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Arizona Corporation Commission
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Generic Investigation of the Development
Of a
Renewable Portfolio Standard
As a Potential Part of the
Retail Electric Competition Rules

Docket No. E-00000A-99-0205

Direct Testimony and Exhibits of
James F. (Rick) Gilliam
for the
Environmental Intervenors

1 Q. Please state your name and business address.

2 A. My name is James F. (Rick) Gilliam. My business address is 2260 Baseline Road, Boulder
3 Colorado.

4
5 Q. By whom are you employed and in what capacity?

6 A. I am employed by the Land and Water Fund of the Rockies Energy Project (LAW Fund) as its
7 Senior Technical Advisor.

8
9 Q. Please describe your responsibilities with the LAW Fund.

10 A. My responsibilities include review and analysis of existing, and the development of new statutes,
11 regulations, policies, practices, and procedures which may affect the development and promotion
12 of electric resources less harmful to the environment than traditional utility resources.

13
14 Q. Please describe your experience in utility regulatory matters.

15 A. My experience with utility regulatory matters ranges from the perspective of regulatory agency to
16 regulated investor-owned utility, and more recently with a regional non-profit environmental law
17 and policy center. A summary of my background and experience is attached as Appendix A.

18
19 Q. Have you previously testified before this Commission?

20 A. Yes. In addition, I have testified in proceedings before the Public Utility Commission of the State
21 of Colorado, the Wyoming Public Service Commission, and the Federal Energy Regulatory
22 Commission. I have also submitted testimony in proceedings before the New Mexico Public
23 Service Commission and the Nevada Public Service Commission, however these matters were
24 resolved by settlement prior to hearing.

25

1 Q. On whose behalf are you testifying?

2 A. In this proceeding, I am representing the Environmental Intervenors, consisting of the LAW
3 Fund, the Grand Canyon Trust, and the Grand Canyon Chapter of the Sierra Club.

4

5 Q. Please describe the members of the Environmental Intervenors.

6 A. The LAW Fund is a regional environmental law and policy center founded in 1990 to provide
7 legal and policy assistance to community groups throughout the Rocky Mountain and Desert
8 Southwest region. The LAW Fund's Energy Project was established in 1991 to advocate for
9 sustainable energy policy and practices in a variety of state and national forums.

10

11 The Grand Canyon Trust (Trust) is a non-profit, regional conservation organization dedicated to
12 the conservation of the natural and cultural resources of the Colorado Plateau. The Trust began
13 its work in 1985, currently has 5,000 members, and is headquartered in Flagstaff, Arizona, with
14 offices in St. George and Moab, Utah. The Trust is committed to the development of clean,
15 renewable energy sources and the efficient use of our current energy resources.

16

17 The Grand Canyon Chapter of the Sierra Club Grand Canyon Chapter was formed in the late 60's
18 and has over 11,000 members in Arizona. Among other things, its mission is to practice and
19 promote the responsible use of the Earth's ecosystems and resources; and to educate and enlist
20 humanity to protect and restore the quality of the natural and human environment.

21

22 Members of all these organizations have a substantial interest in preserving, protecting, and
23 improving the environment throughout Arizona.

24

1 Q. What is the purpose of your testimony?

2 A. The purpose of my testimony is to support the proposed Renewable Portfolio Standard¹ or "RPS"
3 (Exhibit JFG-1 to this testimony) and to propose an addition to Section B. This new Section B.3.
4 will describe a funding and implementation method that helps the RPS achieve its objectives.
5 This proposal will mitigate the cost exposure of the responsible Electric Service Providers²
6 (ESPs) and ratepayers, and stimulate the expansion of niche renewable energy markets that are
7 nearly cost-effective.
8

9 Summary of Testimony

10 Q. Can you please summarize your testimony?

11 A. Yes. There are developing niche markets throughout Arizona for renewable resources. Examples
12 include off-grid applications, on-grid rooftop PV arrays, green marketed solar electric resources,
13 and distributed generation. Each of these applications is sufficiently cost-effective, given the
14 unique and diverse value of renewable resources (especially solar electric in Arizona), to have
15 already entered the energy market in some small way. The RPS can drive these markets by
16 providing a small amount of competitive seed capital. Such capital can greatly expand the
17 penetration of renewable resources in the Arizona energy market, capturing economic benefits
18 along the way. This testimony outlines an implementation plan for driving these markets that
19 balances the interests of the diverse parties involved in these restructuring proceedings over the
20 past four years.
21

¹ The RPS referred to throughout this testimony is alternatively know as the "Environmentally-friendly Portfolio Standard" and is derived from the Solar Portfolio Standard approved by the Commission in August of 1998, as modified by the Attachment to the June 16th Procedural Order in this docket.

² The Rules define "Electric Service Provider" (ESP) as a company supplying, marketing, or brokering at retail any Competitive Services pursuant to a Certificate of Convenience and Necessity.

1 Q. Please summarize your implementation plan.

2 A. Our proposal provides a means for the ESPs providing competitive electricity in Arizona, and the
3 Utility Distribution Companies³ (UDCs) providing competitively acquired electricity to standard
4 offer customers, to satisfy the requirements of the RPS with little, if any, adverse impact on
5 customer rates. We will show how a relatively modest amount of funding can be leveraged
6 through competitive bidding to achieve the RPS targets and objectives.

7

8 The key points of our proposal are as follows:

- 9 ♦ The revenue currently being collected in existing rates for renewable resources and energy
10 efficiency is about the right order of magnitude to fund the renewable resources requirement
11 of the RPS. Thus, the first point is to reassign a substantial portion of this revenue to offset
12 the cost of the RPS;
- 13 ♦ Next, we propose that a competitive bidding or request for proposal (RFP) process be utilized
14 to capture the most cost-effective renewable resources in the market, and help drive down
15 prices;
- 16 ♦ The RFP process would seek to purchase solar electric *credits*, not kWhs;
- 17 ♦ The UDC would administer the RFP process for its Standard Offer customers. For the
18 renewable requirements associated with non-Standard Offer competitive electricity service,
19 the ESPs could administer their own bidding program, contract with the UDC or another third
20 party to administer the program, or achieve the requirements of the RPS in some other
21 fashion.

22

³ The Rules define "Utility Distribution Company" as the electric utility entity regulated by the Commission that operates and maintains the distribution system for the delivery of power to the end user point of delivery on the distribution system.

1 Q. How do you intend to address the questions posed in the June 16th Procedural Order?

2 A. There are several threshold questions that will be addressed first, such as the need for a portfolio
3 standard. These are the several parts to question 1 and question 2. The response to these
4 questions leads into a discussion and more detailed description of the proposed RPS
5 implementation plan. Questions 5 and 7 relate to implementation details and will be addressed
6 immediately following the detailed description of our proposal. The detail questions 3, 4, and 6
7 will be answered next. Question 8 asks for other relevant comments. I will discuss precedent at
8 the ACC and portfolio standards in other southwestern U.S. states in response to this question.
9

10 Background and History of the Portfolio Standard

11 Q. Please briefly describe the history leading to these proceedings.

12 A. These proceedings are the culmination of nearly four years of effort on the part of this
13 Commission and many of the parties presently involved, including ourselves. Numerous
14 meetings, discussions, formal and informal comments, and reports led up to the adoption on
15 December 26, 1996 of the Electric Competition Rules. These Rules included a Solar Portfolio
16 Standard (SPS) that would have required ½ of 1% beginning in 1999, and rising to 1% in 2002.
17 Solar electric resources deployed as a result of previous Integrated Resource Planning (IRP)
18 proceedings were not to qualify for the standard.
19

20 Q. How much solar electric generation has resulted from previous IRP proceedings?

21 A. It is my understanding that less than 1 MW of solar resources has resulted from previous IRP
22 commitments. The 1993 IRP established goals for the major utilities subject to the jurisdiction of
23 this Commission. The Opinion and Order in Docket No. U-0000-93-052 stated (p. 45):

1 IT IS FURTHER ORDERED that Arizona Public Service Company, Tucson Electric
2 Power Company, Arizona Electric Power Cooperative, and Citizens Utilities Company shall
3 strive for installing and operating the following amounts of renewable capacity not later than
4 December 31, 2000:

5 Arizona Electric Power Cooperative	1,000 kW
6 Citizens Utilities Company	1,000 kW
7 Tucson Electric Power Company	5,000 kW
8 Arizona Public Service Company	12,000 kW
9	

10 The Commission specifically addressed the concept of renewable "goals" in the body of its order
11 as follows:

12 During the hearing, APS indicated that it is willing to strive toward a "goal" of
13 12 MW for renewables by 2000 and TEP indicated that it is willing to strive toward a
14 goal of 5 MW for renewables by 2000. We regard these statements as serious
15 commitments and will accept them as planning goals. However, if APS and TEP appear
16 to fall significantly short of meeting these goals, we shall reconsider short-term set
17 asides. (page 46, Docket No. U-0000-93-052, Opinion and Order)
18

19 Q. In your opinion, has APS and TEP fallen significantly short of meeting these goals?

20 A. Yes, they have.

21
22 Q. After adoption of the Restructuring Rules in December of 1996, what happened with respect to
23 the Solar Portfolio Standard?

24 A. These Rules were adopted as a framework for competition, and the Commission established a
25 number of working groups to hammer out its implementation. Among these was the Unbundling
26 and Standard Offer Working Group. Responsibility for determining the implementation details
27 for the SPS and a related provision, the System Benefits Charge (SBC), was given to this working
28 group, which subsequently set up subcommittees to deal with each of these issues. The work of
29 these subcommittees was encapsulated in written reports back to the Working Group. These
30 reports were incorporated into the report of the overall working group to the Commission in the
31 fall of 1997.
32

1 Q. Who was represented in these groups?

2 A. The Unbundling and Standard Offer Working Group and the SPS Subcommittee included
3 representatives of the Commission Staff, the Governor's office, large and small public and private
4 utilities, utility investors, providers of competitive services, customer groups including low-
5 income, municipals and industrial, solar industry, and the environmental community.

6
7 Q. What were the key results resulting from the work of the SPS subcommittee?

8 A. The subcommittee developed an expanded list of SPS objectives from the Commission Staff's
9 original five. In addition, the work of the subcommittee led to agreement on
10 (1) how to implement any funds collected through the "penalty" mechanism,
11 (2) expanding the use of incentives to better meet the SPS objectives,
12 (3) the banking and trading of solar kWh, i.e. excess solar kWh should be a tradable commodity
13 that may be sold to other interested parties, and
14 (4) the development of an acceptable cost/benefit point.

15
16 Q. What action did the Commission take as a result of the reports of the working groups?

17 A. The Commission adopted the first three of the subcommittee recommendations, and these were
18 incorporated into the proposed SPS adopted by the Commission on August 10 and December 11,
19 1998. The development of a process to determine an acceptable cost/benefit point was added by
20 Chairman Kunasek in April of this year.

21
22 Q. Were there other developments in the restructuring docket related to the SPS in 1998?

23 A. Yes. On November 5, 1998, the two largest investor-owned utilities in the state, APS and TEP,
24 filed settlement agreements with the Commission that, among other things, included an
25 agreement to meet the requirements of the SPS, as amended in August of 1998. Both APS and

1 TEP (as utility distribution companies) agreed to purchase all the necessary solar power required
2 by the SPS through a Request for Proposal (RFP) process.

3
4 In addition, both APS and TEP agreed to continue the programs included in the System Benefits
5 Charge at a level equal to or greater than the level at which TEP was funding those programs in
6 1997.

7
8 Q. Do you know what the funding levels were for the programs included in the System Benefits
9 Charge in 1997?

10 A. Based on reports filed with this Commission, the funding levels during 1997 for demand-side
11 management programs and renewable resources for APS totaled over \$8.5 million. TEP's
12 funding levels are not publicly available.

13
14 Q. Did the Commission approve these settlement agreements?

15 A. No. These agreements were withdrawn.

16
17 Q. What was the next relevant event related to the SPS?

18 A. In April of 1999, the Commission eliminated the SPS from the draft Rules and established the
19 instant docket to formally consider the issues, particularly cost and ratepayer impacts,
20 surrounding the development and implementation of a portfolio standard. As a result of several
21 proposed modifications suggested by Commissioner Kunasek, including provisions allowing
22 solar hot water and non-solar renewables to qualify, the standard is referred to here as a
23 Renewable Portfolio Standard or "RPS."
24

1 Q. Would you outline the major points of the RPS as presently constructed?

2 A. Yes. The RPS presently proposed has a number of important features that provide benefits to a
3 variety of constituencies in Arizona. The key features are as follows:

- 4 1. The portfolio percentage is a small fraction of the energy growth in Arizona, and increases
5 gradually each year from 0.2% in 1999 to 1.0% in 2005. The percentage applies to all
6 electricity sold competitively by ESPs, and beginning in 2001 will also apply to standard
7 offer sales of electricity provided by UDCs.
- 8 2. The RPS kWh requirements may be met with up to 20% solar water heating systems⁴ and up
9 to 10% other renewable electricity technologies.⁵
- 10 3. The percentage will continue to increase after 2002 only if the cost of solar electricity has
11 declined to a Commission-approved cost-benefit point.
- 12 4. There are incentives built into the standard to encourage early installation, and in-state
13 manufacturing and installation of renewable resources (including solar hot water). In addition
14 there are incentives in the RPS designed to specifically encourage distributed solar
15 generation, certain solar programs (i.e. green pricing, net metering, and solar leasing), and
16 investments in solar electric manufacturing plants.
- 17 5. A penalty will be assessed to any ESP that fails to comply with the standard of 30¢/kWh for
18 any shortfalls in the RPS requirement. These funds will be utilized to acquire solar electricity
19 for public entities such as schools, cities, counties, or state agencies.
- 20 6. Solar kWh may be banked, sold, or traded among ESPs to meet RPS requirements in the
21 current or future years.

22

⁴ The RPS uses a conversion factor of 1 kWh for each 3,415 BTU of heat produced by the solar water heater.

⁵ Other renewable electricity technologies are described as environmentally-friendly, and must be approved by the Commission after a hearing.

1 Threshold Questions

2 Q. Question 1A from the Procedural Order is “Should there be an Environmental Standard in
3 Arizona and why?” How do you respond?

4 A. Clearly, the answer is yes, there should be an “Environmental” Standard that encourages
5 the use of renewable resources because the benefits that result will far outweigh the monetary
6 costs. Virtually all of the benefits of the RPS inure to the people of Arizona directly or indirectly.
7 The RPS can aid in the state’s economic development in a number of ways, provide significant
8 benefits to the utility system itself, and provide assistance to low-income and rural Arizonans in
9 addition to the benefits to the environment.

10

11 As a point of clarification, the non-environmental benefits of the standard are so significant that
12 we urge it be officially named the *Renewable Portfolio Standard*, as in the docket heading. In
13 particular, we believe the growth in demand for off-grid renewable resources provides Arizona
14 with an opportunity to become the Silicon Valley of the solar industry through the operation of
15 the portfolio standard. Thus, I will refer to the standard as the *Renewable Portfolio Standard* or
16 RPS throughout this testimony.

17

18 Q. Please describe the economic development benefits to Arizona.

19 A. Anyone who visits Arizona is immediately struck by the state’s most prominent natural resource
20 – the sun. The RPS promotes development of technologies in Arizona that capture this abundant
21 resource. In addition, the growth in demand for off-grid renewable resources, especially in
22 developing countries, is so great that substantial new manufacturing facilities will be needed in
23 the near future. Two billion people around the world lack electric power, and many governments
24 around the world see electrification of rural areas using renewable resources as a means of
25 improving quality of life and reducing urban crowding. Indeed, three-fourths of the 20% annual
26 growth in solar electric resources is occurring in developing nations.

1
2 By creating local demand through the RPS, Arizona has an opportunity to increase its share of the
3 expanding global manufacturing capacity requirement. A solid and consistent portfolio standard
4 will provide solar electric developers and manufacturers of renewable technologies with the
5 assurance they need to commit resources to manufacturing and related operations. Such a policy
6 will bring jobs to Arizona in a clean industry.

7
8 Q. Please describe the benefits to the utility system.

9 A. The utility system within which renewable resources are strategically placed can capture cost and
10 risk benefits⁶ for both generation and the wires businesses. These benefits include resource
11 diversification and fuel cost risk management. For example, if fossil fuel costs rise in the future
12 or if environmental regulations are tightened, then solar power can potentially provide a cost
13 effective and attractive alternative. Other benefits to the electric supply system include
14 transmission and distribution cost reduction, reliability enhancement, and reduction in line losses.

15
16 Q. How does the RPS provide low-income assistance?

17 A. As discussed in more detail below in the implementation section, a properly implemented RPS
18 can provide lower cost electricity than would otherwise be available in off-grid applications, and
19 reach greater numbers of low-income peoples, such as Native Americans. In addition, developing
20 businesses that install renewable resources in rural areas can provide jobs where they are sorely
21 needed.⁷

22

⁶ See Hoff, Thomas, "Identifying Distributed Generation and Demand Side Management Investment Opportunities," Energy Journal 17(4): 89-105 (1996); and also Farmer, Hoff, and Wenger, "Measuring the Value of Distributed Photovoltaic Generation: Final Results of the Kerman Grid-Support Project," December, 1994.

⁷ For example, the Yavapai-Apache Nation believes the portfolio standard creates an opportunity for tribal economic development. In addition, a significant part of the mission of the Hopi Solar Electric Enterprise is to provide a method for Native societies to move towards greater self-sufficiency.

1 Q. Please describe the benefits to the environment of the RPS.

2 A. The type of resources that would generally qualify under the proposed RPS would produce
3 electricity at various times of day that will offset the burning of fossil fuels. From an
4 environmental perspective, encouraging the use of renewable resources will help reduce
5 emissions from traditional fossil fuel power plants. For example, a typical 2 kilowatt home-sized
6 photovoltaic system will produce about 4,400 kWh each year. This should reduce CO2 emissions
7 by about 4,400 pounds per year, SO2 emissions by about 175 pounds per year, and NOx
8 emissions by about 235 pounds per year. The full portfolio standard would increase these annual
9 reduction figures dramatically. Exhibit JFG-2 shows the calculation of emission offsets for the
10 RPS.

11

12 Q. Do you have any final comments on whether there should be a RPS in Arizona?

13 A. Yes. Clearly, other electric supply resources have been supported through public policy efforts,
14 most notably nuclear power. It is our belief that the people of Arizona desire to utilize more
15 environmentally benign resources, and thus far other methods for increasing the use of
16 renewables have fallen far short of goals.

17

18 Indeed, a recent Technical Report⁸ issued by the National Renewable Energy Laboratory studied
19 preferences on energy and environmental policy found Colorado homeowners follow national
20 trends in preferring renewable energy over conventional energy sources. Eighty-one percent of
21 homeowners are willing to pay a modestly higher electricity rate to have renewables included in
22 the fuel source mix. "Among renewables, PV and wind power are seen as the best sources for
23 meeting energy needs." This was the result in a state with considerably less of a solar resource
24 than Arizona.

25

1 As Arizona opens the electric supply industry to competitive forces, we fear that the open
2 electricity market - driven by the largest customers - will spiral down to the least expensive short-
3 run electricity resource. The RPS has the potential to provide a much needed boost to the
4 development and availability of renewable resources, to satisfy customer needs, and to reduce
5 resource costs.

6
7 Q. Question 1B posed by the Commission is "If so, what should be the objectives of an
8 Environmental Standard and who should bear the costs of the standard and how should these
9 costs be collected?" Question 2 is "Will the proposed new Portfolio Standard meet the desired
10 objectives or would you propose an alternative mechanism?" How do you respond to these
11 questions?

12 A. I will begin by outlining the appropriate objectives and whether the proposed RPS will meet
13 them. Then, I will address the cost-related parts of question 1B. In conjunction with the latter, I
14 will provide a more detailed description of our implementation proposal, which balances the
15 interests of the constituencies involved in this and the larger restructuring proceedings.

16
17 The Solar Portfolio Standard (SPS) Subcommittee to the Unbundling and Standard Offer
18 Working Group identified objectives in its work in 1997. We believe that these continue to be
19 appropriate objectives for the RPS at issue in this proceeding. Where the words "solar" or "solar
20 electric" appear, *renewable* may be substituted. The objectives are:

- 21 1. Encourage the use of solar electric technologies to increase the fuel diversity in the
22 electricity generation mix.
23
24 2. Increase utility and electric service provider expertise and experience in the
25 procurement, installation, and operation of solar electric systems or in the purchase
26 and transmission of solar electricity from other sources.
27

⁸ Farhar and Coburn, "Colorado Homeowner Preferences on energy and Environmental Policy," June, 1999.

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3. Encourage new solar electric technologies as a reasonable percentage of competitive retail electric sales that is significantly less than the annual growth of demand for electricity.
 4. Encourage the use of modest-sized, distributed solar generators to reduce the loading on existing transmission lines and also reduce the need to build new, expensive transmission lines as the demand for electricity increases in the future.
 5. Contribute to the commercialization of solar electric technologies, which will decrease the cost of solar electricity to Arizona customers in the future.
 6. Contribute to economic benefits throughout Arizona.
 7. Encourage environmental benefits.
 8. Encourage a market-based solar electric industry.
 9. Increase public information/awareness of solar electricity.
 10. Reach an acceptable cost/benefit point.
 11. Encourage solar resource development, rather than payment for non-compliance.

24 Q. Who participated in the SPS Subcommittee?

25 A. Representatives of the solar industry, incumbent utilities and new entrant electricity suppliers, the
26 Commission Staff, customer groups (including large industrial, residential, and low-income) the
27 non-profit environmental community, and municipalities all participated in the Subcommittee.

28
29 Q. Would you say that all parties agreed on the SPS as then framed, including the objectives?

30 A. I cannot represent that all parties agreed on the SPS and the objectives. However, the report of
31 the SPS Subcommittee incorporated all comments of parties without editing. In reviewing these
32 materials for this proceeding, I have not found comments of any party opposed to the objectives
33 stated above.

34

1 Q. Do you believe the RPS, as proposed by the Commission, meets the objectives of the SPS
2 Subcommittee?

3 A. Yes. The proposed RPS, including the modifications by Chairman Kunasek, does meet the
4 objectives of the Subcommittee.

5
6 Q. How do you respond to the aspect of question one that deals with who bears the costs of the
7 standard and how costs are to be collected?

8 A. The cost issue has been central to the debate over the RPS (and its predecessor – the SPS) since
9 the restructuring proceedings began. Indeed, one of the reasons the Commission removed the
10 Solar Portfolio Standard from the Rules in April of this year was the perception of its high costs.
11 Chairman Kunasek addressed the cost issue by proposing a task force during 2001 that will
12 develop an acceptable cost/benefit point for recommendation to the Commission by the end of
13 that year⁹. This is consistent with objective 10 above.

14
15 The cost of the RPS should be borne by those who benefit from the renewable resources that it
16 encourages. These benefits are broad and overlap various constituencies. These constituents
17 include direct renewable electricity customers, other electricity consumers, ESPs, UDCs, and the
18 people of Arizona. The challenge is in balancing the financial support of renewable resources
19 from these target groups.

20

⁹ The Commission would continue the annual increase in the portfolio percentage after December 31, 2002 only if the cost of solar electricity has declined to a Commission-approved cost/benefit point. The Director, Utilities Division shall establish, not later than January 1, 2001, a Solar Electricity Cost Evaluation Working Group to make recommendations to the Commission of an acceptable solar electricity cost/benefit point or solar kWh cost impact cap that the Commission could use as a criteria for the decision to continue the increase in the portfolio percentage. The recommendations of the Working Group shall be presented to the Commission not later than December 31, 2001.

1 Q. Please describe the benefits enjoyed by these groups, and the related financial support sought.

2 A. The most obvious beneficiaries of the RPS are the electricity consumers that receive the
3 electricity generated (or saved in the case of solar hot water) by the renewable resource. These
4 customers not only receive the value of the electricity itself, but also have the personal
5 satisfaction of helping the development of an environmentally sound technology. These
6 customers are typically willing to pay more for their service to an entity that is developing the
7 renewable resource. This entity may be a manufacturer, contractor, consultant, buying
8 cooperative, homeowners association, or aggregator. In some cases an individual customer may
9 be installing a private renewable resource for its own use. These entities that receive the
10 electricity commodity itself will pay a portion of the cost of the renewable resource directly.

11
12 Other electricity customers may be less focused on the environment, but still benefit from the
13 development of renewable technologies through enhanced system reliability and increased
14 economic activity and jobs. The people of Arizona in general will also receive the economic
15 development benefits.

16
17 We propose a relatively small wires charge to collect a flat amount of revenue per kWh from each
18 retail electric customer of every UDC under this Commission's jurisdiction (perhaps to include
19 SRP) to financially support renewable resources. This charge is not purely additive, but will
20 offset a portion of the System Benefits Charge to be implemented by the UDCs. Moreover, these
21 funds will be leveraged through a competitive bidding process that will capture the best cost
22 renewable resources, given the incentives in the RPS.

23
24 The UDCs will receive system benefits such as enhanced reliability, as well as reduced
25 transmission and distribution capital costs. The UDC may contribute funding in targeted areas
26 where distributed generation can capture these economic benefits.

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Finally, the ESPs also receive system benefits including enhanced reliability, reduction of losses, and diversification of fuel resources. Ultimately, the ESP is the responsible party that runs the risk of paying a penalty if it falls short of the standard enumerated in the RPS. Thus, the ESP should be sufficiently motivated to maximize the financial support from the sources noted above to minimize its exposure.

Q. What are the bases for your implementation proposal.

A. Our proposal is based upon the application of a small wires charge to all retail customers of each UDC to provide funding (partial or full) for the acquisition of renewable resource credits under the portfolio standard. The second important element is to incorporate a process that will leverage these funds to maximize the amount of renewable resource credits acquired for a given funding level.

Q. Why do you refer to the acquisition of credits, rather than the actual renewable resources themselves?

A. In order to maximize the leveraging of the funds available, the "credit" value in the RPS is segregated from the electricity and other values to the customer or developer. Thus, the credit can be sold separately into the RFP process, and that value captured. In addition, it can be banked, traded, and otherwise sold.

Q. Please describe your implementation proposal.

A. As each certificated ESP is responsible for fulfilling the requirements of the RPS, each ESP would have two options. The first option would be to utilize the wires charge revenue collected from the customers (including standard offer, if applicable) to whom it provides electricity service, to acquire sufficient renewable resource credits to meet the standard in whatever way it

1 deems appropriate. This is essentially implementing the RPS with some funding provided
2 through a wires charge. One potential disadvantage to this approach would be the overheads
3 involved in procuring sufficient renewable resources for small ESPs. These companies might
4 find it less expensive to simply pay the penalty – a consequence we seek to avoid.

5
6 Q. What is the second option?

7 A. The second option would be for ESPs to band together and utilize a third party to conduct a
8 competitive bidding process intended to maximize the value obtained with the “wires charge”
9 revenue collected from all UDC customers.

10
11 Q. Do you have a recommendation for this “third party?”

12 A. Yes. Our goal is to avoid creating a new bureaucracy to administer the competitive bidding
13 process. Indeed, we believe that would be counter-productive. We propose that the UDC
14 collecting the wires charge revenue is well situated to administer the process with a minimum of
15 additional cost. Indeed, the UDC will be conducting its own competitive procurement process for
16 generation resources (including renewable) to supply its standard offer service. ESPs could
17 participate in a UDC’s renewable resource procurement process under a formal contract, and
18 minimize the administrative burden for all parties. This could result in three to five relatively
19 large bidding processes that capture economies of scale while providing the necessary
20 competitive incentives to bidders.

21
22 Q. Can you provide an example of how your proposal might work in practice?

23 A. Yes. The process would work something like this:

24
25 *Step One:* The UDCs collect revenue at a flat rate/kWh on an ongoing basis. This revenue is
26 provided to the ESP from whose customers the funds were collected, or more likely, used to fund

1 the bidding process administered by the UDC. The UDC is also required to determine additional
2 value for implementation of distributed generation at specific locations on its system (based on
3 capital-avoidance and/or reliability considerations), and contribute at least half that value to the
4 bidding process. It then develops a formal Request for Proposal (RFP) package that it provides to
5 the Corporation Commission for its review and approval.

6
7 *Step Two:* A variety of renewable resource developers¹⁰ propose systems that meet the definition
8 of the RPS, and analyses are run to estimate costs and benefits based upon the RFP.

9
10 *Step Three:* The Commission-approved RFP process is performed. We anticipate the RFP
11 process will stimulate innovative proposals from widely diverse entities seeking to develop
12 renewable resources for themselves, for specific clients, or for merchant sales. These renewable
13 resource developers will submit bids into the RFP of various amounts of credits over varying time
14 frames, taking into consideration additional values such as UDC-contributed capital to encourage
15 distributed renewable resources in certain congested areas of its system. This process is
16 described in more detail in Exhibit JFG-3.

17
18 Q. Can you provide a numerical example of a sample developer's bid?

19 A. Yes. Without knowing actual costs, I'll make some simplifying assumptions. I'll assume that the
20 total initial cost for a 5 kW system that produces approximately 11,000 kWh annually is \$30,000.
21 If financed over 10 years at 10%, the annual cost is a little under \$5,000, resulting in a cost/kWh
22 of about 45¢. This solar electric developer's system is installed in Arizona and qualifies for all
23 multipliers. In the first year of the RPS, each kWh credit bid into the RFP is effectively worth 3

¹⁰ These developers could be a manufacturer, contractor, consultant, buying cooperative, homeowners association, aggregator, individual electricity consumer, or some other entity. The application could be on or off-grid.

1 kWh credits to the developer. Thus, the developer could cut its costs in half by bidding 7.5¢/kWh
2 into the RFP. A bid of 10¢/kWh, if accepted, cuts the developer's cost by 2/3.

3
4 Q. Do you believe that developers will actually make such bids into the RFP you propose?

5 A. Yes, I do. The reason is based upon experience with other technologies in other states. For
6 example, Public Service Company of Colorado ran a similar bidding program two years ago to
7 stimulate energy efficiency on its system. It targeted markets that it felt were potentially cost-
8 effective, but under-utilized, namely commercial lighting. The result was acquiring 5 MW of
9 peak demand reduction at a cost of \$162/kW. The most interesting point however, is that the
10 average bid only reduced the total cost to the energy service company (the "developer") by about
11 20%. Thus, considering the additional leveraging that's available in the Arizona RPS, I think it's
12 quite possible to get bids into the renewable resource RFP process as low as 5¢/kWh.

13
14 Q. Is there any evidence that a similar result would occur with renewable resources in Arizona?

15 A. Yes, there is some evidence. The use of renewable resources in niche markets is already
16 occurring in limited ways in Arizona. For example, the Hopi Solar Electric Enterprise,
17 NativeSUN,¹¹ established in 1985, advocates accelerating the commercialization of renewable
18 energy by Native American people. It has installed over three hundred solar electric systems at
19 traditional housing in the Hopi villages and at rural Navajo residences,¹² sponsored PV training
20 with Ecuadorian natives, and installed a demonstration project at the Pueblo of Zuni. A small
21 amount of seed capital obtained by selling its solar credits into the RFP, in combination with the
22 in-state incentives, can provide NativeSUN with significant opportunities for expansion and
23 replication on other Native American lands.

24

¹¹ NativeSUN is a project of the Hopi Foundation, a 501(c)3 nonprofit corporation.

1 Other off-grid renewable applications can be cost effective when considering the cost of line
2 extensions. In fact, this Commission's line extension policy requires utilities to conduct a
3 cost/benefit analysis to compare the cost of line extension with the cost of a stand alone PV
4 system. An ACC brochure entitled "The Solar Electric Option: Instead of Power Line Extension"
5 helps utilities and customers assess these options. APS offers a remote solar service that includes
6 all service and maintenance, and a financing package for the installation of PV systems for
7 remote customers.

8
9 Grid-connected rooftop PV for individual residences is gaining ground, particularly among
10 owners of higher-end homes. One company has installed over 40 rooftop PV systems this year in
11 Colorado. We expect that the market for such systems is larger in Arizona, given the greater
12 amount of the solar resource.

13
14 Other evidence includes APS' and SRP's modest success with their green-pricing programs.
15 These centralized PV projects were sold out faster than expected, indicating strong customer
16 interest in supporting solar resources.

17
18 Each of these developing markets can be significantly expanded with a relatively small amount of
19 financial support to enhance initial cost-effectiveness. As the markets grow and as costs are
20 reduced, we anticipate that the market for solar electric and other renewable resources will stand
21 on its own.

¹² For example, 18,000 homes in the Navajo Nation lack electricity

1 Q. Do you believe that 45¢/kWh represents the average cost of renewable resources that might be
2 developed as a result of the RPS and your procurement proposal?

3 A. No. I believe that the cost are likely to be lower than 45¢/kWh, given the mix of technologies
4 authorized by the RPS.

5
6 Section M of the RPS provides that up to 20% of the RPS requirement can be met with solar hot
7 water resources that offset the use of electricity, and specifies a BTU per kWh conversion for
8 such resources. It is anticipated that this is a lower cost resource than most straight solar electric
9 resources. Similarly, Section N provides that up to 10% of the RPS requirement can be satisfied
10 with "environmentally-friendly" renewable electricity technologies approved by the Commission
11 after a hearing. The cost of these resources is highly dependent on the technology, the type of
12 resource (wind, biomass, etc.). In both cases, the early installation and in-state incentive
13 multipliers apply. The upshot of these provisions is that a minimum of 70% of the RPS
14 requirement must be provided by solar electric resources.

15
16 From the RPS perspective however, it is not the actual cost that's important but the amount that is
17 bid into the RFP. Based on this limited analysis, it seems reasonable to believe that bids would
18 be submitted by developers in the 5 to 15 cent per kWh range.

19
20 Q. What does your estimated range of RFP bids translate to in terms of total dollars for the major
21 Arizona utilities?

22 A. First, its important to keep in mind that the costs of solar and other renewable resources have
23 been declining at about 15% per year and are expected to continue to decline. Thus, it is my view
24 that bid prices will follow suit, i.e. start out at the higher end of the range in the early years, and
25 decline to the lower end of the range in the middle to later years.

26

1 APS and TEP comprise about 90% of the ACC jurisdictional sales. Exhibit JFG-4 shows the cost
2 of the RPS to APS and TEP at bid prices of 5, 10, and 15 cents per kWh over the proposed term
3 of the standard.

4
5 Q. How would these cost be recovered from customers?

6 A. To differing extents, these costs are already being recovered from ratepayers. APS, for example,
7 funded its DSM and renewable programs at over \$8.5 million in 1998. This level of funding
8 would more than fund the projected RPS bidding process through 2003 at a 15¢/kWh bid price
9 and through the life of the program at 10¢/kWh and 5¢/kWh.

10
11 TEP on the other hand is collecting about \$3.3 million for DSM and renewable programs. This
12 amount of funding would support the RPS bid program through the same years for the various bid
13 prices calculated.

14
15 Q. What happens if the bids come in higher than expected?

16 A. The UDCs, ESPs, and customers are protected in this circumstance by the slow start to the RPS
17 and the review process. First, the initial two years of the RPS have relatively small renewable
18 requirements, and it's unlikely that the bids would be insufficient to achieve compliance. In
19 addition, the cost/benefit review of the RPS (Section B.2.) will occur well before the higher levels
20 of the standard are reached. This provides an opportunity to readjust the standard and/or the
21 bidding process, if necessary.

22
23 Q. What is your understanding of the willingness of these companies to utilize funds presently being
24 collected for DSM and renewable programs for support of the RPS?

25 A. My understanding is that APS is phasing its DSM programs out and might be willing to reassign
26 these funds to support the RPS. TEP, however, is committed to maintaining its cost-effective

1 DSM programs and thus is less willing to shift funds. As a result, it is more likely that there will
2 be a small cost impact on TEP customers.

3
4 Q. Does your proposal require a wires charge to work?

5 A. No. It does not require a wires charge. The description of the bidding process is intended to
6 illustrate the power of leveraging combined with the incentive multipliers in the proposed RPS.
7 However, I believe that funding from some source of this order of magnitude is necessary to
8 achieve the requirements of the RPS.

9
10 Q. What changes are required to the RPS to incorporate a competitive bidding process?

11 A. I recommend that a new section B.3. be added to R14-2-1609 that reads as follows:

12 Each UDC is authorized to collect from its customers 0.05¢/kWh for the life of this standard for
13 the purpose of funding a competitive bidding process to acquire the renewable resources required
14 by this standard. Funding from existing rates or through existing mechanisms (System Benefits
15 Charges) may be reassigned for this purpose with Commission approval.
16

17
18 RPS Procedural Order Implementation Questions

19 Q. You noted above that questions five and seven dealt with implementation issues. Will you now
20 respond directly to those questions?

21 A. Yes.

22 5A. Should the Standard be imposed only on sales in the competitive market?

23 Yes. The standard should be imposed on all sales in the competitive market, which includes
24 standard offer sales. Beginning in 2001, the electricity supply for standard offer service will be
25 obtained through competitive bidding. As described above, the renewable resource requirement
26 can be obtained in the same fashion.

1 If standard offer sales were to be excluded from application of the RPS, it would not only
2 significantly reduce the amount of funding available, it would dramatically cut the benefits of the
3 standard to all Arizonans. In fact, any benefits that Arizonans did obtain as a result of the greatly
4 reduced standard would be unfairly shared with those who contributed nothing to its funding.

5 5B. Instead of implementing a Standard as part of the Retail Electric Competition Rules, should
6 the market (the retail consumers themselves) dictate the amount of "green" power to include
7 in competitive energy choices? Should the Commission encourage Energy Service Providers
8 to offer programs, instead of mandating rigid targets, allowing the market for such products
9 to develop naturally?

10 No. Although there has been limited success with the implementation of "green power" programs
11 in some jurisdictions, the sole reliance on such a mechanism in Arizona would be inappropriate.
12 Given Arizona's indigenous solar potential, it is appropriate and necessary to provide market
13 stimulation for the commercialization of solar technology in Arizona. The solar market in
14 Arizona is currently in that "dead zone" between R&D and fully viable commercial market where
15 some outside "jump-start" is required to push it into a competitive position.

16
17 The institution of a RPS together with a small charge to fund the necessary infrastructure to
18 effectively implement the RFP will provide that "push" at a minimal cost to ratepayers. At the
19 same time the implementation of a RPS in this manner will provide all members of the Arizona
20 community with greater benefits from the sales and installation of in-state solar technology than
21 would a "green power" program.

22
23
24 5C. Would it be appropriate to include recovery of costs of renewable systems in a systems
25 benefits charge rather than the general cost/rate structure?
26

27 As described in detail above, we believe it is appropriate to provide funding for the RPS partially
28 through a systems benefit-type charge. With proper leveraging, this charge can minimize

1 adverse customer impacts. However, to encourage an orderly development of renewable
2 resources in Arizona, it's important that the mechanism have specific kWh targets, and penalties
3 for failing to meet them. This is the best way to provide proper motivation to ESPs to take the
4 standard seriously and help to drive the market.

5
6 7. Should the proposed standard or any alternative that you are proposing apply to Standard
7 Offer Customers in 2001? If yes, should the standard or alternative as applied to Standard Offer
8 be energy driven (kWh) or dollar driven to limit or cap the impact on Standard Offer Customers?
9 What would the impact be on an average residential and commercial customer's monthly bill?
10 (Please state assumptions, including technology costs.) What mechanisms should the
11 Commission put in place to recover the costs from Standard Offer Customers?

12 Yes, the proposed standard should apply to Standard Offer Customers in 2001. As noted above,
13 the standard must have teeth in it in the form of penalties for non-compliance. Renewable
14 resource "goals" in the 1993 IRP without a penalty for non-compliance provided little results.

15
16 I believe that the implementation proposal described above will provide adequate funding for the
17 UDCs to administer a competitive bidding process that will acquire sufficient renewable
18 resources to comply with the RPS. The impacts of our wires charge proposal are small. We
19 believe this "wires charge" effectively acts as a cap and is sufficient protection for customers.
20 Moreover, we don't believe any mechanism is necessary beyond the wires charge to recover the
21 costs from Standard Offer Customers.

22
23 If the Commission feels more protection for customers is warranted, we recommend that a
24 review of the effectiveness of the procurement processes be undertaken in 2003 or 2004. At that
25 time there should be sufficient experience with competitive bidding and alternative methods that
26 would allow for effective refinements of the system.

1 Other Relevant Information: Precedent for the RPS and Funding Mechanism

2 Q. Is there any precedent for using a wires charge approach to fund important public policies at the
3 Corporation Commission?

4 A. Yes. On June 23, 1995, the Corporation Commission issued Decision No. 59124 approving new
5 rules for competitive telecommunications services. These require the establishment of a
6 Universal Service Fund (USF) to assure the continued availability of basic telephone service at
7 reasonable rates. The USF was later expanded to provide public schools, certain non-profit
8 private schools, and libraries discounts on services such as telecomm, internet access, software,
9 and local area networking.

10
11 Thus, the concept of an across-the-board charge for funding beneficial public policy has been
12 adopted and is currently in use in the competitive telecommunications business. Indeed, the USF
13 was proposed as such a vehicle due to concerns about the impact of competition in the phone
14 industry on less-profitable services. Renewable resources in the competitive electric utility
15 industry face a similar "less-profitable" status that merits financial support for a period of time.
16 The funding mechanism proposed herein provides that support with a minimal impact on
17 customers.

18
19 Q. Are there similar renewable portfolio standards in other southwestern states?

20 A. Yes. Nevada and Texas have forms of a renewable portfolio standard.

21
22 Q. Please describe Nevada's RPS.

23 A. The Nevada State Legislature enacted Assembly Bill 366 in 1997¹³ that, among other things,
24 ordered the Nevada Public Utilities Commission to establish portfolio standards for domestic

¹³ The Nevada Legislature adopted certain amendments to AB366 during the most recent session however these did not affect the portfolio standard provisions.

1 energy. The portfolio standards must start at 0.2% of the total amount of electricity consumed
2 annually in Nevada, and increase by 0.2% every two years until 1.0% is reached. The portfolio
3 standard must be derived from at least 50% solar renewable energy systems (including solar
4 thermal water heating). A credit trading system was also included in the legislation.

5
6 Q. What is the current status of the Nevada Portfolio Standard?

7 A. The Nevada Public Utilities Commission has opened a docket to fulfill the legislative mandate,
8 and has taken written comments on its procedural order. We are presently awaiting action by the
9 Nevada Commission.

10
11 Q. Please describe Texas' RPS.

12 A. Earlier this year, the Texas Legislature enacted Senate Bill No. 7, an act related to electric utility
13 restructuring and the powers and duties of the Public Utility Commission of Texas. Section
14 39.604 of this act established minimum capacity requirements from renewable resources. The
15 standard is as follows:

16 (a) Each retail electric provider, municipally owned utility, and electric cooperative
17 operating in the state shall obtain a minimum of 1.65 percent of its annual capacity
18 requirements from renewable energy technologies by January 1, 2003, 2.15 percent of its
19 annual capacity requirements from renewable energy technologies by January 1, 2005,
20 2.75 percent of its annual capacity requirements from renewable energy technologies by
21 January 1, 2007, and 3 percent of its annual capacity requirements from renewable
22 energy technologies by January 1, 2009.
23

24 Q. How does this section of the act define renewable resources?

25 A. In this section, "renewable energy technology" means any technology that exclusively relies on
26 an energy source that is naturally regenerated over a short time and derived directly from the sun,
27 indirectly from the sun, or from moving water or other natural movements and mechanisms of the
28 environment. Renewable energy technologies include, but are not restricted to, those that rely on
29 energy derived directly from the sun; on wind, geothermal, hydroelectric, wave, or tidal energy;

1 or on biomass or biomass-based waste products. A renewable energy technology does not rely on
2 energy resources derived from fossil fuels, waste products from fossil fuels, or waste products
3 from inorganic sources.

4
5 Q. Are there other provisions of this section that are relevant to this proceeding?

6 A. Yes. The legislation required the Texas PUC to establish a renewable energy credits trading
7 program. This trading program requires retail electric providers, municipally owned utilities, or
8 electric cooperatives that fail to achieve the portfolio requirements must purchase sufficient
9 renewable energy credits to satisfy those requirements.

10
11 While the Texas PUC has not yet acted on this trading program, clearly it combines elements of
12 the Arizona renewable credit banking and trading system with the penalty provision.

13
14 Q. Are you aware of any other information from Texas that is relevant to this proceeding?

15 A. Yes. In 1996, three Texas utility operating companies (all subsidiaries of Central and South
16 West) conducted town meetings to gain insight into the values of customers, as part of the
17 Integrated Resource Planning (IRP) process in that state. When asked which of four resource
18 options should be pursued first and second, the results were as follows:

First / Second Choice As % of Total	Central Power and Light	West Texas Utilities	Southwestern Electric Power Company
Reduce the need for additional generation (e.g. energy efficiency)	46 / 22	31 / 24	50 / 25
Build fossil fuel facilities	29 / 26	16 / 21	13 / 21
Build solar or wind facilities	16 / 38	35 / 30	28 / 29
Buy wholesale power and import	8 / 13	18 / 24	6 / 21

19
20 When asked how much more customers would be willing to pay on their monthly electric bill for
21 renewables, the results were as follows:

Willingness to Pay More for Renewable Resources	Central Power and Light	West Texas Utilities	Southwestern Electric Power Company
Mean / Median	\$5.56 / \$4.00	\$7.85 / \$5.00	\$6.44 / \$5.00
Unwilling to pay anything more	18%	11%	16%
Willing to pay \$1-\$5 more	50%	45%	53%
Willing to pay \$6-\$10 more	18%	25%	19%
Willing to pay more than \$10	8%	17%	11%

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RPS Procedural Order Component Questions

Q. You noted that a number of the questions from the Procedural Order address components of the RPS.¹⁴ Please identify those questions to which you were referring.

A. Question numbers 2, 3, and 6 from the Procedural Order fit the described category:

Q. How do you respond to question two?

A. Question two reads as follows:

2. Are you supportive of the proposed Portfolio Standard and, if not, describe any modifications that you would make to the proposed Portfolio Standard (including response to 6 below) or describe your company's proposed alternative mechanism.

We are supportive of the proposed Portfolio Standard and would recommend only one change at this time, related to our proposed procurement plan and funding mechanism. However, should the first several years of experience with the RPS not result in the objectives being met, we would recommend modifications at that time as a result of an open inquiry. Our recommended change to the RPS language is as follows:

New Section B.3.

Each UDC is authorized to collect from its customers 0.05¢/kWh for the life of this standard for the purpose of funding a competitive bidding process to acquire the renewable resources required by this standard. Funding from existing rates or through existing mechanisms (System Benefits Charges) may be reassigned for this purpose with Commission approval.

1 Q. How do you respond to question three?

2 A. Question three reads as follows:

3 3. If you are proposing an alternative to the proposed Standard, include a detailed description of:
4 1) technologies to be included, 2) timing, 3) any incentives, 4) cost projection of the
5 alternative over the life of the alternative, 5) impact on customer rates, 6) all major
6 assumptions for the proposed alternative.

7 We are not proposing an alternative to the proposed Standard, other than a procurement process
8 outlined above that will minimize costs and rate impacts.

9
10 Q. Question six asks parties to comment on certain aspects of the proposed new Portfolio Standard.
11 How do you respond to question six, part (a)?

12 A. Question 6a reads as follows:

13 6a. New section N allows for "environmentally friendly renewable electricity technologies"
14 other than solar. Which technologies should be included in this subsection? Would those
15 technologies be available in Arizona or work in Arizona?

16 Other technologies should include at least wind and geothermal resources, although I'm not
17 aware of good resources for these technologies in Arizona. The Commission may also want to
18 consider other resources like biomass (e.g. landfill gas) after review through a hearing or other
19 formal process.

20
21 Q. How do you respond to question six, part (b)?

22 A. Question 6b reads as follows:

23 6b. In subsections A and B of the proposed Portfolio Standard, a schedule of portfolio
24 percentages is defined. Is the size of portfolio percentage and timing of increases a
25 reasonable strategy to be included in the competition rules? What alternatives would you
26 propose and why?

27 We believe the magnitude of the portfolio percentages and the timing of increases is a reasonable
28 strategy to be included in the competition rules. It's a relatively small percentage of the growth in

¹⁴ The Procedural Order refers to Commissioner Kunasek's Solar and Environmentally-Friendly Portfolio Standard as the "new" or "proposed" Portfolio Standard in its questions. This is the same RPS provided as Exhibit JFG-1.

1 electricity sales in Arizona, but large enough to capture other important economic benefits. The
2 important element is a sustained ramp-up to reach the 1% target within a reasonable time frame.
3 The ramp-up could be structured many different ways, but the proposal is reasonable.
4

5 Q. Have you made an estimate of the amount of renewable generation that would be required to
6 satisfy the RPS?

7 A. Yes, I have. My estimate begins with the following 1998 retail electric sales:

Utility	1998 MWh Sales
Arizona Public Service Company	20,463,083
Tucson Electric Power Company	7,630,485
Arizona Electric Power Cooperative	1,830,658
Citizens Utilities	1,077,973
Navopache	297,895
Subtotal excluding SRP	31,300,094
Salt River Project	19,948,229
Total including SRP	51,248,323

8
9 I have assumed a 3% average growth rate for retail electric sales in Arizona. Combined with the
10 phase-in of competition and the RPS percentages, the resulting electricity to be derived from
11 renewable resources for the term of the RPS is shown in Exhibit JFG-5. This exhibit shows the
12 electricity in terms of capacity and energy to be derived under the RPS with and without SRP.
13

14 I would not propose any alternatives at this time to the RPS because I believe the renewable kWh
15 requirement resulting from the RPS can be achieved with almost no impact on retail customers.
16

17 Q. How do you respond to question six, part (c)?

18 A. Question 6c reads as follows:

19 6c. The proposed Portfolio Standard includes incentives for in-state manufacturing and in-
20 state installation of solar and other environmentally friendly technologies. Are those
21 incentives appropriate and substantial enough to have a positive impact on Arizona's
22 economy and on Arizona economic development? What alternatives would you propose and
23 why?

1 The incentives included in the RPS resulted primarily from the work of the Solar Portfolio
2 Standard Subcommittee to the Unbundling and Standard Offer Working Group. These are about
3 as close as we can get to a consensus view on appropriate incentives and should not be modified.
4

5 Q. How do you respond to question six, part (d)?

6 A. Question 6d reads as follows

7 6d. What long-term benefits will the proposed Portfolio Standard have on the state of Arizona
8 and its residents? Specific items to be addressed include job creation, maintenance of energy
9 dollars in the local economy, load diversification, and pollution prevention.

10 The benefits to the state and its residents are outlined near the beginning of this testimony.
11

12 Q. How do you respond to question six, part (e)?

13 A. Question 6e reads as follows

14 6e. What would the impact be on an average competitive (residential and commercial)
15 customer's monthly bill (assume 1000kWh/month usage for residential) of the proposed
16 Portfolio Standard? (Please state assumptions, including technology costs.)

17 As a result of the proposed bidding process outlined above, the impact of the RPS is not affected
18 by technology costs. Based on our proposal of 0.5 mills/kWh, the cost per residential customer is
19 effectively capped at 50¢. For commercial customers, the effective cap would be under \$2.00.¹⁵

20 The real impact on the average customer will likely vary from nothing for APS customers to a
21 small number for TEP, depending on the amount of offset of its System Benefits Charge.

22 Experience in an actual bid process will pin actual impacts down much more tightly. Indeed, the
23 process may result in a need to reduce the wires charge in the future.
24

25 Q. How do you respond to question six, part (f)?

26 A. Question 6f reads as follows:

¹⁵ Based upon TEP's average commercial customer usage of 47,000 kWh/year.

1 6f. Section 1609.B.2 provides for determination of a cost/benefit point in 2001 prior to an
2 increase in the percentage in 2002. Is it appropriate to determine the cost/benefits point
3 during this proceeding (and the corresponding impact on customers) or in 2001? Should the
4 Commission cap the impact that the Portfolio Standard may have on customers?

5 I don't believe we have sufficient information at this time to determine an appropriate cost/benefit
6 point. Indeed, I'm not sure we'll have enough experience in the competitive market by 2001 to
7 make an effective determination. We need to go through several cycles of bidding to better
8 understand not only the costs, but also the economic benefits to Arizona. Moreover, we need to
9 identify the cost and benefit trends, requiring more than one or two data points. However, I do
10 believe it may be possible to complete three cycles between now and the end of 2001, so I am not
11 recommending any changes to the rule in this area.

12
13 Q. How do you respond to question six, part (g)?

14 A. Question 6g reads as follows:

15 6g. Section 1609.I of the proposed Portfolio Standard allows for the "banking" or sale of
16 excess solar kWh. This could create a trading program similar to the EPA's sulfur dioxide
17 trading program. Do you have any suggestions about creating a credit trading or banking
18 program?

19 The credit trading and banking program is a very important element of the rule, as it allows for
20 matching solar resources with RPS requirements related to competitive (and standard offer) sales
21 without the necessity of purchasing hardware each step along the way. Indeed, it is the very basis
22 for the bidding process. The only suggestions we offer at this time is to keep it as simple as
23 possible, implement the system electronically, and have either the Commission itself or perhaps
24 the Department of Commerce Energy Office act as administrator of the credit clearinghouse.

25
26 Q. How do you respond to question six, part (h)?

27 A. Question 6h reads as follows:

1 6h. Section 1609.F provides for penalties if ESPs fail to meet the proposed Portfolio
2 Standard. Are there additional provisions needed to require ESPs to issue RFPs or negotiate
3 contracts in a timely fashion rather than merely paying the penalty?

4 I believe our implementation proposal, and new section B.3. adequately addresses this question.
5
6

7 Conclusion and Recommendation

8 Q. What are your final comments?

9 A. This Commission has worked very hard over the last four years to strike balances among the
10 many constituencies represented in these proceedings on issues ranging from stranded costs
11 (representing potentially enormous transfers of wealth) to information disclosure (enormously
12 important transfers of information). The Commission should strike a similar balance in this
13 proceeding among customers, suppliers, developers, and the environment. Each constituent
14 stands to receive a benefit and incur a cost related to the RPS. We believe the Renewable
15 Portfolio Standard proposed by the Commission, along with the RFP process and associated
16 wires or System Benefits Charge funding vehicle, strikes an appropriate balance among these
17 constituencies.
18

19 Q. What is your recommendation to this Commission?

20 A. I recommend the Commission adopt the Renewable Portfolio Standard and the following new
21 Section B.3.:

22 Each UDC is authorized to collect from its customers 0.05¢/kWh for the life of this standard for
23 the purpose of funding a competitive bidding process to acquire the renewable resources required
24 by this standard. Funding from existing rates or through existing mechanisms (System Benefits
25 Charges) may be reassigned for this purpose with Commission approval.
26

27 Q. Does this conclude your testimony?

28 A. Yes. It does.
29

Appendix A

James F. (Rick) Gilliam
Senior Technical Advisor
Land and Water Fund of the Rockies

Professional Employment

- Dec 1994 to Present: Senior Technical Advisor, Land and Water Fund of the Rockies, Boulder, Colorado. Promote renewable resources and energy efficiency in a variety of forums including state and federal regulatory proceedings, regional air quality bodies, municipal agencies, and other electric energy stakeholder and interest groups. In addition, promote air quality related values, such as emission control of fossil fuel fired plants.
- Jan 1983 to Dec 1994 Director of Revenue Requirements, Public Service Company of Colorado, Denver, Colorado. Primary responsibility for development of formal rate-related filings for this investor-owned utility for three utility services with two state and one federal regulatory body. As part of this work, developed and responded to a variety of proposed mechanisms to encourage the use of energy efficiency technologies.
- Dec 1976 to Dec 1982 Technical Witness (Engineer), Federal Energy Regulatory Commission, Washington, D.C. Testified as expert witness on behalf of the FERC in wholesale rate filings on technical, accounting, and economic issues.

Education

- August 1998 Masters, Environmental Policy and Management
University of Denver
Denver, Colorado
- December 1975 Bachelor of Science, Electrical Engineering
Rensselaer Polytechnic Institute
Troy, New York

Publications

(contributor), "How the West Can Win: A Blueprint for a Clean & Affordable Energy Future," 1996.

Blank, Gilliam, and Wellinghof, "Breaking Up Is Not So Hard To Do: A Disaggregation Proposal," The Electricity Journal, May 1996.

James F. (Rick) Gilliam

Summary of Testimonies

Representing the Land and Water Fund of the Rockies

- Public Service Company of Colorado Docket No. 98A-511E: Air Quality Improvement Rider
- Arizona Restructuring Rulemaking Docket No. 94-165: Stranded Cost Proceeding
- Nevada Power Company Docket No. 94-7001 (Refiled) – Integrated Resource Plan Proceeding
- Public Service Company of Colorado Docket No. 95A-531EG – Merger Proceeding

Representing Public Service Company of Colorado

- PSCo Rate Revenue Requirements Proceeding Docket No. 93S-001EG
- PSCo Demand-side Management & Decoupling Proceeding Docket No. 91A-480EG
- PSCo Incentive Regulation Investigation Docket No. 93I-199EG
- PSCo Rate Proceeding Docket No. 91S-091EG
- PSCo Fort St. Vrain Supplemental Settlement Agreement Docket No. 91A-281E
- Various PSCo FERC rate proceedings, and subsidiary rate proceedings

Representing the Staff of the Federal Energy Regulatory Commission

- Connecticut Light & Power Company, Docket ER82-301
- Kentucky Utilities Company, Docket ER81-341
- Philadelphia Electric Company, Docket ER 80-557, et al.
- Minnesota Power & Light Company, Docket ER80-5
- Boston Edison Company, Docket ER79-216, et al.
- Connecticut Light & Power Company, Docket ER78-517
- Minnesota Power & Light Company, Docket ER78-245
- South Carolina Electric & Gas Company, Docket ER78-283
- New England Power Company, Docket ER78-78
- New England Power Company, Docket ER77-97

**TITLE 14. PUBLIC SERVICE CORPORATIONS; CORPORATIONS AND
ASSOCIATIONS; SECURITIES REGULATION**

CHAPTER 2. CORPORATION COMMISSION – FIXED UTILITIES

ARTICLE 16. RETAIL ELECTRIC COMPETITION

**(As adopted in Decision No. 61272, December 11, 1998, and modified by the
language from Attachment No. 1 of the June 16, 1999 Procedural Order.)**

R14-2-1609. Solar and Environmentally-Friendly Portfolio Standard

A. Starting on January 1, 1999, any Electric Service Provider selling electricity or aggregating customers for the purpose of selling electricity under the provisions of this Article must derive at least .2% of the total retail energy sold competitively from new solar energy resources, whether that solar energy is purchased or generated by the seller. Solar resources include photovoltaic resources and solar thermal resources that generate electricity. New solar resources are those installed on or after January 1, 1997.

B. The portfolio percentage shall increase after December 31, 2000.

1. Starting January 1, 2001, the portfolio percentage shall increase annually and shall be set according to the following schedule:

YEAR	PORTFOLIO PERCENTAGE
2001	.4%
2002	.5%
2003	.6%
2004	.8%
2005-2012	1.0%

2. The Commission would continue the annual increase in the portfolio percentage after December 31, 2002 only if the cost of solar electricity has declined to a Commission-approved cost/benefit point. The Director, Utilities Division shall establish, not later than January 1, 2001, a Solar Electricity Cost Evaluation Working Group to make recommendations to the Commission of an acceptable solar electricity cost/benefit point or solar kWh cost impact cap that the Commission could use as a criteria for the decision to continue the increase in the portfolio percentage. The recommendations of the Working Group shall be presented to the Commission not later than December 31, 2001.

- C. The solar portfolio requirement shall only apply to competitive retail electricity in the years 1999 and 2000 and shall apply to all retail electricity in the years 2001 and thereafter.
- D. Electric Service Providers shall be eligible for a number of extra credit multipliers that may be used to meet the solar portfolio standard requirements:

- 1. Early Installation Extra Credit Multiplier: For new solar electric systems installed and operating prior to December 31, 2003, Electric Service Providers would qualify for multiple extra credits for kWh produced for 5 years following operational start-up of the solar electric system. The 5-year extra credit would vary depending upon the year in which the system started up, as follows:

YEAR	EXTRA CREDIT MULTIPLIER
1997	.5
1998	.5
1999	.5
2000	.4
2001	.3
2002	.2
2003	.1

The Early Installation Extra Credit Multiplier would end in 2003.

- 2. Solar Economic Development Extra Credit Multipliers: There are 2 equal parts to this multiplier, an in-state installation credit and an in-state content multiplier.
 - a. In-State Power Plant Installation Extra Credit Multiplier: Solar electric power plants installed in Arizona shall receive a .5 extra credit multiplier.
 - b. In-State Manufacturing and Installation Content Extra Credit Multiplier: Solar electric power plants shall receive up to a .5 extra credit multiplier related to the manufacturing and installation content that comes from Arizona. The percentage of Arizona content of the total installed plant cost shall be multiplied by .5 to determine the appropriate extra credit multiplier. So, for instance, if a solar installation included 80% Arizona content, the resulting extra credit multiplier would be .4 (which is $.8 \times .5$).
- 3. Distributed Solar Electric Generator and Solar Incentive Program Extra Credit Multiplier: Any distributed solar electric generator that meets more than one of the eligibility conditions will be limited to only one .5 extra credit multiplier from this subsection. Appropriate meters will be attached to each solar electric generator and read at least once annually to verify solar performance.

- a. Solar electric generators installed at or on the customer premises in Arizona. Eligible customer premises locations will include both grid-connected and remote, non-grid-connected locations. In order for Electric Service Providers to claim an extra credit multiplier, the Electric Service Provider must have contributed at least 10% of the total installed cost or have financed at least 80% of the total installed cost.
 - b. Solar electric generators located in Arizona that are included in any Electric Service Provider's Green Pricing program.
 - c. Solar electric generators located in Arizona that are included in any Electric Service Provider's Net Metering or Net Billing program.
 - d. Solar electric generators located in Arizona that are included in any Electric Service Provider's solar leasing program.
 - e. All Green Pricing, Net Metering, Net Billing, and Solar Leasing programs must have been reviewed and approved by the Director, Utilities Division in order for the Electric Service Provider to accrue extra credit multipliers from this subsection.
4. All multipliers are additive, allowing a maximum combined extra credit multiplier of 2.0 in years 1997-2003, for equipment installed and manufactured in Arizona and either installed at customer premises or participating in approved solar incentive programs. So, if an Electric Service Provider qualifies for a 2.0 extra credit multiplier and it produces 1 solar kWh, the Electric Service Provider would get credit for 3 solar kWh (1 produced plus 2 extra credit).
- E.** Electric Service Providers selling electricity under the provisions of this Article shall provide reports on sales and solar power as required in this Article, clearly demonstrating the output of solar resources, the installation date of solar resources, and the transmission of energy from those solar resources to Arizona consumers. The Commission may conduct necessary monitoring to ensure the accuracy of these data.
- F.** If an Electric Service Provider selling electricity under the provisions of this Article fails to meet the requirement in R14-2-1609(A) or (B) in any year, the Commission shall impose a penalty on that Electric Service Provider that the Electric Service Provider pay an amount equal to 30¢ per kWh to the Solar Electric Fund for deficiencies in the provision of solar electricity. This Solar Electric Fund will be established and utilized to purchase solar electric generators or solar electricity in the following calendar year for the use by public entities in Arizona such as schools, cities, counties, or state agencies. Title to any equipment purchased by the Solar Electric Fund

will be transferred to the public entity. In addition, if the provision of solar energy is consistently deficient, the Commission may void an Electric Service Provider's contracts negotiated under this Article.

1. The Director, Utilities Division shall establish a Solar Electric Fund in 1999 to receive deficiency payments and finance solar electricity projects.
 2. The Director, Utilities Division shall select an independent administrator for the selection of projects to be financed by the Solar Electric Fund. A portion of the Solar Electric Fund shall be used for administration of the Fund and a designated portion of the Fund will be set aside for ongoing operation and maintenance of projects financed by the Fund.
- G.** Photovoltaic or solar thermal electric resources that are located on the consumer's premises shall count toward the solar portfolio standard applicable to the current Electric Service Provider serving that consumer.
- H.** Any solar electric generators installed by an Affected Utility to meet the solar portfolio standard shall be counted toward meeting renewable resource goals for Affected Utilities established in Decision No. 58643.
- I.** Any Electric Service Provider or independent solar electric generator that produces or purchases any solar kWh in excess of its annual portfolio requirements may save or bank those excess solar kWh for use or sale in future years. Any eligible solar kWh produced subject to this rule may be sold or traded to any Electric Service Provider that is subject to this rule. Appropriate documentation, subject to Commission review, shall be given to the purchasing entity and shall be referenced in the reports of the Electric Service Provider that is using the purchased kWh to meet its portfolio requirements.
- J.** Solar portfolio standard requirements shall be calculated on an annual basis, based upon electricity sold during the calendar year.
- K.** An Electric Service Provider shall be entitled to receive a partial credit against the solar portfolio requirement if the Electric Service Provider or its affiliate owns or makes a significant investment in any solar electric manufacturing plant that is located in Arizona. The credit will be equal to the amount of the nameplate capacity of the solar electric generators produced in Arizona and sold in a calendar year times 2,190 hours (approximating a 25% capacity factor).
1. The credit against the portfolio requirement shall be limited to the following percentages of the total portfolio requirement:

1999	Maximum of 50 % of the portfolio requirement
2000	Maximum of 50 % of the portfolio requirement
2001	Maximum of 25 % of the portfolio requirement

2002 Maximum of 25 % of the portfolio requirement

2003 and on Maximum of 20 % of the portfolio requirement

2. No extra credit multipliers will be allowed for this credit. In order to avoid double-counting of the same equipment, solar electric generators that are used by other Electric Service Providers to meet their Arizona solar portfolio requirements will not be allowable for credits under this Section for the manufacturer/Electric Service Provider to meet its portfolio requirements.
- L.** The Director, Utilities Division shall develop appropriate safety, durability, reliability, and performance standards necessary for solar generating equipment to qualify for the solar portfolio standard. Standards requirements will apply only to facilities constructed or acquired after the standards are publicly issued.
- M.** An Electric Service Provider shall be entitled to meet up to 20% of the portfolio requirement with solar water heating systems purchased by the Electric Service Provider for use by its customers, or purchased by its customers and paid for by the Electric Service Provider through bill credits or other similar mechanisms. The solar water heaters must replace or supplement the use of electric water heaters for residential, commercial, or industrial water heating purposes. For the purposes of this rule, solar water heaters will be credited with 1 kWh of electricity produced for each 3,415 British Thermal Units of heat produced by the solar water heater. Solar water heating systems shall be eligible for Early Installation Extra Credit Multipliers as defined in R14-2-1609 D.1 and Solar Economic Development Extra Credit Multipliers as defined in R14-2-1609 D.2.
- N.** An Electric Service Provider shall be entitled to meet up to 10% of the portfolio requirement with electricity produced by environmentally-friendly renewable electricity technologies approved by the Commission after a hearing. Systems using such technologies shall be eligible for Early Installation Extra Credit Multipliers as defined in R14-2-1609 D.1 and Solar Economic Development Extra Credit Multipliers as defined in R14-2-1609 D.2.

**ARIZONA RENEWABLE PORTFOLIO STANDARD
ESTIMATED RPS EMISSION OFFSETS**

**DOCKET NO. 99-0205
EXHIBIT JFG-2**

Year	Max RPS MWh	Reduction in pounds/year*			Min RPS MWh	Reduction in pounds/year*		
		CO2	SO2	NOx		CO2	SO2	NOx
1999	12,896	12,896	507	691	4,299	4,299	169	230
2000	13,283	13,283	522	712	4,580	4,580	180	245
2001	136,810	136,810	5,375	7,329	48,861	48,861	1,920	2,618
2002	176,143	176,143	6,920	9,436	65,238	65,238	2,563	3,495
2003	217,712	217,712	8,553	11,663	83,736	83,736	3,290	4,486
2004	298,992	298,992	11,746	16,017	119,597	119,597	4,698	6,407
2005	384,952	384,952	15,123	20,622	153,981	153,981	6,049	8,249
2006	396,500	396,500	15,577	21,241	158,600	158,600	6,231	8,496
2007	408,395	408,395	16,044	21,878	163,358	163,358	6,418	8,751
2008	420,647	420,647	16,525	22,535	168,259	168,259	6,610	9,014
2009	433,267	433,267	17,021	23,211	173,307	173,307	6,808	9,284
2010	446,265	446,265	17,532	23,907	178,506	178,506	7,013	9,563
2011	459,652	459,652	18,058	24,624	183,861	183,861	7,223	9,850
2012	473,442	473,442	18,600	25,363	189,377	189,377	7,440	10,145
Total		4,278,954	168,102	229,230		1,695,557	66,611	90,833
Including Salt River Project								
1999	21,114	21,114	829	1,131	7,038	7,038	276	377
2000	21,748	21,748	854	1,165	7,499	7,499	295	402
2001	224,002	224,002	8,800	12,000	80,001	80,001	3,143	4,286
2002	288,402	288,402	11,330	15,450	106,816	106,816	4,196	5,722
2003	356,465	356,465	14,004	19,096	137,102	137,102	5,386	7,345
2004	489,545	489,545	19,232	26,226	195,818	195,818	7,693	10,490
2005	630,290	630,290	24,761	33,766	252,116	252,116	9,905	13,506
2006	649,198	649,198	25,504	34,778	259,679	259,679	10,202	13,911
2007	668,674	668,674	26,269	35,822	267,470	267,470	10,508	14,329
2008	688,735	688,735	27,057	36,896	275,494	275,494	10,823	14,759
2009	709,397	709,397	27,869	38,003	283,759	283,759	11,148	15,201
2010	730,679	730,679	28,705	39,143	292,271	292,271	11,482	15,657
2011	752,599	752,599	29,566	40,318	301,040	301,040	11,827	16,127
2012	775,177	775,177	30,453	41,527	310,071	310,071	12,181	16,611
Total		7,006,025	275,237	375,323		2,776,173	109,064	148,724

*EPA Regional Emission Factors for Calculating Offsets in Arizona

Emission	rams/kWh/y	lbs/kWh/yr
CO2	---	1.00
SO2	1.10	0.04
NOx	1.50	0.05

RESOURCE PROCUREMENT PROCESS

- ◆ ESPs have final responsibility for meeting the RPS. The ESP may fulfill its RPS obligation, utilizing applicable wires charge funds, in any manner it deems appropriate for that purpose.
- ◆ UDCs will utilize a Request for Proposal (RFP) competitive bidding process to acquire renewable resource credits for their standard offer customers.
- ◆ Each UDC will evaluate its system needs in terms of reliability and capital requirements to determine where distributed generation can improve reliability and/or reduce capital requirements and the associated value per kWh. The UDC will contribute a minimum of one-half of this value to the RFP process for distributed renewable resources within those areas.
- ◆ The UDC will submit the proposed RFP to the Arizona Corporation Commission for its approval.
- ◆ The Commission-approved RFP, administered by the UDC on behalf of its standard offer customers, may be joined by any certificated Arizona ESP that contracts with the UDC for such purpose.
- ◆ Distribution cooperatives may be too small to administer an effective RFP process. The G&T supplier to these coops may administer a RFP process for all its members.
- ◆ The RFP bidding process will be subject to the regulatory oversight of the ACC
- ◆ General bidding process concepts:
 - ◆ Acquire the solar/renewable resource credits with the lowest NPV per kWh;
 - ◆ Administrative costs are limited to 1% of the applicable SBC revenue, the remainder is to be utilized to acquire solar/renewable resources; and
 - ◆ Bids may be made for up to a five year payment stream.

ARIZONA RPS
ESTIMATED COST OF RPS AT BID PRICES
OF 5, 10, & 15 CENTS/kWh

DOCKET NO. 99-0205
EXHIBIT JFG-4

Year	RPS %	Arizona Public Service				Current Funding
		RPS MWh	at 5 cents	at 10 cents	at 15 cents	
1999	0.20%	2,810	\$141	\$281	\$422	\$8,770
2000	0.20%	2,994	\$150	\$299	\$449	\$9,033
2001	0.40%	31,944	\$1,597	\$3,194	\$4,792	\$9,304
2002	0.50%	42,651	\$2,133	\$4,265	\$6,398	\$9,583
2003	0.60%	54,744	\$2,737	\$5,474	\$8,212	\$9,871
2004	0.80%	78,189	\$3,909	\$7,819	\$11,728	\$10,167
2005	1.00%	100,668	\$5,033	\$10,067	\$15,100	\$10,472
2006	1.00%	103,688	\$5,184	\$10,369	\$15,553	\$10,786
2007	1.00%	106,799	\$5,340	\$10,680	\$16,020	\$11,109
2008	1.00%	110,003	\$5,500	\$11,000	\$16,500	\$11,443
2009	1.00%	113,303	\$5,665	\$11,330	\$16,995	\$11,786
2010	1.00%	116,702	\$5,835	\$11,670	\$17,505	\$12,139
2011	1.00%	120,203	\$6,010	\$12,020	\$18,030	\$12,504
2012	1.00%	123,809	\$6,190	\$12,381	\$18,571	\$12,879

Year	RPS %	Tucson Electric Power				Current Funding
		RPS MWh	at 5 cents	at 10 cents	at 15 cents	
1999	0.20%	1,048	\$52	\$105	\$157	\$3,416
2000	0.20%	1,117	\$56	\$112	\$167	\$3,519
2001	0.40%	11,911	\$596	\$1,191	\$1,787	\$3,624
2002	0.50%	15,904	\$795	\$1,590	\$2,386	\$3,733
2003	0.60%	20,413	\$1,021	\$2,041	\$3,062	\$3,845
2004	0.80%	29,156	\$1,458	\$2,916	\$4,373	\$3,960
2005	1.00%	37,538	\$1,877	\$3,754	\$5,631	\$4,079
2006	1.00%	38,664	\$1,933	\$3,866	\$5,800	\$4,202
2007	1.00%	39,824	\$1,991	\$3,982	\$5,974	\$4,328
2008	1.00%	41,019	\$2,051	\$4,102	\$6,153	\$4,458
2009	1.00%	42,250	\$2,112	\$4,225	\$6,337	\$4,591
2010	1.00%	43,517	\$2,176	\$4,352	\$6,528	\$4,729
2011	1.00%	44,822	\$2,241	\$4,482	\$6,723	\$4,871
2012	1.00%	46,167	\$2,308	\$4,617	\$6,925	\$5,017

Note: Dollars are expressed in thousands

**ARIZONA RENEWABLE PORTFOLIO STANDARD
ESTIMATED RENEWABLE MWH AND MW**

**DOCKET NO. 99-0205
EXHIBIT JFG-5**

Year	Phase-in	RPS %	Retail Sales	Maximum RPS		Multipliers	Minimum RPS	
				MWh	MW		MWh	MW
1999	20%	0.20%	32,239,098	12,896	5.9	3	4,299	2.0
2000	20%	0.20%	33,206,270	13,283	6.1	2.9	4,580	2.1
2001	100%	0.40%	34,202,459	136,810	62.5	2.8	48,861	22.3
2002	100%	0.50%	35,228,532	176,143	80.4	2.7	65,238	29.8
2003	100%	0.60%	36,285,388	217,712	99.4	2.6	83,736	38.2
2004	100%	0.80%	37,373,950	298,992	136.5	2.5	119,597	54.6
2005	100%	1.00%	38,495,168	384,952	175.8	2.5	153,981	70.3
2006	100%	1.00%	39,650,024	396,500	181.1	2.5	158,600	72.4
2007	100%	1.00%	40,839,524	408,395	186.5	2.5	163,358	74.6
2008	100%	1.00%	42,064,710	420,647	192.1	2.5	168,259	76.8
2009	100%	1.00%	43,326,651	433,267	197.8	2.5	173,307	79.1
2010	100%	1.00%	44,626,451	446,265	203.8	2.5	178,506	81.5
2011	100%	1.00%	45,965,244	459,652	209.9	2.5	183,861	84.0
2012	100%	1.00%	47,344,202	473,442	216.2	2.5	189,377	86.5
Including Salt River Project								
1999	20%	0.20%	52,785,773	21,114	9.6	3	7,038	3.2
2000	20%	0.20%	54,369,347	21,748	9.9	2.9	7,499	3.4
2001	100%	0.40%	56,000,427	224,002	102.3	2.8	80,001	36.5
2002	100%	0.50%	57,680,440	288,402	131.7	2.7	106,816	48.8
2003	100%	0.60%	59,410,853	356,465	162.8	2.6	137,102	62.6
2004	100%	0.80%	61,193,179	489,545	223.5	2.5	195,818	89.4
2005	100%	1.00%	63,028,974	630,290	287.8	2.5	252,116	115.1
2006	100%	1.00%	64,919,843	649,198	296.4	2.5	259,679	118.6
2007	100%	1.00%	66,867,438	668,674	305.3	2.5	267,470	122.1
2008	100%	1.00%	68,873,462	688,735	314.5	2.5	275,494	125.8
2009	100%	1.00%	70,939,666	709,397	323.9	2.5	283,759	129.6
2010	100%	1.00%	73,067,855	730,679	333.6	2.5	292,271	133.5
2011	100%	1.00%	75,259,891	752,599	343.7	2.5	301,040	137.5
2012	100%	1.00%	77,517,688	775,177	354.0	2.5	310,071	141.6

CERTIFICATE OF SERVICE

I hereby certify that the original and 10 copies of the DIRECT TESTIMONY OF JAMES F. (RICK) GILLIAM FOR THE ENVIRONMENTAL INTERVENORS were FedExed to Docket Control, Arizona Corporation Commission, 1200 West Washington Street, Phoenix, Arizona 85007, on the 29th day of July, 1999, and a true and correct copy was sent by U.S. mail, first-class and postage prepaid, to each of the following:

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