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AZ CORP COM
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May 6, 2008

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

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AZ CORP COMM
Director Utilities

RE: Arizona Public Service Application on Resource Planning
Docket No. E-01345A-08-0010

On January 7, 2008, Arizona Public Service Company (APS) filed a Resource Alternatives Application, which indicated that APS is initiating a series of stakeholder meetings regarding resource planning. The third meeting was held on April 11, 2008. Attached please find the meeting report, attendance list, and copies of presentations made at that meeting.

Meeting notices, agendas, presentations, reports, and other related information regarding APS' Resource Alternative Stakeholder meetings can be found at www.aps.com/resources. If you have any questions regarding this process or would like to be added to the service list, please send an email to ResourceAlternatives@aps.com.

Sincerely,

Barbara Klemstine

Attachment

CC: Ernest Johnson
Teri Ford
Barbara Keene
Interested Parties

**ARIZONA PUBLIC SERVICE COMPANY
RESOURCE ALTERNATIVE PLANNING
STAKEHOLDER MEETING REPORT
Docket No. E-01345A-08-0010**

DATE: APRIL 11, 2008
TIME: 8:30 a.m.
PLACE: Arizona Public Service Corporate Headquarters, Room 2 South
400 North 5th Street, Phoenix, Arizona 85004

ATTENDANCE: See attached attendance list

TOPICS: --Updates and Recent Developments:
1. APS Peak Demand and Energy Forecast -- Update
2. Rate Case: Resource Planning Items
--Climate Change
1. Climate Change Legislation: National and Regional Activities
2. Climate Change Technologies
3. Climate Change CO₂ Projections – Alternative Resource Scenarios

Copies of the Presentations are available on the website:
<http://www.aps.com/resources>

DISCUSSION:

- **Brad Albert**, APS Director of Resource Planning, welcomed the attendees, provided an email address for any questions related to the stakeholder meetings, (ResourceAlternatives@aps.com), referenced the APS resource planning website (<http://www.aps.com/resources>), and highlighted some new links to the website, including the following reports:
 - David Berry, Western Resource Advocates, *A Clean Electric Energy Strategy for Arizona* (2007)
 - ISO New England Inc., *New England Electricity Scenario Analysis: Exploring the economic, reliability, and environmental impacts of various resource outcomes for meeting the region's future electricity needs* (August 2, 2007)
 - Nicole Hopper, Charles Goldman, and Jeff Schlegel, Ernest Orlando Lawrence Berkeley National Laboratory, *Energy Efficiency in Western Utility Resource Plans: Impacts on Regional Resource Assessment and Support for WGA Policies* (August 2006)
 - Stephen Whitley, Connecticut Energy Advisory Board, *Scenario Analysis Update* (August 9, 2007)

Mr. Albert reiterated that the purpose of the stakeholder meetings is for APS to share its views on resource planning, to receive feedback from stakeholders on possible resource

alternative choices, and to use the information obtained from the meetings to develop a resource plan that APS ultimately will file with the Arizona Corporation Commission (“Commission”). Mr. Albert emphasized that the process involves considering all of the resource alternatives available.

- **Dr. Marty Rozelle** of the Rozelle Group Ltd., facilitator for the stakeholder meetings, explained the process and ground rules for the meetings: the meetings are intended to be interactive; participants should feel free to ask questions or provide input, feedback, and ideas during the presentations; and additional time for discussion would be provided at the end of the meeting.
- **Pete Ewen**, APS Manager of Forecasts, presented “APS Peak Demand and Energy Forecast – Update.”

Mr. Ewen explained that due to deteriorating economic conditions, APS customer growth rates are falling much faster than anticipated in APS’s September 2007 energy forecast. As a result, growth in energy and peak demand in the near term are also slowing markedly. The March 2008 forecast indicates that in 2008, the customer growth rate is expected to decline to 1.5%. The recent economic downturn has resulted in a growing excess of housing inventory, a decline in construction jobs, a slowing of net population migration, and a weakening of new business investment. At the beginning of 2008, APS is still adding more new meter sets than customers, an indicator that new home construction is continuing to outpace housing demand.

While Mr. Ewen explained that this is the worst economic downturn Arizona has seen in at least 35 years, he stated that Arizona has always recovered from such downturns, that this is a near-term change, and that peak demand and energy will still grow substantially over the next 20 years. In fact, robust growth in customers and energy demand should return by 2010-2011. Mr. Ewen displayed a graph of the projected long-term growth of residential customers which incorporated the current anticipated economic cycle. This data showed a return in 2011 to the growth levels Mr. Ewen presented in the Stakeholder Meeting held on February 15. It is estimated that the economic downturn has resulted in a reduction of 1-1.5 years of growth (or 300 MW over a four year period) out of APS energy forecast to 2027.

Presentation Discussion:

A discussion ensued regarding the annual increase in APS’s peak capacity requirements to satisfy customer growth, which, excluding this current economic downturn, is generally 250-300 MW.

- **David Rumolo**, APS Manager of Regulation and Pricing, presented “Rate Case: Resource Planning Items.”

Mr. Rumolo addressed APS’s rate case, which was filed with the Commission on March 24, 2008. APS is seeking Commission approval of the following: (1) a non-fuel base increase of \$253 million; (2) a reset of the base fuel from 3.25 cents per kWh to 3.66 cents per kWh; and

(3) two new conservation rate offerings plus modifications of existing rates to encourage energy efficiency.

The two proposed time-of-use rate offerings, which customers may opt into, are intended to reduce energy use when APS's system peaks at around 5:00 p.m. and to be revenue neutral for participating customers. These offerings are referred to as Critical Peak Pricing and Super Peak Time-of-Use:

- **Critical Peak Pricing.** Critical Peak Pricing is an option for larger general service and commercial customers (customers using 750 kW or above) who are capable of reducing energy usage during critical periods by a minimum of 200 kW. Under this program, customers would pay a price of 40 cents per kWh during critical hours (generally 2 p.m. to 7 p.m. on weekdays during June through September), but would receive a price discount during all other hours. The critical hours would be at most for 18 days per year and may not encompass the entire 2 p.m. to 7 p.m. time period. APS would notify all customers on this pricing option at least one day prior to any critical hours.
- **Super Peak Time-of-Use.** The Super Peak Time-of-Use is a modification of a current program for residential customers. The program is based on a three part time-of-use rate: (1) super peak; (2) peak; and (3) off-peak. Under this program, customers would pay a price of 46 cents per kWh during super peak hours (3 p.m. to 6 p.m. during the weekdays of June through August), but would receive a price discount during off-peak hours. The program would be available to residential customers who have advanced metering infrastructure.

Finally, Mr. Rumolo explained the conservation price modification (as opposed to time-of-use pricing). The conservation price modification seeks to encourage energy conservation, particularly for APS's largest residential customers. In the rate case, APS requested Commission approval for adding another tier to its current block structure of Rate E-12. Under Rate E-12, the average cost per kWh goes up depending on the consumption level (based on kWh per month). For example, the current rate blocks for the summer months are as follows: (1) 0-400 kWh; (2) 401-800 kWh; (3) 801 and above kWh. The proposed rate adds blocks 801-3000 kWh and 3000 kWh and above.

Presentation Discussion:

There was some discussion regarding whether time-of-use programs should be offered for small business customers. There was also mention that the time-of-use and conservation programs are designed to reduce the need to provide peaking capacity in the future and are part of a larger APS demand response structure that will be presented in a subsequent stakeholder meeting. Additionally, as advanced metering becomes more prevalent among APS customers, more pricing options will be possible.

- **C.V. Mathai, Ph. D.**, APS Manager for Environmental Policy, presented “Climate Change Legislation: National and Regional Activities.”

Dr. Mathai provided background regarding climate activity, beginning with the United States ratification of the United Nations Framework Convention on Climate Change (“UNFCCC”), which was adopted in 1992. The objective of the UNFCCC was to stabilize green house gas (“GHG”) concentrations in the atmosphere at a level that would prevent dangerous interference with the climate. In 1997 the UNFCCC adopted the “Kyoto Protocol”, which required the 38 industrialized countries to reduce their global average GHG emissions by 5.2% below 1990 levels during 2008-2012. The Kyoto Protocol also established certain specific emissions limits for each of these countries (e.g., the U.S. would have had to reduce GHG emissions to 7% below its 1990 levels). The Kyoto Protocol is still in effect, and the U.S. is the only major developed country that has not ratified the Kyoto Protocol.

While the U.S. is responsible for 20% of global GHG emissions, there are reports that China’s annual GHG emissions exceeded U.S. emissions in 2006. Significant GHG emissions come from the combustion of coal, gas, and oil. As a result, in the U.S., the electricity sector is responsible for 32% of GHG emissions. In the U.S., 49% of power generated is by coal-based generation, 19.9% is by natural gas-based generation, and 1.6% is by oil-based generation. The demand for electricity in the U.S. is projected to increase by 30% by 2030.

Dr. Mathai also reported on climate policy initiatives currently underway locally and throughout the United States.

- **National Activities.** Several bills have been introduced in the U.S. Congress to reduce GHG emissions. While these bills have varying levels of emission reduction targets, most of them cover the entire economy (rather than just the electricity sector, for example) and establish a cap and trade system. Additionally, all of them would dramatically reduce GHG emissions below business as usual. The Lieberman-Warner Bill, which is currently the most prominent bill (S.2191), would establish an economy-wide, hybrid cap and trade program with emissions targets that become more stringent as time passes. The bill would regulate upstream for petroleum and gas (i.e., distributor) and downstream for coal (i.e., power plant). Unlike other bills, this bill does not contain a safety valve, which allows a covered entity to pay a set fee for its emissions if the emissions exceed a certain level and enables covered entities to know exactly what their economic exposure would be for exceeding the levels. The bill would permit the auctioning of emissions allowances, which could be banked and borrowed. In addition, allowances would be granted to new entrants, and bonus allowances would be provided to covered entities engaged in carbon capture and storage. While allocations would be provided for certain covered entities, the amount of such allocations would decline as time passes. The bill also provides for emissions offsets: covered entities can meet up to 15% of their annual submission requirement with credits from domestic offset projects and 15% from international offset projects. Finally, the bill would establish the Carbon Market Efficiency Board, which would be responsible for minimizing allowance price volatility.

Several research groups have analyzed the cost of allowances under the Lieberman-Warner Bill, with the price ranging from \$18-64 per ton of CO₂ in 2015 to \$38-227 per ton of CO₂ in 2030. The Environmental Protection Agency (“EPA”) has estimated that, as a result of the Lieberman-Warner Bill, electricity prices would increase by 44% by 2030. The full Senate is expected to consider the bill in June 2008.

In the House of Representatives, Representatives Dingell and Boucher are developing a bill to reduce economy-wide GHG emissions by 60-80%. The bill is expected to be introduced this spring. Additionally, Chairman Dingell has introduced a “carbon tax” bill which sets a tax of \$15 per ton of CO₂.

Additionally, the United States Supreme Court recently decided a key environmental case where the Court held that GHGs are “air pollutants” and that the EPA can regulate them under the Clean Air Act if EPA makes a regulatory finding that such gases are endangering public health and welfare. The EPA has issued an advance notice of proposed rulemaking regarding the final endangerment decision.

- **Regional Activities.** In the absence of federal legislation, several states have initiated climate action plans. Such action plans include California legislation (AB 32), the Regional Greenhouse Gas Initiative (“RGGI”), the Western Climate Initiative (“WCI”), and the Midwestern Greenhouse Gas Accord. In addition, several major U.S. corporations have joined in calling for federal climate legislation as part of the United States Climate Action Partnership (“USCAP”). WCI is composed of seven states and two Canadian provinces as “partners” and others who are “observers.” The goal of WCI is to collectively cut GHG emissions by 15% below 2005 levels by 2020. This goal is based on the aggregation of state-specific goals. WCI is also designing a cap and trade program that is scheduled to be unveiled by August 2008.
- **Arizona Activities.** Arizona has been actively involved in climate change issues. In 2006, the Governor of Arizona established the Climate Change Advisory Group (“CCAG”). The CCAG was responsible for producing an action plan with recommendations to reduce GHG emissions in Arizona. The CCAG made 49 recommendations, almost all of which have been adopted. The State of Arizona, as well as APS, are charter members of The Climate Registry, a nonprofit partnership that is currently developing a GHG reporting system. Finally, as a WCI partner, Arizona has agreed to reduce its GHG emissions by 72 million metric tons below its 2005 level by 2020.

Dr. Mathai provided a summary of APS’s climate policy positions, which include:

- Climate change legislation should harmonize emission reduction targets and timelines with commercial availability of technologies to meet system-load requirements at affordable costs;
- GHG emission reduction program should recognize regional differences in population growth and existing infrastructure for power generation;

- Climate change legislation should be applied economy-wide to maximize economic efficiency to benefit the entire society and should not penalize one sector of the economy;
- Market-based programs (e.g., a cap and trade program) to reduce GHG emissions should involve a cost containment mechanism such as a “safety valve” to allow for some economic certainty;
- Climate change legislation should provide for research, development, and deployment of low and no carbon emitting technologies and carbon sequestration and storage technologies; and
- National and state programs dealing with climate change should be harmonized to avoid conflicts and inconsistencies.

Presentation Discussion:

There was discussion regarding state legislation, as well as regional issues such as whether WCI recognized different growth rates in considering GHG emissions reductions, and the need for regional organizations and federal legislation to do so. Finally, there was a comment that, given the circumstances, it is particularly important to construct efficient and environmentally sound facilities (residences and commercial buildings) rather than having to go back and make costly renovations.

- **Peter Johnston**, APS Leader of Technology Department, presented “Climate Change Technologies.”

Mr. Johnston provided an overview of carbon capture technologies, which include:

- **Pre-Combustion.** This involves extracting carbon from carbon-based fuel prior to burning of coal using an Integrated Gasification Combined Cycle power plant. The coal is partially oxidized, thereby producing hydrogen rich “syn” gas and a carbon dioxide (“CO₂”) rich waste stream. The disadvantage of pre-combustion carbon capture is that the syn gas is useless in current natural gas pipeline infrastructure, and, while gasification is used worldwide for chemical processing, there is not yet an integrated gasification and carbon capture system.
- **Post-Combustion.** This is the most promising technology because it can be retrofitted to existing coal plants. Post-combustion capture involves the absorption of CO₂ through a reversible chemical reaction usually by applying heat using a solid or liquid sorbent. The sorbent can then be regenerated, which releases the CO₂. The regenerated sorbent can then be reused. 80-95% of CO₂ can be captured using sorbents currently in use. Unfortunately, the energy required to capture the carbon is significant: 20-30% of power plant output is used in the process. Small scale power plant demonstrations are currently being planned.
- **Oxy-Fuel Combustion.** Oxy-fuel combustion involves burning coal in oxygen rather than in air so that flu gas steam is almost entirely CO₂. As with post-combustion capture, this process is energy intensive. It is estimated that 20% of power plant

output is used in the process. Several small scale demonstrations are currently being planned.

Mr. Johnston also discussed carbon sequestration. There are two main areas of carbon sequestration currently being considered: oceanic sequestration and geologic sequestration. Oceanic sequestration involves dissolving CO₂ at depths of 3,000 feet or more. The CO₂ would then form a CO₂ lake at depths greater than 10,000 feet. The long-term effects of oceanic sequestration are unknown, although the environmental impacts do not appear to be positive. Dissolving the CO₂ would result in an increase in pH of the ocean water, which would increase the acidity of the water, negatively impacting sea life. Additionally, some CO₂ will be re-released into atmosphere.

Geologic sequestration involves pumping liquid CO₂ into underground geological formations. APS is a partner of the West Coast Regional Carbon Sequestration Partnership (“Westcarb”). Westcarb is one of nine regional partnerships co-funded by the Department of Energy to characterize regional carbon sequestration opportunities and to conduct field tests in order to monitor CO₂ movement in the subsurface. Westcarb will conduct the Arizona CO₂ Geologic Pilot, a \$5.5 million project that will involve injecting 2,000 tons of liquid CO₂ into a deep saline aquifer via a 4,000 foot well, probably in the Colorado Plateau. A site at the APS Cholla Power Plant has been identified as a potential location for the field test. Westcarb is actively working with Arizona Department of Environmental Quality and EPA to obtain permitting for the field test and plans to conduct the test between 2008 and 2009. As a frame of reference, a coal power plant creates about one ton of CO₂ per MW hour. APS’s Cholla Power Plant produces between three to four million tons per year of CO₂ for APS’s share of the plant.

Mr. Johnston also discussed carbon recycling using algae or bacteria. The process involves using flue gas CO₂ as feed stock for algae or bacteria, extracting lipid oil and starch from the harvested material, and using the oil and starch from the harvested material to make more fuels. APS partnered with GreenFuel Technologies, a company out of MIT that pioneered the algae growing process, to test this process at APS’s Redhawk facility. The project was a success, resulting in one acre of algae producing over 8,000 gallons of vegetable oil (as compared to one acre of canola beans, which creates only 184 gallons of vegetable oil or one acre of soybeans, which creates only 44 gallons of vegetable oil). Unlike carbon sequestration, carbon recycling has the potential to provide a revenue stream.

Presentation Discussion:

There was some discussion regarding APS’s annual expenditures on these various technologies, as well as the possibility of using the algae harvested from carbon recycling as a source for making biodiesel and jet fuels.

- **Brad Albert**, APS Director of Resource Planning, presented “Climate Change: CO₂ Projections – Alternative Resource Scenarios.”

Mr. Albert provided a comparison of the average CO₂ emissions from the various APS resource technologies. For example:

- Existing coal units are projected to emit an average of .98 metric tons per MWh in 2008;
- New conventional coal units are projected to emit an average of .86 metric tons per MWh;
- Existing gas combined cycle units are projected to emit an average of .43 metric tons per MWh in 2008;
- Existing gas combustion turbines are projected to emit an average of .62 metric tons per MWh in 2008; and
- Nuclear technology, energy efficiency technology, and renewable sources (wind, solar, and geothermal) do not emit CO₂.

In 2008, it is projected that APS will emit 16.4 million metric tons of CO₂, with coal units responsible for 73% of the emissions, gas combined cycle responsible for 25%, and gas peaking units responsible for 2%. Currently, coal units provide 38% of APS's electricity generation, gas units provide roughly 32%, and nuclear and renewable sources provide 30%. Mr. Albert then showed several graphs depicting a 2012 projection based on the expected impact of potential climate change legislation. The carbon cost adder would affect coal units the most, with gas units also being affected. At \$70 per ton, it would be more cost efficient from a variable cost perspective to switch from coal resources to natural gas (excluding the variable of the increase in the price of natural gas due to increased demand). Additionally, it is estimated that there would be a 15% reduction in CO₂ when the cost of CO₂ is \$70 per ton. Furthermore, depending on the amount of CO₂ credits allocated to APS as part of a cap and trade system, the potential costs could be significant: a 50% allocation will result in a potential cost of \$490 million while a 0% allocation will result in a potential cost of \$985 million.

Mr. Albert also discussed the various resource alternatives addressed in CO₂ projections to 2020. These projections included projected emissions associated with meeting native load requirements as well as projected emissions from energy purchases. All four scenarios showed a net increase in CO₂ emissions and even the renewable scenario showed a 10% increase from 2008 to 2020.

- **Gas.** This scenario consisted of using a combination of natural gas resources (combined cycle and peaking) to meet future resource needs. The gas scenario was projected to result in the emission of over 21 million metric tons of CO₂ in 2020.
- **Renewables.** This scenario involved ramping up renewable resources from 2011 to 2020 and assumed additional 200 MWs geothermal sources and 1,350 MWs of solar sources with approximately 6,700 GWh per year added by 2020 above renewable energy standard requirements. The renewables scenario was projected to result in the emission of about 18 million metric tons of CO₂ in 2020.

- **Nuclear.** This scenario would involve adding a total of 934 MWs of nuclear sources (half in 2018 and half in 2019). The nuclear scenario was projected to result in the emission of less than 18 million metric tons of CO₂ in 2020.
- **Coal.** This scenario would involve adding a total of 934 MWs of coal sources (half in 2017 and half in 2018). The coal scenario was projected to result in the emission of over 24 million metric tons of CO₂ in 2020.

The projection also concluded that APS could reduce CO₂ emissions in 2020 by 800,000 metric tons by investing in energy efficiency programs.

Finally, Mr. Albert explained the projected impact of the Lieberman-Warner Bill on APS. Based on anticipated allocation of allowances under the Lieberman-Warner Bill, APS would significantly exceed its allocations. For example, there would be a gap of 11.8 million metric tons between the amount of CO₂ emitted under the gas scenario and the projected allocation of allowances under the bill in 2015. By 2025 this gap would increase to 19 million metric tons. Depending on the price for CO₂ emissions that exceed the allowance, the potential cost to APS would be significant.

Presentation Discussion:

During the presentation, it was acknowledged that there has been a shift in utility resource planning over the past two years toward nuclear and renewables options. Additionally, there was a consensus that the cost impact on customers is a significant factor in the resource planning process and that such cost impact needs to be considered when selecting the appropriate resource mix. It was also recognized that the development and commercialization of technology may alter the costs and choices available.

FUTURE MEETINGS AND AGENDAS:

The next three stakeholder meetings will be held on the mornings of May 9, June 6, and July 11. All of these meetings will be held at the APS corporate headquarters. At the May 9 meeting, there will be a presentation on APS's Renewable Resource Plans and Initiatives, a presentation by David Berry and Amanda Ormond on the Western Resource Advocates report entitled, "A Clean Electric Energy Strategy for Arizona"; a presentation on the Black & Veatch report entitled, "Arizona Renewable Energy Assessment"; and a presentation on Renewable Resource Strategies. At the June 6 meeting, there will be presentations on Energy Efficiency, Demand Response, and APS Portfolio Analysis Results. Finally, on July 11, there will be presentations on Short-Term Resource Strategies and Financial Sustainability.

APS Resource Alternatives Planning Workshop
Friday, April 11, 2008
Attendance List

<u>Name</u>	<u>Company</u>
Al Bellac	
Amy LeGere	Foresight Wind Energy
Barbara Keene	Arizona Corporation Commission
Becky Turner	Entegra/Gila River Power
Bud Annan	Annan Group
Carmen Tilghman	Tucson Electric Power
David Berry	Western Resource Advocates
Gary Mirich	Energy Strategies, LLC
Greg Patterson	Arizona Competitive Power Alliance
Jana Brandt	Salt River Project
Jeff Schlegel	Southwest Energy Efficiency Project
Joe McGuirk	Sun Miner, LLC
John Coggins	Salt River Project
John LeSueur	Arizona Corporation Commission
Laura E. Sanchez	Natural Resources Defense Council
Laurie A. Woodall	KR Saline & Associates PLC
Lee Tanner	Solar Mission Technologies
Lew Dodendorf	Salt River Materials Group
Mark Marshall	K. R. Saline & Associates, PLC
Michael Neary	Desert Sun Solar, Inc
Patrick Black	Fennemore Craig, P.C.
Paul Walker	Insight Consulting, Inc
Peggy Goodrich	URS Corporation
Ray Williamson	Arizona Corporation Commission
Rob Smith	Sierra Club Southwest Office
Scott Wakefield	Residential Utility Consumers Office
Stephen Mellentine	Salt River Project
Toby Voge	Tucson Electric Power
Roger Clark	Grand Canyon Trust