisor  
Docket Control  
Arizona Corporation Commission  
1200 W. Washington  
Division: Hearing  
Phoenix, AZ 85007

Re: Arizona Public Service Company  
Docket No. E-01345A-01-0822

Dear Ms. Cole:

Enclosed for filing are seventeen copies of the prepared direct testimony of Larry E. Ruff and William R. Engelbrecht, which is being submitted on behalf of Sempra Energy Resources.

Please call me if you have any questions.

Sincerely,

*Laurence V. Robertson, Jr. /JRM*

Lawrence V. Robertson, Jr.

LVR:cl

cc: Lyn Farmer  
Chris Kempley  
Ernest G. Johnson  
All parties of record

Arizona Corporation Commission  
**DOCKETED**

MAR 29 2002

DOCKETED BY *nac*

JOHN F. MUNGER  
MARK E. CHADWICK \*  
MICHAEL S. GREEN  
KATHLEEN DELANEY WINGER  
EVELYN PATRICK BOSS \*\*  
LAURA P. CHIASSON  
\* Also Admitted in Colorado  
\*\* Also Admitted in Washington State

MICHAEL M. RACY (NON-LAWYER)  
GOVERNMENT RELATIONS DIRECTOR  
DIRECT LINE: (520) 906-4646

MEREDITH LEYVA (NON-LAWYER)  
PUBLIC RELATIONS MANAGEMENT

**MUNGER CHADWICK, P.L.C.**

ATTORNEYS AT LAW  
A PROFESSIONAL LIMITED LIABILITY COMPANY  
NATIONAL BANK PLAZA  
333 NORTH WILMOT, SUITE 300  
TUCSON, ARIZONA 85711  
(520) 721-1900  
FAX (520) 747-1550  
MungerChadwick.com

PHOENIX APPOINTMENT ADDRESS:  
5225 N. CENTRAL  
SUITE 235  
PHOENIX, ARIZONA 85012-1452  
(602) 230-1850

OF COUNSEL  
LAWRENCE V. ROBERTSON, JR.  
ADMITTED TO PRACTICE IN:  
ARIZONA, COLORADO, MONTANA,  
NEVADA, TEXAS, WYOMING,  
DISTRICT OF COLUMBIA

OF COUNSEL  
MILLER, LA SOTA AND PETERS, P.L.C.  
PHOENIX, ARIZONA

OF COUNSEL  
OGARRIO Y DIAZ ABOGADOS  
MEXICO, D.F., MEXICO  
(LICENSED SOLELY IN MEXICO)

March 28, 2002

Nancy Cole, Supervisor  
Docket Control  
Arizona Corporation Commission  
1200 W. Washington  
Division: Hearing  
Phoenix, AZ 85007

Re: Arizona Public Service Company  
Docket No. E-01345A-01-0822

Dear Ms. Cole:

Enclosed for filing are seventeen copies of the prepared direct testimony of Larry E. Ruff and William R. Engelbrecht, which is being submitted on behalf of Sempra Energy Resources.

Please call me if you have any questions.

Sincerely,

*Laurence V. Robertson, Jr. /JM*

Lawrence V. Robertson, Jr.

LVR:cl

cc: Lyn Farmer  
Chris Kempley  
Ernest G. Johnson  
All parties of record

**BEFORE THE  
ARIZONA CORPORATION COMMISSION**

**DOCKET NO. E-01345A-01-0822**

**DIRECT TESTIMONY  
OF  
LARRY E. RUFF**

**ON BEHALF OF  
SEMPRA ENERGY RESOURCES**

**March 27, 2002**

# Table of Questions

<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>1.1 BACKGROUND AND SUMMARY .....</b>	<b>1</b>
Q. Please state your name, occupation and business address.....	1
Q. What is your educational and professional background?.....	1
Q. What is the purpose of your testimony in this proceeding? .....	2
Q. Please summarize your overall conclusions and recommendations.....	2
<b>1.2 OUTLINE AND CONCLUSIONS .....</b>	<b>3</b>
Q. How is your testimony organized?.....	3
Q. Please summarize your conclusions regarding electricity competition in general.....	3
Q. Why do you think the proposed PPA arrangements are not in the public interest or in the interests of APS' SOS customers?.....	4
Q. Please summarize your evaluation of arguments made by APS and its witnesses in support of the requested variance and proposed PPA.....	5
Q. What does your testimony conclude and recommend regarding alternatives to the APS requested variance and proposed PPA? .....	5
<b>2. ELECTRICITY COMPETITION IN GENERAL.....</b>	<b>6</b>
<b>2.1 THE OBJECTIVES OF WHOLESALE AND RETAIL COMPETITION.....</b>	<b>6</b>
Q. What is the ultimate objective of competition in electricity markets?.....	6
Q. How does wholesale competition help accomplish the objective of meeting consumer needs reliably and efficiently? .....	6
Q. How does retail competition or "choice" help accomplish the objective of meeting consumer needs reliably and efficiently? .....	6
Q. Can retail competition be effective and efficient without a liquid and competitive wholesale market?.....	7
Q. Can wholesale competition be effective and efficient without active retail competition, and if so how? .....	7
<b>2.2 EXPERIENCE WITH COMPETITION IN ELECTRICITY.....</b>	<b>7</b>
Q. Has competition in electricity been successful in delivering its promised benefits, in most cases?.....	7
Q. How do you explain the problems in the California electricity market, and why will Arizona not have similar problems? .....	8

Q.	Enron was a principal advocate of competition in electricity and the use of risk-management paper as substitutes for hard assets. What does the collapse of Enron say about these policies? .....	9
Q.	How do you think events such as California and Enron should or will affect the future of electricity competition in the US and in the Southwest?.....	9
<b>3.</b>	<b>THE APS-PROPOSED PPA AND ITS EFFECTS .....</b>	<b>10</b>
<b>3.1</b>	<b>THE KEY FEATURES OF THE PPA.....</b>	<b>10</b>
Q.	What are the principal features of the proposed PPA that affect the public interest and the interests of APS' SOS customers?.....	10
<b>3.2</b>	<b>EFFECTS OF THE PPA ON COMPETITION.....</b>	<b>12</b>
Q.	Please explain your statement that the PPA arrangements involve affiliate arrangements that are inappropriate in principle and that create identifiable problems in this specific case.....	12
Q.	Please explain why you think this PPA would reverse the most important steps the Commission has taken to move toward a competitive wholesale market.....	13
Q.	Please explain why you think this PPA would delay the development of retail competition in Arizona.....	13
<b>3.3</b>	<b>EFFECTS OF THE PPA ON STRANDED COSTS .....</b>	<b>14</b>
Q.	Please explain why you say that the PPA would undo parts of the 1999 APS Settlement on stranded costs that were designed to protect consumers.....	14
Q.	Please explain why you say that the PPA creates the potential for new stranded costs.	14
Q.	Will the possibility of new stranded costs be eliminated if market prices increase in the future? .....	15
Q.	Could the Commission prevent the PPA from creating new stranded costs by determining that some of the PPA costs were not prudent?.....	15
<b>3.4</b>	<b>EFFECTS OF THE PPA ON INCENTIVES.....</b>	<b>16</b>
Q.	Please explain your conclusion that the PPA contains few incentives for PWCC and/or PWEC to operate efficiently for the benefit of consumers?.....	16
Q.	Does the PPA give PWEC and/or PWCC incentives to improve the energy and capacity available from the Dedicated Units, and if so would APS or its SOS customers share in the benefits?.....	17
Q.	Please explain your conclusion that the PPA contains some incentives for PWCC and/or PWEC to operate inefficiently at the expense of APS' SOS customers.....	17

<b>3.5</b>	<b>EFFECTS OF THE PPA ON RETAIL COMPETITION – AND <i>VICE VERSA</i></b> .....	<b>18</b>
Q.	Please explain your conclusion that the PPA may create a “death spiral” effect if retail competition becomes effective before 2015. ....	18
Q.	Why do you assume that APS’ SOS rates will be based on the total PPA cost per unit of SOS load, and are there alternatives that might eliminate the death spiral effect? .....	18
Q.	Could APS avoid the death spiral effect by selling output from Dedicated Units into the market or to the retailers serving the previously-SOS customers?.....	19
Q.	Could the death spiral effect be avoided by assuring that retail competition does not become effective during the term of the PPA? .....	19
<b>3.6</b>	<b>PWCC’S UNILATERAL RENEWAL OPTION AND ITS EFFECTS</b> .....	<b>19</b>
Q.	Please explain your conclusion that PWCC has a unilateral option to extend or terminate the PPA, thereby creating “a heads-PWCC-wins, tails-PWCC-wins-more arrangement.” .....	19
Q.	What do you think is the most likely long-run economic outcome under the PPA? 21	
<b>4.</b>	<b>APS’ ARGUMENTS FOR THE VARIANCE AND PPA</b> .....	<b>21</b>
<b>4.1</b>	<b>THE APS BOGEYMAN VERSION OF RULE 1606(B)</b> .....	<b>21</b>
Q.	Why do you say that APS sets up a misleading bogeyman version of Rule 1606(B)?.....	21
Q.	Why do you say that APS puts forth its own PPA as though it were the only possible alternative to Rule 1606(B), and that there are many, possibly better, alternatives? .....	23
<b>4.2</b>	<b>ALLEGED RELIABILITY ADVANTAGES OF THE PPA</b> .....	<b>23</b>
Q.	Please explain why you say there is little basis for the reliability advantages that APS alleges for the PPA. ....	23
Q.	How would the reliability advantages of central dispatch be maintained if APS were to contract with many unaffiliated generators rather than with PWCC as a single, full-requirements seller? .....	24
<b>4.3</b>	<b>ALLEGED ECONOMIC ADVANTAGES OF THE PPA</b> .....	<b>24</b>
Q.	Why, according to APS and its witnesses, is the PPA in the economic interest of APS’ SOS customers, and what is your summary evaluation of these arguments? .....	24

Q.	Please explain why a reasonable interpretation and implementation of Rule 1606(B) would protect APS' SOS customers from price volatility as well as, and at less risk than, the proposed PPA. ....	25
Q.	Please explain why APS witness Jack Davis' comparison of PPA costs to long-run marginal cost is inappropriate. ....	26
Q.	Please explain why APS witness William Hieronymus' comparison of average PPA costs to the prices of long-term contracts in California is inappropriate. ....	26
Q.	Please comment on the argument that natural gas prices are likely to be more volatile and to increase more than the costs of coal and nuclear fuels.....	27
Q.	Do you think the uncertainties about the economics of the PPA relative to implementation of Rule 1606(B) can or should be resolved by debates among experts, or by some other means? .....	28
Q.	Please explain why ineffective competition within the APS market region would suggest denying or revoking PWEC's market rate authority and moving to break up PWEC rather than approving the PPA. ....	28
Q.	Are you aware that FERC has granted market-based rate authority to PWEC, and what are the implications of this?.....	29
Q.	If Dr. Hieronymus is correct that PWEC has significant market power within the APS market region, what are the implications for the Rule 1606(B) process? .....	29
<b>4.4</b>	<b>THE ALLEGED "NON-EFFECTS" OF THE PPA ON COMPETITION .....</b>	<b>30</b>
Q.	Is there a theoretical basis for the assertion by APS and its witnesses that long-term contracts will not affect market competition, and if so what is its applicability to this situation? .....	30
Q.	Why does this simple theory of contracting not apply well to real electricity markets? .....	31
Q.	Given that high transaction costs are a reality, how can these inefficiencies of long-term contracting be reduced? .....	31
Q.	What role does the APS (or PWCC) economic dispatch process play in the kind of contract market you are describing? .....	32
Q.	Does the PPA affect competition only in the short-run dispatch, or does it have long-run effects on competition as well? .....	32
Q.	How can the PPA affect competition if, as APS says, there are no realistic alternatives to most of the PWEC generation units, which were designed and located specifically to serve APS load? .....	33
Q.	Why would competition to provide Supplemental and Replacement Energy Products to PWCC, and the Competitive Bidding Process, not be enough to allow wholesale competition to develop? .....	34

Q. APS emphasizes that it is not asking the Commission to slow retail competition, and says that competitive generators can supply the competitive retail market. What is your reaction to these statements?..... 34

Q. Is APS correct that the PPA cannot have a significant effect on competition because APS' load and PWEC generation are small parts of regional totals?..... 35

Q. Does it matter that much or most of the independent generation in Arizona has been or is being built to serve other markets?..... 35

**5. AN ALTERNATIVE APPROACH..... 36**

Q. What is your recommendation to the Commission with regard to the APS requested variance and proposed PPA? ..... 36

Q. Can you outline the kind of clarification to Rule 1606(B) you would recommend to the Commission?..... 36

Q. Do you think it is realistic that APS could, by January 2003, design and implement the kind of arm's length negotiations and competitive process you describe?..... 37

**BEFORE THE  
ARIZONA CORPORATION COMMISSION**

**DOCKET NO. E-01345A-01-0822**

**DIRECT TESTIMONY OF LARRY E. RUFF**

**March 27, 2002**

**1. INTRODUCTION**

**1.1 BACKGROUND AND SUMMARY**

1 **Q. Please state your name, occupation and business address.**

2 A. My name is Larry E. Ruff. I am currently an independent consultant. My business  
3 address is 8017 Oak Way, Windsor, California, 95492.

4 **Q. What is your educational and professional background?**

5 A. My professional résumé is attached. In summary, I have a BS degree in physics from  
6 the California Institute of Technology and a PhD in economics from Stanford  
7 University. I have thirty-three years experience in academia, government, industry and  
8 consulting as an energy and environmental economist, policy advisor and consultant.  
9 For the fourteen years prior to May 2000, when I became an independent consultant, I  
10 was a Senior Vice President with National Economic Research Associates (NERA) and  
11 a Managing Director (and other titles) at Putnam, Hayes & Bartlett Inc. (PHB). Since  
12 the late 1980s I have specialized in the design and implementation of competitive  
13 electricity and gas markets in the United States and abroad.

14 A. I lived and worked in London during, and played a major role in, the development of  
15 the initial competitive electricity market in England and Wales. I subsequently led  
16 market design projects in Victoria and New South Wales (Australia), India, Thailand  
17 and Ontario (Canada) and was closely involved in the design and/or implementation of

1 competitive electricity markets in New Zealand, Argentina, Peru, Alberta (Canada), and  
2 Spain. In the United States, I have testified before the Federal Energy Regulatory  
3 Commission and numerous state regulatory commissions on gas and electricity  
4 transmission pricing and market design issues, demand-side management programs and  
5 other matters, and have advised parties in many states regarding competitive electricity  
6 markets. I speak and write widely on these issues.

7 **Q. What is the purpose of your testimony in this proceeding?**

8 A. Counsel for Sempra Energy Resources has asked me to analyze and comment on the  
9 economic and competitive issues raised by the request of the Arizona Public Service  
10 Company (APS) to the Arizona Corporation Commission (Commission) for a variance  
11 to the Commission's Rule R14-2-1606(B). This Rule 1606(B) requires that, beginning  
12 in 2003, "the power purchased by [APS] for Standard Offer Service [SOS] shall be  
13 acquired from the competitive market through prudent, arm's length transactions, and  
14 with at least 50% through a competitive bid process." APS is requesting that the  
15 Commission waive this requirement for prudent, arms long, competitive purchasing,  
16 and instead allow APS to enter into a long-term – i.e., 13-to-28 year – full-requirements  
17 Purchase Power Agreement (PPA) with APS' own parent company Pinnacle West  
18 Capital Corporation (PWCC), under which PWCC's generating subsidiary Pinnacle  
19 West Energy Corporation (PWEC) would be guaranteed full-cost-plus-ROR on all the  
20 generating assets transferred to PWEC by APS plus more than \$1,000,000,000 of  
21 additional assets to which PWEC committed after wholesale competition became  
22 Commission policy.

23 **Q. Please summarize your overall conclusions and recommendations.**

24 A. The Commission's Rule 1606(B), fairly interpreted, was and still is a prudent and  
25 practical way to phase in wholesale competition in Arizona for the benefit of Arizona  
26 consumers and the economy; it does not, as APS suggests, require that APS scrap its  
27 previous generation assets and meet all its needs by buying from unreliable merchant  
28 plants burning spot-priced gas. In contrast, the APS request for a variance, and in

1 particular the proposed long-term, full-requirements, cost-plus-guaranteed-profit PPA,  
2 are not in the public interest or in the interest of APS' SOS customers for many  
3 reasons, including: the inherent conflicts of interest and lack of incentives for  
4 efficiency in the PPA arrangements; the likelihood that the PPA will require SOS  
5 customers to pay new stranded costs; and the chilling and distorting effect on wholesale  
6 and retail competition. Instead of approving the APS request, the Commission should  
7 require APS to implement Rule 1606(B) in a prudent, phased process, such as using  
8 competitive negotiation and/or bidding processes to define new, five-year contracts for  
9 approximately 20 percent of its SOS load requirements each year beginning in 2003.

## 10 1.2 OUTLINE AND CONCLUSIONS

### 11 Q. How is your testimony organized?

12 A. My testimony consists of the following four sections in addition to this introductory  
13 Section 1:

14 Section 2: Electricity Competition in General

15 Section 3: The APS-Proposed PPA and Its Effects

16 Section 4: APS' Arguments for the Variance and PPA

17 Section 5: An Alternative Approach

### 18 Q. Please summarize your conclusions regarding electricity competition in general.

19 A. On the value of and experience with competition in electricity, I conclude that:

- 20 • Well-designed and well-implemented competitive wholesale electricity markets  
21 can deliver and – with a few notable and understandable exceptions – have  
22 delivered real benefits to consumers and the economy generally;
- 23 • Retail competition for small consumers, while potentially valuable, is difficult in  
24 the short run and is not strictly necessary for effective wholesale competition –  
25 provided that the utility distribution companies (UDCs) that serve SOS customers  
26 actively compete in the wholesale market for their SOS supplies; and
- 27 • The California and Enron debacles demonstrate that big mistakes can be made,  
28 but also provide valuable lessons about how to avoid these mistakes; these events

1 are not reasons to avoid competition itself and are not slowing efforts at the  
2 Federal level to create efficient, competitive wholesale markets.

3 **Q. Why do you think the proposed PPA arrangements are not in the public interest**  
4 **or in the interests of APS' SOS customers?**

5 A. The proposed PPA arrangements – which include both the PPA between APS and its  
6 parent PWCC and the contract between PWCC and its generation affiliate PWEC – are  
7 not in the public interest or in the best interest of APS' customers for many reasons, the  
8 most important of which include:

- 9 • The PPA arrangements involve inherent conflicts of interest that are inappropriate  
10 in principle and that create identifiable problems in this specific case;
- 11 • The PPA would reverse the most important steps the Commission has taken to  
12 move toward competitive wholesale and retail markets in Arizona, including  
13 undoing parts of the 1999 APS Settlement on stranded costs that were designed to  
14 protect consumers and probably even requiring SOS customers to pay new  
15 stranded costs;
- 16 • The PPA contains few incentives for PWCC and/or PWEC to operate efficiently,  
17 many inherent conflicts of interest, and some incentives for PWCC and/or PWEC  
18 to operate inefficiently at the expense of APS' SOS customers;
- 19 • The pricing provisions in the PPA may create a “death spiral” effect if retail  
20 competition becomes effective within the next ten years or so, creating strong  
21 pressure on APS and the Commission to keep retail competition ineffective; and
- 22 • The PPA gives PWCC a unilateral option to extend or terminate the PPA in the  
23 future, which PWCC will presumably exercise based on expected market  
24 conditions at the time, in effect creating a heads-PWCC-wins, tails-PWCC-wins-  
25 more arrangement.

1 **Q. Please summarize your evaluation of arguments made by APS and its witnesses in**  
2 **support of the requested variance and proposed PPA.**

3 A. The APS case does not demonstrate any real problems with Rule 1606(B) or compare  
4 the APS request for variance and proposed PPA to reasonable alternatives, and the  
5 arguments made in support of the PPA are at best weak. More specifically:

6 • APS creates a bogeyman version of Rule 1606(B) and then puts forward its PPA  
7 as though it were the only viable alternative to this bogeyman, when in fact there  
8 are many, better alternatives to the APS bogeyman and to the proposed full-cost-  
9 plus-guaranteed-profit PPA;

10 • The claims made by APS and its witnesses concerning the reliability and  
11 economic advantages of the PPA over Rule 1606(B) have little basis, particularly  
12 when the PPA is compared to interpretations or slightly modified versions of Rule  
13 1606(B) that are more reasonable than the APS bogeyman; and

14 • The claims that the PPA will not impede the development of wholesale  
15 competition are based implicitly on simplistic theories that are not valid for  
16 complex electricity markets in the early stages of development, and on factual  
17 assertions that are incorrect, irrelevant or (in at least one case) inconsistent with  
18 APS' own testimony.

19 **Q. What does your testimony conclude and recommend regarding alternatives to the**  
20 **APS requested variance and proposed PPA?**

21 A. My testimony concludes that there are alternatives to the APS request that would be  
22 more prudent, more consistent with the public and consumers' interests, and more  
23 consistent with the Commission's competition objectives. In particular, I recommend  
24 that Rule 1606(B) be modified or – more accurately – clarified to allow/require APS to  
25 use arms-length negotiations and/or an open bidding process to acquire the resources it  
26 needs for SOS supply from a prudent combination of affiliated and unaffiliated  
27 generators. As an example, I outline a process in which APS would eventually be  
28 meeting its SOS needs with a portfolio of five-year contracts, approximately 20 percent  
29 of which (measured by energy) would be replaced each year.



1 **Q. Can retail competition be effective and efficient without a liquid and competitive**  
2 **wholesale market?**

3 A. No. Competitive retailers must have access to an open and efficient wholesale market  
4 so that they can contract for the supplies they need to serve final consumers and sell  
5 any contracted amounts their customer do not need. Until there is such a wholesale  
6 market – including a real-time spot market that prices imbalances on a market basis –  
7 retail competition will be difficult and its results disappointing.

8 **Q. Can wholesale competition be effective and efficient without active retail**  
9 **competition, and if so how?**

10 A. Retail competition can help maintain effective and efficient wholesale competition but  
11 is not strictly necessary for it, at least not in the initial years of market development.  
12 But the only effective substitute for retail competition as a way to keep pressure on the  
13 wholesale market is to require the UDCs who supply SOS customers to buy their SOS  
14 supplies in the competitive wholesale market with strong incentives to keep their  
15 purchase costs down. If the UDCs who supply SOS customers do not buy in the  
16 wholesale market, but instead enter into long-term, full requirements, cost-based  
17 contracts – particularly contracts with their own affiliates – wholesale competition will  
18 suffer badly. There will be fewer generators competing to sell in the market, fewer  
19 UDCs competing to buy in the market, less activity by innovative traders and  
20 marketers, and fewer market transactions to provide liquidity and price transparency.  
21 The few generators favored with the UDC contracts will have both short-run and long-  
22 run advantages over other generators, for no reason except that they somehow got the  
23 initial contracts.

24 **2.2 EXPERIENCE WITH COMPETITION IN ELECTRICITY**

25 **Q. Has competition in electricity been successful in delivering its promised benefits,**  
26 **in most cases?**

27 A. Yes. There have been teething problems in all competitive markets, but these have  
28 usually been less serious than the problems in the monopoly systems they replaced and  
29 have been the predictable/predicted results of bad market designs that can be avoided

1 elsewhere. Successful competitive markets in New Zealand, Australia, Spain and  
2 elsewhere have reduced the historical tendency toward over-capacity, over-staffing and  
3 inefficient operations in these systems. Competitive markets in Argentina, Chile, Peru  
4 and elsewhere have solved the historical tendency toward underinvestment and  
5 unreliability in these systems. Competitive markets in systems where there was no  
6 apparent crisis, such as the UK and PJM, have increased diversity, flexibility,  
7 innovation and efficiency in the wholesale market, and ultimately choice in the retail  
8 market, while maintaining reliability.

9 **Q. How do you explain the problems in the California electricity market, and why**  
10 **will Arizona not have similar problems?**

11 **A.** California is the universal poster child for those who do not want competitive  
12 electricity markets for whatever reason. But California made many serious policy  
13 mistakes, including:

- 14 • A decade or more of bad policy and uncertainty prior to competition, such as the  
15 “Standard Offer 4” requirement that utilities contract long-term for large  
16 quantities of high-cost power from qualifying facilities (QFs), and stringent and  
17 inflexible air pollution and plant siting regulations that discouraged new power  
18 plant construction;
- 19 • Creation of an idiosyncratic and badly flawed wholesale market that independent  
20 market design experts saw as such and warned about in advance; and
- 21 • Last-minute, poorly-analyzed, even imprudent political decisions, particularly the  
22 decision that UDCs would provide SOS at capped rates but would not own or  
23 contract for generation resources.

24 These California-specific factors created a tinderbox waiting for a spark. And then a  
25 regional drought, high natural gas prices and surging demand hit all at once, setting off  
26 the California explosion and meltdown.

27 None of the factors that created the California disaster-in-waiting is or is likely to  
28 be present in Arizona. New power plants are being developed in the region faster than

1 the market can absorb them, and hence many are in the wings just waiting for demand  
2 to grow. The wholesale market is not efficient and liquid enough to support effective  
3 retail competition, but has well-tested mechanisms for supporting bilateral wholesale  
4 contract trading among UDCs and generators. The SOS procedures, including Rule  
5 1606(B) properly interpreted, not only allow but require UDCs to enter into contracts to  
6 serve their SOS loads. Nobody can guarantee good rainfall, low gas prices or modest  
7 demand growth for long, but the controllable factors in Arizona give the system enough  
8 resilience to withstand any plausible surprises here.

9 **Q. Enron was a principal advocate of competition in electricity and the use of risk-**  
10 **management paper as substitutes for hard assets. What does the collapse of**  
11 **Enron say about these policies?**

12 A. The Enron collapse primarily reinforces old and well-understood principles, such as the  
13 imprudence of making large bets and then doubling-up to try to recover losses, and the  
14 ultimate futility of trying to hide bad results with false or perhaps even fraudulent  
15 reporting. The fact that Enron tried to fool the world, and perhaps itself, by calling its  
16 gambling "hedging" says nothing about the wisdom or viability of true hedging  
17 strategies. The most important lesson of the Enron collapse for the issues in this  
18 proceeding is that something this large could be absorbed with barely a ripple in  
19 competitive power markets.

20 **Q. How do you think events such as California and Enron should or will affect the**  
21 **future of electricity competition in the US and in the Southwest?**

22 A. Due caution is always in order, and everybody in this business should take time to  
23 identify the right lessons to draw from the California and Enron disasters. But this has  
24 already largely been done, and FERC is now moving forward to adopt a Standard  
25 Market Design and RTO rules that will continue the development of wholesale  
26 competition across the US without making the California mistakes. The fact that it is  
27 possible to make big mistakes that create large costs should not be allowed to  
28 overshadow the fact that we know how to do it right and that when it is done right there  
29 can be significant benefits.



- 1       • **Limited Market Purchases of Energy Products by PWCC:** If APS' Full Load  
2 Requirements exceed what PWEC is required to provide under the PPA, or if  
3 contract entities fail to deliver, PWCC will purchase Supplemental or  
4 Replacement Energy Products in the market. Furthermore, commencing on  
5 January 1, 2003, PWCC will use a Competitive Bidding Process to buy for APS,  
6 at APS' cost, Energy Products equivalent to 270 MW of capacity (at 51% load  
7 factor), with the amount purchased through this process increasing to 1,620 MW  
8 in 2008 and staying there for the remaining term of the PPA. The 1,620 MW of  
9 competitively purchased Energy Products is estimated by APS to be 23% of peak  
10 load in 2008. This is less than half as much competitive purchasing, five years  
11 later, than currently required by Rule 1606(B).<sup>1</sup>
- 12       • **Fixed Payments To Cover All Recoverable Fixed Costs and ROR:** The  
13 monthly Facilities Charge (FC) guarantees that PWEC will recover depreciation  
14 plus a 9.38%/year ROR on the full, undepreciated capital costs (less amounts  
15 written off as part of the 1999 APS Settlement on stranded costs) plus all actual  
16 short-run-fixed costs such as plant payrolls and maintenance, of all Dedicated  
17 Units. The amount of the FC does not depend in any way on whether or how  
18 much the Dedicated Units are used to supply APS' Full Load Requirements or are  
19 cost-effective in doing so, or on the amount or value of output from the Dedicated  
20 Units that is sold to third parties.
- 21       • **Energy Payments To Cover All Actual Fuel Costs but Only Fuel Costs:** The  
22 Base Fuel Charge (BFC) and a Fuel & Purchased Power Adjustment (FPPA)  
23 guarantee that PWEC will (perhaps with a lag due to the annual true-up  
24 mechanism) recover the full costs of all the fuel used in the Dedicated Units,  
25 including the costs (or benefits) associated with hedging fuel costs, emission

---

<sup>1</sup> If 270 MW is 23% of peak SOS load in 2008, peak SOS load in 2008 is 7,043 MW (1,620/0.23 MW). Dedicated Units are to provide at least 4,720 MW of peak capacity in 2008, [PPA Service Schedule, pp. SS 2-3] which is two-thirds (4,720/7,043 = 0.67) of the expected peak load. Thus, in 2008 about two-thirds of peak load will come from Dedicated Units, about one-fourth from the Competitive Bidding Process and about one-tenth from other contracts.

1 allowances, etc. The variable energy charge does not include any short-run-fixed  
2 costs such as payroll and maintenance, all of which are in the FC.

- 3 • **Retention by PWEC of 75% of Any Net Margin from Off-System Sales:** The  
4 net margin from any sales to third parties of Energy Products from Dedicated  
5 Units is shared between PWEC and APS, but with PWEC getting 75 percent –  
6 even though APS is paying all fixed and variable costs of all Dedicated Units.
- 7 • **Inclusion of New PWEC Units in Dedicated Units:** The Dedicated Units  
8 include not only all the previously-regulated units transferred from APS to  
9 PWEC, but also new PWEC units such as West Phoenix and Redhawk with a  
10 capital cost of over one billion dollars. PWEC committed to these units after the  
11 Commission's competition policy was in place, presumably at its own risk in the  
12 emerging competitive wholesale market, but under the PPA will be guarantee full  
13 recovery of all capital costs plus a ROR of 9.38 percent/year.

### 14 3.2 EFFECTS OF THE PPA ON COMPETITION

15 **Q. Please explain your statement that the PPA arrangements involve affiliate**  
16 **arrangements that are inappropriate in principle and that create identifiable**  
17 **problems in this specific case.**

18 **A.** The potential for conflicts of interest is obvious in this situation, where PWCC, APS  
19 and PWEC have "negotiated" and will administer complex agreements among  
20 themselves, and will then expect the Commission to approve passing all the resulting  
21 costs on to APS' SOS customers. Such affiliate relationships destroy the usual  
22 presumption that a regulated utility such as APS, while it may not have strong  
23 incentives to reduce costs or be innovative, will at least try to get the best possible deal  
24 for its captive customers in its dealings with suppliers and others. When APS is buying  
25 from unregulated, for-profit affiliates, the most realistic assumption for the  
26 Commission to make is that APS will negotiate and administer the PPA with at least  
27 one eye on the bottom line of its affiliates. There are very good reasons why such  
28 conflicts of interest are regarded as inherently undesirable.

1           It is impossible in complex situations to identify all the specific problems caused  
2 by conflicts of interest, which is why such conflicts of interest are usually rejected on  
3 principle. Most of the problems with the PPA discussed later in this testimony are  
4 traceable to or at least exacerbated by the fact that the contract counterparties are  
5 affiliated. One example is the possibility, discussed further later in my testimony, that  
6 PWCC could sell output from Dedicated Units in the market and keep 75 percent of the  
7 net margin at the same time it is buying Supplemental or Replacement Energy Products  
8 at APS' cost to meet APS' load. This would be unlikely to happen if PWCC had  
9 incentives to get maximum performance from PWEC and/or to minimize costs to APS,  
10 or if APS were an independent company acting as prudent purchasing agent for its  
11 captive customers.

12 **Q. Please explain why you think this PPA would reverse the most important steps the**  
13 **Commission has taken to move toward a competitive wholesale market.**

14 A. The Commission has taken two principal steps to create wholesale competition in  
15 Arizona: (1) APS and other utilities are required to transfer their generation assets to  
16 unregulated and presumably independent, entities – PWEC in the case of APS; and (2)  
17 the separated UDCs are required to meet their SOS needs with prudent, arms-length,  
18 market transactions with some combination of affiliated and unaffiliated generation  
19 companies. The proposed variance to Rule 1606(B) would eliminate the market  
20 purchasing requirement, while the proposed long-term, full-requirements, full-cost-  
21 pass-through PPA would effectively undo the separation of generation from the UDCs,  
22 leaving little or nothing of the Commission's wholesale competition policy.

23 **Q. Please explain why you think this PPA would delay the development of retail**  
24 **competition in Arizona.**

25 A. On paper there is full retail competition or choice in Arizona now, but in fact there is  
26 virtually none – and there will be little or none until the wholesale market is efficient  
27 and liquid. The implementation of Rule 1606(B) would not by itself make much  
28 difference to retail competition, because real retail competition will be limited until  
29 there is an efficient wholesale spot market and Arizona is far from having (or wanting)

1 that. But the PPA, by reversing the movement toward efficient wholesale competition,  
2 would also eliminate one of the necessary (if not sufficient) conditions for retail  
3 competition.

### 4 3.3 EFFECTS OF THE PPA ON STRANDED COSTS

5 **Q. Please explain why you say that the PPA would undo parts of the 1999 APS**  
6 **Settlement on stranded costs that were designed to protect consumers.**

7 A. The APS stranded cost settlement required APS to write down the recoverable value of  
8 its generation assets and allowed APS to charge prices above expected market prices  
9 through 2004 in order to recover as much of its remaining book asset value as it could,  
10 with no guarantees. After 2004 and the transfer of APS generating assets to PWEC,  
11 APS was to buy its SOS supplies at market (contract and spot) prices and pass the costs  
12 through to SOS customers, while PWEC would sell its output at market (contract and  
13 spot) prices. But the PPA guarantees PWEC a ROR of 9.38 %/year on the full book  
14 value of all the transferred APS assets at least until 2013 and far beyond if extensions  
15 are in the interest of PWCC as a whole. This arrangement appears to be very different  
16 from what was agreed in the 1999 APS Settlement, and will probably result in the  
17 PWCC family recovering more of its original stranded costs than it otherwise would.

18 **Q. Please explain why you say that the PPA creates the potential for new stranded**  
19 **costs.**

20 A. The PPA guarantees full cost recovery plus a 9.38 %/year ROR, not just for the units  
21 previously owned by APS and previously regulated by the Commission, but also for  
22 units such as West Phoenix and Redhawk that were built by PWEC on an unregulated  
23 basis presumably in anticipation of selling output at unregulated market prices for many  
24 years. But market conditions have softened considerably since these PWEC plants  
25 were committed, and most price forecasts no longer justify building such new plants.  
26 As Mr. Jack E. Davis of APS said: "Even as this testimony is being written [on  
27 December 12, 2001], we are seeing the impact of today's lower market prices for power  
28 in the form of cancelled or delayed power plant projects." [Direct Testimony of Jack E.  
29 Davis, December 12, 2001, p. 24] Unfortunately for PWEC and its parent PWCC, it is

1 too late to cancel or delay the West Phoenix and Redhawk plants; if the market does  
2 not firm up enough to make these plants profitable, ratepayers or shareholders will be  
3 stuck with new stranded costs.

4 The PPA proposed by APS would require APS – i.e., ultimately APS’ SOS  
5 customers – to pay the full capital costs including ROR of the new PWEC units even if  
6 these costs exceed the market value of the services provided by these units. But  
7 generation costs in excess of the market value of the product are, by definition,  
8 stranded generation costs. Thus, as long as market conditions remain as described by  
9 APS’ witness Mr. Davis, APS’ SOS customers will probably be paying otherwise-  
10 stranded costs of generating units built by APS in a competitive environment.

11 **Q. Will the possibility of new stranded costs be eliminated if market prices increase**  
12 **in the future?**

13 A. If market prices increase well before 2015, APS’ SOS customers may get fair value  
14 from the PPA over its initial term. As discussed below, however, the PPA gives  
15 PWCC a unilateral option to terminate the PPA in 2015, 2020 or 2025, so if market  
16 prices increase in the long run PWCC will presumably exercise its option to terminate  
17 the PPA. APS’ SOS customers may cover losses incurred by the new PWEC units in  
18 the early years of their life, and then see PWEC reap the profits later.

19 **Q. Could the Commission prevent the PPA from creating new stranded costs by**  
20 **determining that some of the PPA costs were not prudent?**

21 A. Presumably the Commission will have to approve APS’ SOS rates from time to time  
22 and hence could disallow some of the PPA’s costs as imprudent, leaving these costs  
23 with the PWCC family of companies. But if the Commission approves the PPA now, it  
24 may have difficulty disallowing APS’ PPA costs later unless it specifically reserves the  
25 right to do so; and reserving such a right could have serious financial consequences for  
26 APS’ parent PWCC. The Commission should not approve the PPA now with the  
27 expectation that it can easily disallow later any PPA costs that are stranded by market  
28 developments.



1 **Q. Does the PPA give PWEC and/or PWCC incentives to improve the energy and**  
2 **capacity available from the Dedicated Units, and if so would APS or its SOS**  
3 **customers share in the benefits?**

4 A. There is no incentive for PWEC and/or PWCC to increase the output of Dedicated  
5 Units if this output displaces Supplemental or Replacement Energy in meeting SOS  
6 load, because all Dedicated Unit costs and all Supplemental and Replacement Energy  
7 costs are passed straight through to APS. However, if increased output from the  
8 Dedicated Units is sold to third parties, PWCC keeps 75 percent of the net sales margin  
9 – even if this increases costs for APS and its SOS customers. For example, if PWEC  
10 spends \$1 million on increased maintenance in order to increase off-system sales  
11 margins by \$2 million, PWEC nets \$1,500,000 (75% of \$2 million) but APS/SOS  
12 customers lose \$500,000 (\$1 million minus 25% of \$2 million).

13 **Q. Please explain your conclusion that the PPA contains some incentives for PWCC**  
14 **and/or PWEC to operate inefficiently at the expense of APS' SOS customers.**

15 A. It is hard to identify all such possibilities in a complex situation, but there are several  
16 created by the provision allowing PWCC to keep 75 percent of the net margin from any  
17 off-system sales from Dedicated Units.<sup>3</sup> As long as the Dedicated Units “make  
18 available” the contract minimum MW of capacity at system peak and minimum MWh  
19 of annual energy, PWCC could (for example) buy Replacement Energy at APS' cost to  
20 meet APS' SOS load during scheduled maintenance of a Dedicated Unit and then use  
21 the newly-refurbished unit to sell Energy Products to third parties later and keep 75  
22 percent of the net margin from those sales. Or PWEC could spend \$1 million of APS'  
23 money to upgrade a process that increases off-system sales margins by \$800,000 – a  
24 non-cost-effective investment that would net PWCC \$600,000 (75% of \$800,000) and  
25 cost APS' SOS customers \$800,000 (\$1 million minus 25% of \$800,000).

---

<sup>3</sup> Sharing of the margin from off-system sales is common in power purchase contracts and can be a good way to encourage the seller to find profitable off-system sales opportunities. The problems referred to here are created by the full-cost-pass-through nature of the PPA and particularly the affiliate relationships.

1           **3.5 EFFECTS OF THE PPA ON RETAIL COMPETITION – AND VICE VERSA**

2   **Q. Please explain your conclusion that the PPA may create a “death spiral” effect if**  
3   **retail competition becomes effective before 2015.**

4   A. The PPA requires APS to pay the full costs of all of PWEC’s Dedicated Units, plus the  
5   full costs of the Energy Products supplied through the Competitive Bidding Process,  
6   independent of what APS’ SOS load is at any time. APS expects that, in 2008, the  
7   1,620 MW (at 51 percent load factor) to be purchased through the Competitive Bidding  
8   Process will be 23 percent of APS’ peak SOS load, implying a peak SOS load of  
9   7,043 MW (1,620/0.23 MW) in 2008. Combined with the requirement that Dedicated  
10   Units make available 4,720 MW in 2008, these numbers imply that APS expects  
11   PWCC to be buying about 1,700 MW of Supplemental Energy Products in 2008 to  
12   serve APS’ SOS load.

13           APS does not explicitly say so, but its projections of SOS load appear to assume  
14   that retail competition will not be effective by 2008, i.e., that APS’ SOS load will grow  
15   at about the same rate as electricity demand generally. But if retail competition  
16   becomes effective by 2008 – or 2012 – APS could lose a significant amount of SOS  
17   load to competitive retailers, particularly if market prices are low relative to APS’  
18   average costs under the PPA. If competitive retailers capture, say, 2,000 MW of APS  
19   load by 2008, PWCC will not be buying any Supplemental Energy Products and in fact  
20   will have more capacity and energy from the Dedicated Units and the Competitive  
21   Bidding Process than APS needs. As more SOS load is lost to competitive retailers,  
22   the average costs in \$/MWh of the PPA – and presumably APS’ SOS rates – will  
23   become even higher, driving away more SOS load and increasing prices further, etc.  
24   This is what is commonly called a “death spiral.”

25   **Q. Why do you assume that APS’ SOS rates will be based on the total PPA cost per**  
26   **unit of SOS load, and are there alternatives that might eliminate the death spiral**  
27   **effect?**

28   A. I do not know how the Commission will determine SOS rates in the future, but I  
29   presume APS is assuming it will be able to pass through all PPA costs to SOS

1 customers, and if so the average SOS rate in any (say) year will be approximately the  
2 total annual PPA cost (plus non-energy APS costs) divided by total SOS sales. Of  
3 course, if the death spiral scenario actually materialized, many expectations would be  
4 disappointed, and both APS and the Commission would have some difficult choices to  
5 make. For example, the Commission might disallow some PPA costs as imprudent  
6 and/or PWCC might offer to absorb some costs in order to stop the spiral.

7 **Q. Could APS avoid the death spiral effect by selling output from Dedicated Units**  
8 **into the market or to the retailers serving the previously-SOS customers?**

9 A. It might. But remember, 75 percent of any margin from off-system sales from  
10 Dedicated Units goes to PWCC, not to reduce PPA costs to APS or prices to SOS  
11 customers. PWCC might be able to sell enough of the Energy Products purchased in  
12 the Competitive Bidding Process to keep average PPA costs from increasing, but could  
13 also sell Energy Products from the Dedicated Units and keep 75 percent of the net  
14 margin for itself.

15 **Q. Could the death spiral effect be avoided by assuring that retail competition does**  
16 **not become effective during the term of the PPA?**

17 A. Yes, and that is one reason why I say the PPA would delay retail competition. (The  
18 lack of an efficient wholesale spot market is the other principal reason.) If the PPA is  
19 approved, APS will have strong incentives to assure that retail competition does not  
20 become effective, and even the Commission – or future Commissions – may prefer to  
21 delay effective retail competition than to deal with the problems created by a death  
22 spiral and new stranded costs.

### 23 3.6 PWCC'S UNILATERAL RENEWAL OPTION AND ITS EFFECTS

24 **Q. Please explain your conclusion that PWCC has a unilateral option to extend or**  
25 **terminate the PPA, thereby creating "a heads-PWCC-wins, tails-PWCC-wins-**  
26 **more arrangement."**

27 A. The PPA is in force at least through 2015, and is automatically renewed for up to three  
28 additional 5-year terms unless either of the Parties to the PPA decides not to renew it.

1 But the Parties to the PPA are APS and its parent company PWCC, who are currently  
2 so closely integrated that Mr. Jack E. Davis is president of both. It is reasonable to  
3 assume, therefore, that the PWCC family and its then current president(s?) will decide  
4 to terminate the PPA or not in 2015, 2020 or 2025 depending on what is good for  
5 PWCC as a whole, largely independent of the effects on APS' customers.

6 It is impossible to say now with any certainty whether termination or continuation  
7 of the PPA will be in the interest of PWCC in 2015, 2020 or 2025, but the one-sided  
8 nature of PWCC's unilateral option can be illustrated by considering the following two  
9 possible scenarios:

- 10 • If in 2015 market prices are projected to be higher than average PPA costs over  
11 the next five years or more, PWCC will exercise its option to terminate the deal so  
12 that it can sell PWEC's product at the high market prices, leaving any SOS  
13 customers and/or their SOS suppliers exposed to those high market prices.
- 14 • If in 2015 market prices are projected to be lower than average PPA costs over the  
15 next five years or more, termination would be in the interests of SOS customers  
16 (if there are any by then) but not in the interests of PWCC. If APS were an  
17 unconflicted agent of its SOS customers, it would exercise its option to terminate  
18 on their behalf. But as a subsidiary of PWCC, APS would probably not exercise  
19 its termination option, so that its affiliate PWEC could continue receiving above-  
20 market prices.<sup>4</sup>

---

<sup>4</sup> The Commission might be able to "persuade" APS to exercise its termination option in the best interest of its SOS customers, by determining that failure to do so would be imprudent. But it might not be easy for the Commission to determine what is prudent at the time, and any significant risk that the Commission will deem PPA costs imprudent later would create serious problems for both APS and the Commission. Before approving this or any other long-term PPA, the Commission should carefully consider what this means for its ability to protect consumers in the future.

1 **Q. What do you think is the most likely long-run economic outcome under the PPA?**

2 A. The PPA front-loads capital costs much as traditional utility rate-making does, and  
3 perhaps more if PWEC uses accelerated rather than traditional straight-line utility  
4 depreciation. And current wholesale market conditions are weak, as APS' own  
5 witnesses have acknowledged. Thus, in the early years the average PPA cost is likely  
6 to be above market prices, which will be sustainable because retail competition will not  
7 be a realistic option. In the later years of the initial term of PPA, the average PPA cost  
8 will probably be more-or-less the same as average market prices, provided that retail  
9 competition remains ineffective. Then in 2015, when the depreciated value of the  
10 Dedicated Units is small enough that average PPA costs will probably be significantly  
11 below average market prices, the PPA will be terminated, SOS customers (if there are  
12 any) will be exposed to market prices, and PWEC/PWCC will get the full market value  
13 of the Dedicated Units that SOS customers have paid for with above-market SOS  
14 prices for much of the previous 12 years.

15 **4. APS' ARGUMENTS FOR THE VARIANCE AND PPA**

16 **4.1 THE APS BOGEYMAN VERSION OF RULE 1606(B)**

17 **Q. Why do you say that APS sets up a misleading bogeyman version of Rule**  
18 **1606(B)?**

19 A. APS does not really explain why its proposed variance and PPA are the best solution to  
20 any specific problem, but instead cites a range of scary events and possibilities as  
21 though Rule 1606(B) would necessarily increase the risks of these. For example, in its  
22 Request for a variance and PPA, APS:

- 23 • Cites repeatedly the recent volatility of spot wholesale prices, thereby suggesting  
24 that Rule 1606(B) requires APS to buy in spot markets;
- 25 • Refers to "merchant plant owners [who have no] responsibility for APS system  
26 reliability," thereby suggesting that merchant plants are necessarily less reliable  
27 than utility plants;

- 1 • Cites the alleged “over-reliance by many western energy suppliers on volatile  
2 natural gas supplies,” as though Rule 1606(B) requires APS to “over-rely” on  
3 unhedged gas supplies and as though no western energy suppliers used other fuels  
4 or hedged gas prices;
- 5 • Says that “few if any non-affiliated generators” would be able to supply a  
6 3,000 MW “block of power in 2003 or for several years after that,” suggesting that  
7 Rule 1606(B) requires APS to buy only from non-affiliated generators or even to  
8 buy 3,000 MW in a single block from a single supplier; and
- 9 • Refers to APS “scrambling” for supplies if transmission paths from merchant  
10 plants to APS become constrained, as though all merchant plants and no PWEC  
11 plants used potentially constrained transmission paths.

12 If Rule 1606(B) required APS to buy in the short-term market 3,000 MW of  
13 unhedged gas-fired capacity from a single, unaffiliated, merchant supplier who could  
14 deliver only over unreliable transmission lines, then Rule 1606(B) would indeed be a  
15 foolish Rule. But there is nothing in Rule 1606(B) to prevent APS from defining the  
16 characteristics of the portfolio of supply resources it wants, including specifying the  
17 length of contracts, the types of fuel or (better) price indexing formulas, and the  
18 transmission firmness it wants. There is nothing in Rule 1606(B) to prevent APS from  
19 contracting with its own affiliates when they are the most cost-effective suppliers of  
20 what APS needs. In fact, for APS not to define carefully what it needs or not to  
21 contract with an affiliated generator that is the most cost-effective supplier would be  
22 imprudent, in direct violation of Rule 1606(B).

23 All Rule 1606(B) requires is that, once APS has decided what resources it needs  
24 to meet its load reliably, it select the suppliers of those resources and define the  
25 contract prices and terms in “the competitive market through prudent, arm’s length  
26 transactions, and with at least 50% through a competitive bid process” in which  
27 unaffiliated as well as affiliated generators can participate. This, unlike APS’  
28 bogeyman version of Rule 1606(B), would be a perfectly reasonable and prudent way  
29 for APS to acquire the SOS supplies it needs.

1 **Q. Why do you say that APS puts forth its own PPA as though it were the only**  
2 **possible alternative to Rule 1606(B), and that there are many, possibly better,**  
3 **alternatives?**

4 A. - Even if APS' bogeyman version of Rule 1606(B) were accurate, the appropriate  
5 response would be to propose changes in Rule 1606(B) that might solve identified  
6 problems. But APS takes a different course, proposing to scrap Rule 1606(B) entirely  
7 and replace it with a very specific, long-term, full-requirements, full-cost-plus-  
8 guaranteed-profit contract with APS' affiliated companies.

9 There are many possible alternatives to APS' interpretation of Rule 1606(B),  
10 including what the Commission probably had in mind all along: A prudent phase-in of  
11 competitive contracting over time. Even if market purchases are to be replaced with  
12 long-term contracts, and even if PWCC is to provide all of APS' requirements, there  
13 are many variations on the theme that are more consistent with the Commission's  
14 competitive objectives, more prudent and better for APS' SOS customers than the  
15 specific PPA proposed by APS. For example, the single, 13-to-28-year contract  
16 between PWCC and PWEC for all of PWEC's capacity at full-cost-plus-guaranteed-  
17 profit could be replaced with a portfolio of contracts, and then unaffiliated generators  
18 could be allowed to compete for pieces of the portfolio initially or increasingly over  
19 time. The contract quantities could vary to reflect changes in APS' SOS load. There  
20 could be cost-sharing arrangements to provide more incentives for efficiency. So there  
21 are many options even within the long-term contract framework; but APS does not  
22 suggest or acknowledge the existence of such variations on the PPA that it and its  
23 affiliates have formulated by and for themselves.

#### 24 **4.2 ALLEGED RELIABILITY ADVANTAGES OF THE PPA**

25 **Q. Please explain why you say there is little basis for the reliability advantages that**  
26 **APS alleges for the PPA.**

27 A. Under the PPA, the APS system would be operated by PWCC as a vertically integrated  
28 monopoly, much as it has been operated for decades. There is no doubt that such a  
29 system can be operated reliably or that APS has done so and PWCC could continue to

1 do so. But competitive systems, and the independent generating units within them, can  
2 and do operate just as reliably as the APS system and its generating units, elsewhere in  
3 the United States and abroad. APS has not demonstrated or even made a plausible case  
4 that a reasonable interpretation of Rule 1606(B) could not be consistent with reliable  
5 operations, but has simply sketched a bogeyman version of Rule 1606(B) and implied  
6 that it would be unreliable.

7 **Q. How would the reliability advantages of central dispatch be maintained if APS**  
8 **were to contract with many unaffiliated generators rather than with PWCC as a**  
9 **single, full-requirements seller?**

10 A. It is unclear to me whether APS or PWCC would operate the central dispatch process  
11 under the PPA, but either way the same central dispatch process could be used to  
12 coordinate the activities of many independent generators. Most of the contracts  
13 between APS (or PWCC) and (large) unaffiliated generators would have to be  
14 dispatchable, and those that were not would have to be cheaper to reflect the lower  
15 value of nondispatchable generation. The dispatchable contracts would have to be  
16 written to assure unaffiliated generators that they would not be discriminated against in  
17 the APS/PWCC dispatch or would be compensated if they were. Contracting would be  
18 easier and more efficient if APS were to establish an independent system operator  
19 (ISO) and a central spot market, but some independent generation could be  
20 accommodated reliably within a dispatch process operated by APS or PWCC.

#### 21 4.3 ALLEGED ECONOMIC ADVANTAGES OF THE PPA

22 **Q. Why, according to APS and its witnesses, is the PPA in the economic interest of**  
23 **APS' SOS customers, and what is your summary evaluation of these arguments?**

24 A. APS and its witness make the following three principal arguments to support the view  
25 that the PPA is in the economic interest of SOS customers:

- 26 • The PPA would protect SOS customers from price volatility because the  
27 Dedicated Units are largely coal and nuclear with fixed fuel costs;

- 1       • Average PPA costs are likely to be less than average market prices over the term  
2       of the PPA; and
- 3       • Market-determined prices may not be “reasonable” because there is not enough  
4       unaffiliated generation in the APS market region to create effective competition.

5       My summary evaluations of these argument are, respectively:

- 6       • A reasonable interpretation and implementation of Rule 1606(B) would protect  
7       consumers from price volatility as well as, and at less risk than, the PPA;
- 8       • The alleged price advantage of the PPA is based on inappropriate comparisons  
9       and inherently unreliable forecasts; and
- 10      • PWEC market power is an argument for revoking PWEC’s market-based rate  
11      authority and breaking up PWEC, not for a 13-28 year contract.

12      **Q. Please explain why a reasonable interpretation and implementation of Rule**  
13      **1606(B) would protect APS’ SOS customers from price volatility as well as, and at**  
14      **less risk than, the proposed PPA.**

15      A. Any reasonable interpretation and implementation of Rule 1606(B) would result in  
16      APS holding a portfolio of contracts that would protect APS’ SOS customers almost  
17      entirely from short run – i.e., day-to-day and month-to-month – price volatility and  
18      would significantly dampen year-to-year and even longer-term variations. For  
19      example, my suggestion that APS cover essentially its entire SOS load with a portfolio  
20      of five-year, market-priced contracts, with 20 percent of these contracts expiring and  
21      being renewed in the market each year, would accomplish this.

22             If the PPA insulates SOS consumers from the market more than a portfolio of  
23      market-priced, medium-term contracts would do, it is going too far. Trying to insulate  
24      consumers totally from market prices necessarily creates large risks and inefficiencies,  
25      because market prices will almost surely diverge from the contract prices over time. If  
26      average PPA costs turn out higher than market prices, the death spiral effect may  
27      emerge if retail competition becomes effective or retail competition may be blocked in  
28      order to prevent this. If PPA costs turn out below market prices, efficient energy

1 conservation and competitive retailing will be discouraged and consumers will  
2 experience serious price-shock when the PPA expires. Even consumers taking SOS  
3 should be exposed to market prices to some extent, because it is undesirably and  
4 ultimately impossible to protect them entirely and forever from market realities.

5 **Q. Please explain why APS witness Jack Davis' comparison of PPA costs to long-run**  
6 **marginal cost is inappropriate.**

7 A. Mr. Davis says that the PPA would save APS over \$1 billion by 2007, on the  
8 assumption that market prices equal the long-run marginal cost (LRMC) of a new gas-  
9 fired combined cycle plant, which he estimates to be between \$52/MWh and  
10 \$60/MWh. [Direct Testimony of Jack E. Davis, p. 24] But he also says on the same  
11 page that, "as this testimony is being written, we are seeing the impact of today's lower  
12 market prices for power in the form of cancelled or delayed power plant projects,"  
13 which implies that market prices are now significantly below LRMC and must be  
14 expected by project developers to remain below LRMC for at least several years. Thus,  
15 Mr. Davis' comparison of PPA prices to LRMC over the next five years is irrelevant,  
16 and his estimate of cumulative savings over that period is at best misleading. Even if  
17 he is correct about the relationship between the PPA costs and LRMC, and even if  
18 these do not change over the contract term, the most he can say is that *someday* the  
19 PPA may start providing positive benefits to SOS customers.

20 **Q. Please explain why APS witness William Hieronymus' comparison of average**  
21 **PPA costs to the prices of long-term contracts in California is inappropriate.**

22 A. Dr. Hieronymus compares the estimated average costs of the PPA to the prices in long-  
23 term contracts signed by the Department of Water Resources (DWR) in California in  
24 late 2001, and concludes that the DWR contracts are significantly more expensive than  
25 the PPA after correcting for estimated differences in fuel costs, transmission costs, etc.,  
26 between California and Arizona. He acknowledges that the wholesale electricity  
27 market in California was extremely tight and chaotic prior to the summer of 2001, that  
28 "some critics" regard the DWR contracts as overpriced because of generator market  
29 power, and that short-term electricity contracts signed even later in 2001 were "not

1 economic” for the buyers, but says that the later, longer-term DWR contracts are  
2 comparable to the PPA.

3 It seems obvious to me that market conditions and perceptions in California even  
4 in late 2001 were still heavily influenced by the turmoil, shortages, political pressure  
5 and extremely high prices that were then only a few months in the past. Prices in  
6 contracts negotiated by a government agency during this period in California should not  
7 be regarded as good estimates of the prices APS could get in a well-managed  
8 negotiation and competitive bidding process in 2003. In any case, it is neither wise nor  
9 necessary to guess about such things; the only reliable way to determine what the  
10 market can do is to try it.

11 **Q. Please comment on the argument that natural gas prices are likely to be more**  
12 **volatile and to increase more than the costs of coal and nuclear fuels.**

13 **A.** Short-term or spot natural gas prices are inherently more volatile than coal and nuclear  
14 fuel costs but – as recent market developments demonstrate – go down as well as up,  
15 and can easily be hedged at some cost. Projections that long-run gas prices must start  
16 going up soon because there is only so much gas in the world have been made for  
17 decades, but somehow the “temporary gas bubble” refuses to burst or even to deflate  
18 for long. Nobody should bet too much on anybody’s projection of future gas prices.

19 A more fundamental response to this argument is that, like most of the others  
20 made by APS and its witnesses, it is irrelevant to the relative merits of the PPA and a  
21 reasonable interpretation of Rule 1606(B). Rule 1606(B) does not require that APS  
22 scrap its coal and nuclear plants and bet its future or its customers’ welfare on stable or  
23 low gas prices, but only that APS use arms-length negotiations and competitive bidding  
24 to determine whether and the extent to which unaffiliated generators might be cost-  
25 effective alternatives to some APS affiliates in providing what APS needs to serve its  
26 SOS load. If APS wants supply contracts with price terms comparable to what it can  
27 get from PWEC coal and nuclear plants, it should ask for these and see what the market  
28 can produce.

1 **Q. Do you think the uncertainties about the economics of the PPA relative to**  
2 **implementation of Rule 1606(B) can or should be resolved by debates among**  
3 **experts, or by some other means?**

4 The only reliable way to determine the extent to which generators unaffiliated  
5 with APS can meet APS' needs more cost-effectively than affiliated generators is to  
6 implement the kind of prudent, contestable process the Commission had in mind with  
7 Rule 1606(B). If APS defines the mix of fixed and variable energy cost resources it  
8 wants to serve its SOS customers and then implements arms-length negotiation and  
9 competitive bidding processes to get that mix, gas-fired generators will factor the cost  
10 of any needed hedges into their offers and compete with PWEC's coal and nuclear  
11 plants. The PWEC plants that can provide what APS needs in the most cost-effective  
12 way will win the competition and get contracts. But some non-PWEC plants – plants  
13 that would be excluded from the game under the PPA – might also win APS contracts  
14 in a fair competition. This latter possibility may be just what APS and its affiliates  
15 fear, but is what the Commission and APS' SOS customers should be encouraging.

16 **Q. Please explain why ineffective competition within the APS market region would**  
17 **suggest denying or revoking PWEC's market rate authority and moving to break**  
18 **up PWEC rather than approving the PPA.**

19 A. APS witness Hieronymus says "it is far from certain that the competition to serve the  
20 approximately 3,000 MW of APS load beginning in January 2003 would lead to  
21 reasonable prices" because there will then be only three non-PWEC generating units  
22 with a total of less than 1,500 MW uncontracted capacity in the APS market region.  
23 [Direct Testimony of William H. Hieronymus, p. 3] He acknowledges that PWEC  
24 itself could bid to supply part of the APS load, but says it "would do so with the  
25 knowledge that it faced limited competition and that some of its capacity likely would  
26 be needed." [Direct Testimony of William H. Hieronymus, p. 3]

27 Dr. Hieronymus is saying, in effect, that APS' generation affiliate PWEC has and  
28 will exercise substantial market power in a competitive bidding process to serve half of  
29 APS' 2003 SOS load. In fact, the implication of Dr. Hieronymus' position is that  
30 PWEC would have and would presumably exercise market power in any negotiation

1 with APS to serve the other half of APS' SOS load. I do not know whether Dr.  
2 Hieronymus is correct about this or not, but if he is there would appear (to this non-  
3 lawyer) to be serious implications for this proceeding and beyond. The most obvious  
4 implication is that the PWEC units in the APS market should not have market-based  
5 rate authority, but instead should remain under cost-of-service regulation until its  
6 market power is significantly reduced, which would presumably require PWEC to spin  
7 off some of its units to competitive generating companies.

8 **Q. Are you aware that FERC has granted market-based rate authority to PWEC,**  
9 **and what are the implications of this?**

10 A. Yes, I know that FERC, in September, 2000, approved market-based rate authority for  
11 PWEC, pursuant to its policy of granting such authority to a power seller "if the seller  
12 and its affiliates do not have, or have adequately mitigated, market power in generation  
13 and transmission and cannot erect other barriers to entry." [92 F.E.R.C. P61,248] I  
14 have not reviewed the factual basis for this FERC decision or the current factual  
15 situation, and I would not presume to judge the legal issues here. But as an economist  
16 it certainly seems to me that either:

- 17 • PWEC and its affiliates (still) do not have or have adequately mitigated market  
18 power, in which case there is no reason that APS should not be able to get  
19 "reasonable" prices in a competitive solicitation for its SOS needs; or
- 20 • PWEC and its affiliates (now) have so much market power that they should not  
21 have market-based rate authority, and should not be allowed to negotiate a  
22 "market" PPA among themselves.

23 **Q. If Dr. Hieronymus is correct that PWEC has significant market power within the**  
24 **APS market region, what are the implications for the Rule 1606(B) process?**

25 A. If PWEC has as much market power as Dr. Hieronumus suggests, the wholesale market  
26 in the region cannot be competitive until PWEC spins off enough of its capacity within  
27 the region to create a competitive structure – or until enough new generation enters,  
28 which would probably take longer. If the Commission is still committed to creating  
29 wholesale competition – or retail competition, which is not possible without wholesale

1 competition – it should do what it can to induce PWEC to spin off generation capacity  
2 and, in the meantime, should do what it can to encourage non-PWEC generation in the  
3 region. This argues for moving ahead aggressively to implement Rule 1606(B) rather  
4 than approving the PPA proposed by APS. Indeed, approving that 12-28 year, full-  
5 requirement, cost-plus-guaranteed-profit PPA between PPA and its affiliates would  
6 make it more difficult to restructure PWEC and would discourage new entrants,  
7 delaying by many years the date when wholesale (and then retail) competition could  
8 become effective.

#### 9 4.4 THE ALLEGED “NON-EFFECTS” OF THE PPA ON COMPETITION

10 **Q. Is there a theoretical basis for the assertion by APS and its witnesses that long-**  
11 **term contracts will not affect market competition, and if so what is its**  
12 **applicability to this situation?**

13 **A.** The claim that long-term contracts will not affect outcomes in short-term markets has  
14 its theoretical basis in the principle that a (well-designed) contract does nothing except  
15 create property rights that are perfect substitutes for and just as tradable as the  
16 underlying assets, and hence in a perfect market in a perfect world the existence of a  
17 long-term contract would have no effect on the physical outcomes or the prices in  
18 short-term markets. For example, if APS contracts (through PWCC) to buy Energy  
19 Products from PWEC, PWEC should be willing to buy those Energy Products in the  
20 spot market from anybody else who can produce them more cheaply than PWEC itself  
21 can. If there is some advantage to trading under a contract rather than trading only in  
22 the spot market and somebody other than PWEC could satisfy the contract more  
23 cheaply than PWEC can, PWEC should be willing to sell the contract to or write a  
24 back-to-back contract with the more efficient producer. If PWEC had no commercial,  
25 institutional or political reason not to let other, more efficient generators produce the  
26 services PWEC was contracted to deliver under the PPA, and if it were cheap, easy and  
27 riskless to do the deals necessary to let this happen, the long-term PPA between APS  
28 and PWEC would affect the distribution of money but would not affect who produces  
29 what or at what price in the short run markets.

1 **Q. Why does this simple theory of contracting not apply well to real electricity**  
2 **markets?**

3 A. No market is "perfect" in the strict sense of that term, but electricity markets are more  
4 complex and imperfect than most, particularly where, as in Arizona, there is not (yet)  
5 an efficient spot market integrated with system operations. If PWEC has a contract to  
6 deliver Energy Products to APS, PWEC cannot easily identify and do a deal with other  
7 generators who can provide the Energy Products more cheaply at any time, and cannot  
8 easily sell the contract to or write a back-to-back contract with another generator that is  
9 better situated to perform the contract. Even if PWEC could easily buy the services it  
10 needs to meet its contract, it has commercial, institutional and political reasons to avoid  
11 doing so; for example, it will not want to make life easier for its competitors, pass up a  
12 chance to favor its affiliates, or explain to regulators why other generators are  
13 producing the products when PWEC is collecting fully fixed-costs-plus-guaranteed-  
14 profit under the PPA.

15 Such practical, commercial and political realities mean that, once PWEC has a  
16 long-term PPA with APS, PWEC will perform the contract itself even if others could  
17 provide some services more cheaply. If some other generator has large enough  
18 advantages over PWEC to overcome the high search, negotiation and contracting costs,  
19 and to offset the commercial and political risks of giving business to competitors or  
20 inviting criticism of the PPA arrangements, PWEC might do some subcontracting and  
21 spot buying. But the existence of the exclusive, long-term contract makes it very  
22 difficult for other generators to compete for spot or shorter-term contract sales even if  
23 they are significantly more efficient than PWEC; unlike in the simple theory, the initial  
24 long-term contracts have a strong effect on who actually produces the product and on  
25 prices in the shorter-term markets.

26 **Q. Given that high transaction costs are a reality, how can these inefficiencies of**  
27 **long-term contracting be reduced?**

28 A. The ultimate solution is to create efficient short-term and spot markets, so that the party  
29 with the long-term contract can easily buy physical services from others and so that

1 parties without contracts can easily sell physical services when they really are the low-  
2 cost supplier. But until such efficient short-term markets exist, the only way to reduce  
3 the efficiency and competitive obstacles created by long-term contracts is to diversify  
4 and open the competition for the contracts themselves. Instead of long-term, full-  
5 requirement, cost-based contracts with a single seller, buyers should enter into multiple,  
6 shorter-term contracts with different entities. The lack of an efficient spot market will  
7 mean that operations will be inefficient to some extent no matter who wins these  
8 contracts, but if there is an open competition for the contracts themselves the generators  
9 who can perform the contracts with the least inefficiency will presumably win in the  
10 short run, and the prospect of getting such contracts in the future will encourage others  
11 to get into and stay in the game.

12 **Q. What role does the APS (or PWCC) economic dispatch process play in the kind of**  
13 **contract market you are describing?**

14 A. A well-designed economic dispatch process is a form of spot market that can reduce the  
15 operational inefficiencies that are otherwise created by long-term contracts. If APS  
16 were to contract with PWCC – or, better, an ISO unaffiliated with any generators – to  
17 operate its economic dispatch process on a market basis, all generators could have  
18 equal access to that dispatch process and its payments, thereby maintaining short-term  
19 operational efficiency as well as reliability. Short of creating a market-based ISO, APS  
20 could contract with PWCC on a full-requirements basis but then PWCC could contract  
21 with and dispatch both affiliated and unaffiliated generation on a nondiscriminatory  
22 basis. There would be no reason for PWCC to contract to pay all of PWEC's costs plus  
23 a guaranteed profit on all of PWEC's old and new capacity for 13 to 28 years.

24 **Q. Does the PPA affect competition only in the short-run dispatch, or does it have**  
25 **long-run effects on competition as well?**

26 A. The PPA's long-run effects on competition will ultimately be more important than its  
27 short-run effects. If APS buys exclusively from PWEC/PWCC under the long-term  
28 PPA, other generators will have trouble competing in the short run markets for the  
29 reasons outlined above, and hence will sell less product at lower prices than they would

1 in the absence of the PPA. Obviously, this will mean that fewer existing unaffiliated  
2 generators will be able to stay open and fewer new unaffiliated generators will be built  
3 while the PPA is in effect. Meanwhile, PWEC/PWCC will have a strong cash-flow  
4 from the PPA and hence will be in a good position to invest in new capacity. Then,  
5 when PWCC goes into the market to buy Supplemental or Replacement Energy  
6 Products, it will "discover" that its affiliate PWEC is in the best position to supply  
7 these. And when the PPA is eventually terminated, PWEC will have more capacity,  
8 including more new capacity, in the region than it would have had in the absence of the  
9 PPA. Not only will competition be chilled while the PPA is in effect, but in the long  
10 run competition will be distorted in favor of PWEC.

11 **Q. How can the PPA affect competition if, as APS says, there are no realistic**  
12 **alternatives to most of the PWEC generation units, which were designed and**  
13 **located specifically to serve APS load?**

14 **A.** I can neither confirm nor refute the APS claim that there are no realistic alternatives to  
15 most of the PWEC generation units, although it seems logical that many of the PWEC  
16 assets have locational and operational advantages in serving APS load and hence would  
17 "win" in any fair competition to serve that load. But I doubt that *all* of the Dedicated  
18 Units specified in the PPA would win such a competition even in the short run, much  
19 less over the entire 13-to-28 year term of the PPA. The only reliable way to determine  
20 when it is cost-effective to displace any of the PWEC Dedicated Units and with what is  
21 to keep continual competitive pressure on all of those units, not to ask PWEC's parent  
22 PWCC to decide when to discard some of her children in favor of the neighbors' brats.

23 More fundamentally, competition in a market does not determine only which  
24 units supply the physical product in the short run; it also determines the prices and  
25 other terms in short-term transactions and creates incentives for all prospective players  
26 to operate and invest more efficiently in the long run. Even if a fair competition to  
27 serve APS' SOS load resulted in all of the PWEC Dedicated Units "winning" in the  
28 short run, the winning prices and other terms of the deal, such as who bears what  
29 technical and economic risks, would almost surely be different from those in the PPA.

1 More importantly, all actual and prospective generators in the region would begin  
2 planning for future competitions, knowing that they have a shot at winning future  
3 contracts if, but only if, they are able to offer better terms than their competitors. Using  
4 a competitive process to determine who supplies what and at what prices might not  
5 change physical operations much in the short run, but would immediately change prices  
6 and long-run incentives for all generators – including PWEC.

7 **Q. Why would competition to provide Supplemental and Replacement Energy**  
8 **Products to PWCC, and the Competitive Bidding Process, not be enough to allow**  
9 **wholesale competition to develop?**

10 A. Competition for short-term, marginal sales may be better than no competition at all, but  
11 it is not at all the same as competition for longer-term, large volume contracts. In fact,  
12 given the difficulty other generators will have competing once PWEC has a long-term  
13 contract for its entire existing capacity, PWEC may end up getting much of the  
14 marginal business and building or buying from others much of the capacity needed to  
15 meet growth over the contract term – particularly given that its parent PWCC will be  
16 the most significant buyer in the region. Throwing some crumbs to competitors is not  
17 the same as creating real competition.

18 **Q. APS emphasizes that it is not asking the Commission to slow retail competition,**  
19 **and says that competitive generators can supply the competitive retail market.**  
20 **What is your reaction to these statements?**

21 A. It is easy – perhaps even cynical – for APS to endorse retail competition and tell their  
22 competitors to sell directly to consumers or to competitive retailers, because APS must  
23 know that retail competition will not be effective until there is an efficient and liquid  
24 wholesale market in the APS region, and this will not happen while the PPA is in force.  
25 In fact, APS must not be expecting retail competition to amount to anything over the  
26 term of the PPA, or else they would not confidently be predicting that their SOS load  
27 will continue growing at about the same rate as electricity demand generally. If APS  
28 thought they might lose any significant SOS load by 2008 or 2012, they would be more  
29 worried than they seem to be about how to avoid the death spiral effect I described  
30 earlier in this testimony.

1 Q. **Is APS correct that the PPA cannot have a significant effect on competition**  
2 **because APS' load and PWEC generation are small parts of regional totals?**

3 A. Again, APS is being inconsistent here, arguing first that transmission constraints make  
4 it impossible or difficult for many or most nonaffiliated generators to serve APS load,  
5 and then comparing APS load and PWEC generation to regional totals as though there  
6 were no transmission constraints. As a general matter, electricity markets are  
7 effectively limited by transmission constraints, and APS and its witnesses themselves  
8 say that APS load and PWEC generation are large parts of the totals in the relevant  
9 transmission-constrained markets. The PPA will strongly affect competition in these  
10 markets even if the total quantities are small compared to the total WSCC.

11 Fundamentally, every utility and every generation company is small compared to  
12 some regional, national or international market. If enough submarkets are carved off  
13 from the rest and made noncompetitive, on the grounds that each one is only a small  
14 part of some larger total, there will soon be little effective competition anywhere. If  
15 there were good reasons to approve APS' request for a variance and PPA, there would  
16 be good reasons to approve similar retreats from competition almost everywhere. But  
17 competition in electricity is in the public and consumer interests generally, and hence it  
18 is desirable in the APS market – eve if APS is small compared to some global totals.

19 Q. **Does it matter that much or most of the independent generation in Arizona has**  
20 **been or is being built to serve other markets?**

21 A. Not much. All markets are interrelated, so a reduction in demand for independent  
22 generation to serve APS will affect all generation to some extent. Generation that was  
23 built to serve, say, California and cannot serve APS because of transmission constraints  
24 will not win any APS contracts in a well-designed competitive process. But generation  
25 that was built primarily to serve California but can serve APS should have an  
26 opportunity to compete fairly with APS affiliates to do so.



1 priced contracts with PWEC or other generators for any SOS load not contracted  
2 in the competitive process or supplied by still-regulated generators;

- 3 • The initial contracts should be divided into tranches of one year, two year, three  
4 year, four year and five-year contracts, with approximately 20 percent of SOS  
5 energy covered by contracts in each tranche
- 6 • Each year after 2003, APS should conduct a competitive process and/or arms  
7 length negotiations to replace with new five-year contracts the 20 percent of  
8 contracts expiring in that year, plus or minus any changes in SOS load; and
- 9 • The Commission should, to the extent its procedures allow, commit to approving  
10 SOS rates that will allow APS to recover each year the average costs of its SOS  
11 contract portfolio procured as outlined above.

12 A process such as the one described above will protect SOS customers from short-term  
13 price volatility, moderate any long-term price trends, adjust the size of the portfolio for  
14 any changes in SOS load due to retail competition, take advantage of well-located and  
15 low-cost PWEC units, allow some efficient competitors to get into the market in the  
16 short run and put all generators on notice that they have a shot at business in the long  
17 run if, but only if, they offer real value compared to competitors.

18 **Q. Do you think it is realistic that APS could, by January 2003, design and**  
19 **implement the kind of arm's length negotiations and competitive process you**  
20 **describe?**

21 A. Perhaps not now, given that APS' request for variance and the PPA has diverted so  
22 many APS and other resources from the implementation of Rule 1606(B). Even so,  
23 however, the PPA itself requires APS to use a competitive bidding process to buy  
24 270 MW of Energy Products<sup>6</sup> beginning on January 1, 2003, demonstrating the  
25 feasibility of implementing a competitive process even at this late date. But even if it is  
26 now too late to implement Rule 1606(B) fully by 2003, the obvious solution is to

---

<sup>6</sup> The 270 MW is to provide Energy Products at a 51% load factor, meaning that it will provide  
270 MW x 8,760 hours/year x 0.51 = 1,206,252 MWh/year of Energy Products.

1 modify the schedule to make it more realistic, not to scrap the whole concept of  
2 phasing in competition in favor of a long-term, full-requirements, full-cost-plus-  
3 guaranteed-profit PPA among affiliates.

4 **Q. Does this conclude your testimony?**

5 **A. Yes, it does.**

BEFORE THE  
ARIZONA CORPORATION COMMISSION

DOCKET NO. E-01345A-01-0822

**DIRECT TESTIMONY OF WILLIAM R. ENGELBRECHT  
ON BEHALF OF  
ARIZONA PUBLIC SERVICE COMPANY**

MARCH 29, 2002



1 APS/PWCC inexplicably failed to follow their own recipe in "negotiating" the PPA.  
2 Instead of structuring a procurement portfolio that provided price stability, reliable  
3 resources and sound risk management, APS/PWCC simply put all of their eggs into one  
4 basket and tried to present it as a balanced and reasonable solution to a problem that  
5 probably does not even exist. A contract with a single party for 100% of Standard Offer  
6 Service (SOS) requirements and a potential term of nearly thirty years is altogether  
7 unreasonable on its face. Since APS is wholly owned by PWCC, and since Mr. Davis is  
8 the head of both organizations, he in essence negotiated the PPA with himself -- resulting  
9 in all of the counterparty risk being contained within a single entity. In this setting, there  
10 can be absolutely no business objectivity nor a healthy balancing of risks such as would  
11 be associated with an arms length transaction, and the PPA is structured in such a way  
12 that consumers eventually will pay for any risks that materialize. However, there is one  
13 positive aspect (unfortunately, not from the perspective of the APS customer) to this type  
14 of incestual relationship - there are likely to be very few disputes under the PPA.

15  
16 Along with counterparty risk, the PPA exposes SOS customers to considerable price risk,  
17 as the price they will pay for power is locked in for a number of years without sufficient  
18 regard to the evolution of the competitive wholesale market. The PPA contemplates only  
19 the status quo and whatever generation APS/PWCC may construct (including the Red  
20 Hawk plant, which is nearly completed with no apparent locked-in market for its output)  
21 without regard to power plants currently approved and under construction. Exhibit 1 to  
22 my testimony shows that there is currently over 7,200 MW of new generation under  
23 construction and scheduled to be online in Arizona by the end of 2003, with a total of  
24 over 22,000 MW of new generation by the end of 2007.

25  
26 Prudent Resource Planning would call for a layering of contracts in such a way as to take  
27 advantage of these added resources as they become available. In general, the resource  
28 planner would look at the load shape, the resources currently committed (whether  
29 through existing agreements, must-run or must-take status, etc.) and then look at the total  
30 capacity and energy of baseload, intermediate load and peaking capacity and ancillary  
31 services that would be required to meet that load, and develop an analysis of how to meet

1 those needs at the lowest possible cost, lowest risk, greatest flexibility and greatest  
2 reliability of supply. Resources should be selected based on the lowest risk-adjusted cost  
3 to customers.  
4

5 In a market where so much new supply is in development, there would likely be a great  
6 number of contracts executed for varying products and of varying duration. If the  
7 planning horizon indicated, for example, that 5,000 MW of new peaking capacity would  
8 be available in say, the next five years, then it would be prudent Resource Planning to  
9 create an opportunity to take advantage of that new supply, provided it is cost-  
10 competitive. The means to achieve that would be to structure the layers of contracts in  
11 such a way that some percentage of the power requirements based on projected load  
12 would be available for bidding during the period when the new supply was available. By  
13 "testing the market" in this way, the resource planner can mitigate price risk by taking  
14 advantage of abundant, and therefore cost-competitive, supply.  
15

16 At the same time, price volatility is mitigated by having long-term contracts in place.  
17 Locking up virtually the entire market for an extended period of time almost guarantees  
18 that consumers will pay higher prices in the long run. It also provides disincentives for  
19 newer, less expensive, cleaner and more efficient generation to be built since there will be  
20 no local market available. A structured Resource Planning portfolio is layered with  
21 short-term, intermediate-term and long-term contracts to maximize the benefits to  
22 consumers by providing low prices and price stability.  
23

24 Exhibit 1 focuses only on generation resources that are built within Arizona. In reality,  
25 there are thousands of MW of capacity available from resources outside of Arizona that  
26 should also be considered when doing Resource Planning. The existence of competition  
27 in this fashion helps ensure that supply and demand will equilibrate, that sound  
28 economics will be used in planning and siting generation resources, and that consumers  
29 will enjoy the full benefits of increased competition. In a fully competitive environment  
30 such as I have described, the generators assume the market risk that there will be an  
31 oversupply or that their plants are too old or inefficient to compete successfully. Under

1 the PPA, APS/PWCC pass all of the risk onto consumers and are guaranteed recovery of  
2 all their costs plus a rate of return. For consumers, this is the worst possible outcome.

3  
4 Another interrelated key attribute of any Resource Planning process worth its salt is the  
5 existence of a competitive solicitation of resources. Failure to pursue the opportunities  
6 that exist out in the competitive marketplace is analogous to burying one's head in the  
7 sand and pretending to be an ostrich. Given the potential self-dealing inherent in the  
8 proposed PPA, any such competitive solicitation looking out into the marketplace would  
9 necessarily need to be conducted and evaluated by a commission-assigned independent  
10 third party. This would be the only way to ensure that APS customers were receiving the  
11 most prudent and least expensive Resource Planning mix of resources.

12  
13 **Q. Is SER willing to sell power to APS under competitive and attractive prices, terms  
14 and conditions?**

15 A. Yes, SER is both willing and able to sell short-term, intermediate-term or long-term  
16 power to APS under competitive and attractive prices, terms and conditions to help meet  
17 their resource requirements. In Arizona, specifically adjacent to (within 1,800 ft. of) the  
18 new Hassayampa Switchyard, our Mesquite Power gas-fired combined cycle project is  
19 under construction. Mesquite will have 625 MW of capacity come on-line by June 1,  
20 2003, with another 625 MW by December 31, 2003. This creates a total of 1,250 MW of  
21 new SER generation in the "local"<sup>1</sup> area, the primary portion of the APS load. This new  
22 SER generation has the exact same interconnection point (i.e., Hassayampa 500-kV) as  
23 the PWCC Redhawk Project; therefore it is exactly just as accessible to APS customers as  
24 is Redhawk. The new combined cycle projects proposed by Duke, PG&E, and Gila Bend  
25 Power Partners, which will also connect directly to Hassayampa, fall into this same  
26 category. APS, for the sole use and benefit of its customers, has transmission capacity  
27 available today from the Palo Verde/Hassayampa common bus to its load centers, and  
28 will have additional capacity as its Southwest Valley 500-kV line addition (owned jointly  
29 with SRP) is placed in service by June 2003. That transmission capacity can be used by  
30 APS on behalf of its customers (who pay the annual revenue requirement of that

---

<sup>1</sup> In the greater Phoenix Region.

1 transmission capacity) in order to tap into a large quantity of competitive resource supply  
2 available at the Palo Verde/Hassayampa common bus hub. There is nothing unique about  
3 the PWCC Redhawk plant that makes it a more likely and more attractively priced  
4 candidate for APS customers versus other generating plants and resource opportunities in  
5 the area.

6  
7 In addition to Mesquite, SER has in operation or under construction an additional 1,105  
8 MW of combined cycle generation available in the Southwest that could provide APS  
9 additional power purchase potential from the SER generation portfolio, independent of  
10 the 1,250 MW that Mesquite brings to the market. That SER generation portfolio can  
11 also supply back-up to any APS purchase from Mesquite. The 2,355 MW SER portfolio  
12 alone could in theory provide the majority of the APS 3,000 MW SOS requirement.  
13 When the SER portfolio is combined with the many thousands of MW of additional  
14 capacity represented by other new Palo Verde area generators as well as other sources of  
15 power purchasing opportunities at the Palo Verde hub, there is far more capacity than  
16 necessary available to APS and its customers to form what any energy-coherent person  
17 would call a liquid, competitive marketplace.

18  
19 To date, SER has no forward sales commitments from the Mesquite Power project. It is  
20 fully available to serve Arizona load. In fact, I stated in my ACC Siting Committee  
21 testimony for Mesquite that Mesquite's primary market region focus was Arizona. And,  
22 the ACC, in granting such License, added a requirement that at least a portion of  
23 Mesquite's power be made available for local purchase. SER has fulfilled that  
24 requirement by offering to sell power to PWCC, as discussed below.

25  
26 In addition to the SER generation portfolio and the other generators physically  
27 interconnected at the Palo Verde/Hassayampa common bus, APS also has the ability to  
28 purchase other sources of power at the Palo Verde hub. The Palo Verde hub has been a  
29 major trading hub in the Western U.S. for some time. Physical and financial trades occur  
30 there daily. APS' claim that enough of a competitive market does not and WILL NOT

1 exist as to have justified exploring the marketplace to "search" for the lowest cost power  
2 proposals for their customers is simply absurd.

3  
4 It should be noted that SER has within the last year had discussions with PWCC  
5 representatives regarding a SER sale of power to PWCC and its various customers.  
6 PWCC was not only not interested in purchasing a share of its customer requirement  
7 from SER, but asked us whether we had interest in a power purchase from them.

8  
9 **Q. Will APS customers likely pay more than necessary under the proposed PPA?**

10 **A.** Most definitely. The purpose of this area of my testimony is to demonstrate that the PPA  
11 between APS and its affiliate PWCC is self-serving and denies Arizona consumers access  
12 to the major benefit of wholesale electric competition, namely, low priced, reliable  
13 electricity. By negotiating this lopsided agreement with its affiliated generation company  
14 under terms that assure APS/PWCC a practically risk free lockup of the electricity  
15 market, APS/PWCC virtually assure consumers of higher prices over the long run than  
16 they would expect to pay in a fully competitive market with APS following prudent  
17 Resource Planning and acquisition strategies.

18  
19 This specific PPA harms APS customers by not following prudent Resource Planning  
20 practices. In summary, the PPA is not a competitive solicitation and therefore will not  
21 result in the lowest possible cost to APS customers. It is much too large a block of power  
22 for a single counterparty (who for all intents and purposes is the same entity as the buyer)  
23 and a single deal. The PPA is for much too long a term (i.e., 13 years) – it locks in a big  
24 mistake for a long period of time. The PPA also prevents APS customers from receiving  
25 the price benefit of an oversupplied market.

26  
27 The PPA calls for older, less efficient, higher polluting power plants to become  
28 "Dedicated Units," that are assured of recovering their variable costs, plus an energy  
29 price, plus a dedicated rate of return without regard to whether or not it makes economic  
30 sense for those units to be operated. In fact, the guaranteed recovery of expenses and  
31 return of capital offer a disincentive for APS to exercise prudent decision making in the

1 dispatch of generation. Under a worst case scenario, when market prices are high, APS  
2 would have the best of all possible worlds – namely, the ability to sell its output from its  
3 generating plants into the market at market prices while continuing to earn a rate of return  
4 from its captive SOS customers, who will also reimburse APS for the higher power costs  
5 it incurs buying in the market. This is an unacceptable outcome that both harms  
6 consumers and squelches competition in the wholesale market. It enables APS/PWCC to  
7 reap the benefits normally accruing to an integrated monopoly while maintaining a façade  
8 of competition. In periods of oversupply when market prices are driven down and  
9 competition becomes difficult, APS/PWCC is more likely to survive because it has a  
10 guaranteed price for its power, along with a guaranteed return.

11  
12 The PPA and Variance Request at the heart of this proceeding do not present a Resource  
13 Planning strategy that is beneficial to consumers by providing a reliable source of power  
14 at the lowest obtainable price. To the contrary, the benefits of this arrangement fall  
15 largely on PWCC, as discussed in the testimony of Dr. Ruff. In addition, many of the  
16 assumptions upon which the APS/PWCC's pleadings and testimony are based appear to  
17 be faulty, leading to incorrect conclusions and imprudent stewardship of available  
18 generation resources. For instance, fuel diversity is an issue raised in the testimony of  
19 Mr. Davis. That testimony emphasizes the fact that 40% of the Dedicated Units are  
20 either coal or nuclear fueled, providing some measure of protection from capacity  
21 shortages or price spikes in the short-term natural gas markets. While these assertions are  
22 true on the surface, the APS/PWCC position fails to acknowledge that both nuclear and  
23 coal units have extremely high fixed costs compared to gas-fired generators, and are less  
24 efficient, even though they do have lower variable costs. Therefore, coal and nuclear  
25 plants are only economical to operate when they are running at a capacity factor of at  
26 least 80-90%. Otherwise, the \$/mmBtu values for coal versus natural gas depicted in  
27 Exhibit WHH-2 of the testimony of Dr. Hieronymus change drastically and the coal  
28 units, with higher fixed and environmental costs, cannot compete with newer, more  
29 efficient and less polluting gas units. Thus, the value alleged by APS/PWCC in having  
30 fuel diversity as a hedge against gas curtailments or price spikes during the summer peak  
31 is a myth. Coal and nuclear plants are not intended for use as peaking plants or to

1 provide capacity or ancillary services – they are uneconomical to operate in that fashion.  
2 Instead, coal and nuclear plants are most suited to providing baseload power, which  
3 means that they will normally be operating year round at a high capacity factor and  
4 would largely be unavailable to provide additional power if the gas supply in the state  
5 became constrained.

6  
7 Moreover, given the fact that coal and nuclear plants have lower variable costs and are  
8 also, as APS/PWCC point out, strategically placed in strategic locations where they are  
9 the generation most available to meet APS SOS load. Many of these units are also  
10 designated as Reliability Must Run units and/or provide their output on a “must-take”  
11 basis. Consequently, these units exercise considerable market power and have the ability  
12 to set the market price for power at a level significantly higher than what would be set by  
13 newer, cleaner and more efficient units but for the difference in location. All of these  
14 cost factors work in favor of APS/PWCC and against consumers, who ultimately pay the  
15 higher costs associated with this market power.

16  
17 **Q. In your opinion, is the comparison between the projected long run marginal costs of**  
18 **the new, gas-fired generating units under construction by merchant generators and**  
19 **the long run marginal cost of the “dedicated units” at pages 24-25 (Figure 5) of the**  
20 **testimony of Mr. Davis, a fair and accurate comparison?**

21  
22 **A.** Probably not. Mr. Davis does not indicate what any of the assumptions used by APS in  
23 calculating the \$52-\$60 per MWh in long run marginal costs (LRMC) ascribed to the  
24 merchant generation were, nor does he give an actual projected figure for the LRMC of  
25 the dedicated units. Absent those assumptions, it is difficult to assess the fairness and  
26 accuracy of the alleged savings depicted in Figure 5. I would observe, however, that  
27 merchant generators recover their capital costs through their power sales into the market,  
28 so that the price required for the power includes the recovery of capital investment. By  
29 contrast, APS is proposing to recover the capital costs of the dedicated units through a  
30 separate charge to APS customers including a 9.38% return that appears to have been left  
31 out of the comparison illustrated in Figure 5. Such an omission would be misleading

1 because, if a merchant generator's power is not purchased, that merchant earns no return  
2 on its investment; by contrast, APS will earn a 9.38% return even if no power is  
3 purchased from the dedicated units. In fact, under the proposed PPA, APS would earn  
4 that return even if the dedicated units were not operating.

5  
6 It is unclear from Mr. Davis' testimony (1) what, if any, assumptions were made  
7 regarding return on capital investment in the projected LRMC of the new merchant units,  
8 and (2) what figure Mr. Davis was using as the LRMC of the dedicated units. If one were  
9 to assume that, as it appears, Mr. Davis' "comparison" included both power prices and  
10 return on capital in the projected LRMC of the merchant units, and only power costs and  
11 no return on capital for the dedicated units, then the comparison is an unfair "apples to  
12 oranges" comparison. To make an apples-to-apples comparison, the LRMC of the  
13 merchant units, including a return on capital investment, would have to be compared to  
14 the rates paid by APS customers for both energy purchases and the 9.38% facilities  
15 charge over the period from 2002 to 2007. That comparison may differ dramatically

16 from what is depicted in Figure 5.

17  
18 Q. Does this conclude your testimony?

19 A. Yes.

**ATTACHMENT 1**

**STATEMENT OF QUALIFICATIONS**

**WILLIAM R. ENGELBRECHT**



**EXHIBIT 1**

**ARIZONA PROPOSED POWER  
PLANTS**

**ARIZONA PROPOSED POWER PLANTS**

STATUS	FACILITY	ESTIMATED ONLINE DATE	OUTPUT (MW)	# OF UNITS	TECHNOLOGY	FUEL TYPE
0	West Phoenix (Phase 1)	08/01/2001	120	1-1-1	Combined	Gas
	Desert Basin	06/01/2001	520	1-2-1	Combined	Gas
	Griffith Energy Project	07/01/2001	650	1-2-1	Combined	Gas
	South Point	06/01/2001	540	1-2-1	Combined	Gas
	Yearly Subtotal:		1,830			
	Status Total:		1,830			

1	Kyrene	06/01/2002	250	1-2-1	Combined	Gas
	West Phoenix (Phase 2)	09/01/2002	500	1-2-1	Combined	Gas
	Gila River 2	08/01/2002	520	1-2-1	Combined	Gas
	Arlington Valley 1	08/01/2002	580	1-2-1	Combined	Gas
	Sundance Energy Project # 1	06/01/2002	450	10	Comb Turb	Gas
	Redhawk 2	06/01/2002	530	1-2-1	Combined	Gas
	Redhawk 1	06/01/2002	530	1-2-1	Combined	Gas
	Gila River 1	06/01/2002	520	1-2-1	Combined	Gas
	Yearly Subtotal:		3,880			

	Harquahala	06/15/2003	1,040	3-1-1	Combined	Gas
	Gila River 4	01/01/2003	520	1-2-1	Combined	Gas
	Gila River 3	01/01/2003	520	1-2-1	Combined	Gas
	Mesquite Power Plant	03/01/2003	1,250	2-2-1	Combined	Gas
	Yearly Subtotal:		3,330			
	Status Total:		7,210			

2	Arlington Valley 2	06/30/2003	600	1-2-1	Combined	Gas
	Yearly Subtotal:		600			

	Bowie 1	06/30/2004	500	1-2-1	Combined	Gas
	Springerville Unit 4	06/01/2004	380	1	Fossil	Coal
	Gila Bend	06/01/2004	845	1-3-1	Combined	Gas
	Springerville Units # 3	06/01/2004	380	1	Fossil	Coal
	Yearly Subtotal:		2,105			

STATUS	FACILITY	ESTIMATED ONLINE DATE	OUTPUT (MW)	# OF UNITS	TECHNOLOGY	FUEL TYPE
	Bowie 2	12/31/2005	500	1-2-1	Combined	Gas
	Santan	12/01/2005	825	3-2-1	Combined	Gas
	Yearly Subtotal:		1,325			
	Redhawk 3	06/01/2006	530	1-2-1	Combined	Gas
	Sundance Energy Project # 2	06/12/2006	90	2	Comb Turb	Gas
	Yearly Subtotal:		620			
	Redhawk 4	12/01/2007	530	1-2-1	Combined	Gas
	Yearly Subtotal:		530			
	Status Total:		5,180			
3	Welton-Mohawk	06/01/2003	520	1-2-1	Combined	Gas
	Yearly Subtotal:		520			
	La Paz 1	10/30/2004	540	1-2-1	Combined	Gas
	Yearly Subtotal:		540			
	La Paz 2	03/30/2005	540	1-2-1	Combined	Gas
	Yearly Subtotal:		540			
	Yearly Subtotal:		540			
	Status Total:		1,600			
4	Littlefield (Beaver Dam)	06/01/2003	520	1-2-1	Combined	Gas
	Yearly Subtotal:		520			
	Signal Peak (Desert Basin 2)	06/01/2004	580		Combined	Gas
	Yearly Subtotal:		580			
	Maestros Group Nogales Project	01/01/2007	500			Gas
	Winchester	06/01/2007	750	1-2-1	Combined	Gas
	White Tank Mountain	01/01/2007	1,250	5	Pump Storage	Hydro
	Yearly Subtotal:		2,500			
	Status Total:		3,600			
5	Big Sandy (Phase 1)	08/01/2002	500	1-2-1	Combined	Gas
	Yearly Subtotal:		500			

STATUS	FACILITY	ESTIMATED ONLINE DATE	OUTPUT (MW)	# OF UNITS	TECHNOLOGY	FUEL TYPE
	Toltec 1	09/30/2003	1,200	2-2-1	Combined	Gas
	Big Sandy (Phase II)	12/01/2003	220	1-1-1	Combined	Gas
	Yearly Subtotal:		1,420			
	Toltec 2	03/31/2005	600	1-2-1	Combined	Gas
	Yearly Subtotal:		600			
	Safford	01/01/2007	220			Gas
	Montezuma (520 MW)	01/01/2007	0		Combined	Gas
	Yearly Subtotal:		220			
	Status Total:		2,740			

Total for Arizona Proposed Power Plants: 22,160

- Status Key:
- 0 - Commercial Operation
  - 1 - Under Construction
  - 2 - Regulatory Approval Received
  - 3 - Application Under Review
  - 4 - Announced
  - 5 - Suspended or Denied Approval