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IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR APPROVAL OF THE COMPANY'S 2012 DEMAND SIDE MANAGEMENT IMPLEMENTATION PLAN.

DOCKET NO. E-01345A-11-0232

COMMENTS OF WESTERN RESOURCE ADVOCATES

Western Resource Advocates (WRA) hereby submits comments on selected elements of Arizona Public Service Company's (APS') 2012 demand side management (DSM) implementation plan. WRA may provide additional comments at a later date.

I. Introduction

APS' DSM programs have avoided the costs of generating electricity that would have simply been wasted due to inefficient end uses, behavior, and poor design. Table 1 summarizes APS' recent DSM activities and proposed plan. Each year's efforts result in enormous net benefits to society and the cumulative net benefits for the 2009 to 2012 programs exceed half a billion dollars. Utility program cost per lifetime MWh saved is less than $20/MWh, a cost comparable to just the variable costs of APS' coal-fired power plants and less than the fuel costs of running APS' gas-fired power plants.

There are numerous reasons why consumers do not choose energy efficient solutions to their lighting, motor drive, space cooling, space heating, and other energy needs. These barriers include:

- Habit which leads them to overlook the energy and cost consequences of their routines
- Lack of information about how to properly (and cost-effectively) reduce the amount of energy they waste
- Skepticism about the benefits and costs of energy efficiency
- High up-front costs of some (but not all) energy efficiency measures

Because of this wide range of barriers, APS has designed its efficiency programs to deal with the spectrum of issues encountered in actual program implementation. Thus, financial incentives are important in some programs but not in others, and a program design should not be judged simply on the basis of the magnitude of the financial incentive. Other means of delivering savings, such as educational programs, are often crucial to success.

II. Economic Value of Environmental Benefits

Decision No. 72032 required APS to work with stakeholders to develop appropriate metrics that monetize the value of water consumption and monetize the value of avoided SO_2, PM10, and NOx emissions as a supplement to its analysis of the societal cost test in its 2012 Energy Efficiency Implementation Plan. APS found that inclusion of monetized benefits (avoided damages) attributable to reduced air emissions increases the societal net benefits of its 2012 DSM programs by about $56 million (APS Revised DSM Implementation Plan, p. 34). This impact includes APS' estimates of the costs avoided by reducing CO_2 emissions through its DSM programs.[1]

If the Commission finds the monetization of environmental benefits useful, WRA suggests expanding the analysis to include ecosystem services. This type of analysis could apply to shade tree programs. Trees provide ecosystem services such as removal of pollutants from the atmosphere, reduced runoff, and sequestration of carbon dioxide (net of decomposition and of carbon dioxide emitted in planting and maintaining trees). The U.S. Forest Service has conducted studies of the benefits of trees in Arizona cities and elsewhere.[2] Table 2 summarizes applicable data from the Glendale, Arizona study of street and park trees conducted by the Forest Service. Only species likely to be distributed in APS' shade tree program are shown in the table. The ranges of values in the table reflect the differences in values for street versus park trees. The Glendale study did not include yard trees. From the Glendale report it is not possible to isolate the effects of trees on property values attributable solely to aesthetic and wildlife values, excluding the capitalization of energy savings into property values; therefore, these impacts on

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[1] APS did not provide much detail on the underlying analysis of externalities. Listed below are salient aspects of that analysis:

- The National Research Council (NRC) study (*Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use,* 2009) used by APS looked at health effects of power plant emissions (premature mortality, cases of illnesses), reduced timber and crop yields, accelerated depreciation of man-made materials, reduced visibility, and impacts on recreational activity (see Appendix C). The NRC study also reviewed estimates of damages attributable carbon dioxide emissions (Chapter 5).
- The values of environmental damages of air pollution per MWh of electricity generated are incremental or marginal values. In particular, the National Research Council study determined the marginal damage of emissions by estimating total damages due to all sources in the model at baseline emission levels and then added one ton of pollutant from a particular source and recalculated the total damage. The increase in damages from the additional ton of pollution is the value used to compute the monetized value of individual pollutants. (See Appendix C).
- Damages from emissions are power plant-specific.
- The model used to compute damages takes into account chemical interactions. For example, fine particulate matter (PM2.5) has major health impacts, but it is not one of the pollutants the Commission listed. PM2.5 is created by chemical reactions in the atmosphere involving emissions of SO_2 and NOx. Similarly, ground level ozone causes health effects but is not listed among the pollutants in the Commission's order. Ground level ozone results from emissions of NOx interacting with other compounds in the atmosphere in the presence of sunlight.
- Over 90% of the damages calculated in the National Research Council study come from premature mortality attributable to PM2.5 (p. 97).

In addition to the National Research Council report, there are other useful sources of information. See, for example, Clean Air Task Force, "Death and Disease from Power Plants," interactive map, http://www.catf.us/coal/problems/power_plants/existing/. Leland Deck, Supplemental Answer Testimony, Public Utilities Commission of Colorado, Docket No. 07A-447E, May 27, 2008. Jonathan Levy, Lisa Baxter, and Joel Schwartz "Uncertainty and Variability in Health-Related Damages from Coal-Fired Power Plants in the United States," *Risk Analysis* 29 (2009): 1000-1014.

[2] See Greg McPherson, James Simpson, Paula Peper, Scott Maco, and Qingfu Xiao, *City of Glendale, Arizona Municipal Forest Resource Analysis*, Report CUFR-7, USDA Forest Service, Pacific Southwest Research, Center for Urban Forest Research, 2005. Greg McPherson, James Simpson, Paula Peper, Scott Maco, and Qingfu Xiao, "Municipal Forest Benefits and Costs in Five US Cities," *Journal of Forestry* (December 2005): 411-416.

value are not included in the table. The annual value of ecosystem services reported in the study (excluding the value derived from reduced power generation which APS accounted for separately) depends on the tree species and varies from around $1 to about $3 per tree per year.

Assuming a value of ecosystem services of $2 per mature tree per year in constant 2011 dollars (adjusted to account for tree growth rates and survival rates) adds about $100,000 to the present value of the net benefits over 30 years of the 2012 shade tree program (planting 5,000 trees).

III. Budget Shifting

APS has requested approval for authorization to shift budgeted funds between its residential and non-residential programs, excluding the low income and schools programs, limited to ten percent of a class's total annual budget. APS stated that the increased flexibility would allow it to more efficiently manage its DSM programs in response to market conditions.

APS has assembled a staff of approximately 18 individuals who are responsible for managing specific residential and non-residential programs, event marketing, measurement and evaluation, administration, and overall program supervision. This extensive staff commitment, plus APS' performance as summarized in Table 1, indicate that the Company has developed the institutional capacity to design, implement, monitor, and modify energy efficiency programs on a large scale in a cost effective manner to meet the Commission's energy efficiency standard (R14-2-2401 *et seq.*). Based on this positive track record, it is appropriate to grant APS the limited flexibility it requests to shift money across customer classes in response to market conditions without having to seek additional Commission authorization to do so.

Respectfully submitted this 23rd day of September, 2011 by:

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Table 1. Overview of APS Energy Efficiency Programs

Factor	2009 Program	2010 Program	2011 Program as Planned	Proposed 2012 Program (excludes demand response)	Cumulative Effect as of 2012
1. Program cost (including MER & performance incentive)	$25,562,141	$49,831,722	$68,258,000	$78,136,000	$221,787,863
2. Annual MWh savings from measures installed *in* year	208,917	319,507	352,000	480,000	1,360,424
3. Lifetime MWh savings from measures installed in year	2,084,062	3,514,998	3,683,000	4,995,000	14,277,060
4. Capacity savings (MW)	33.9	46	68.2	85.5	234
5. Program cost per lifetime MWh saved ($/MWh)	$12.27	$14.18	$18.53	$15.64	$15.53
6. Societal net benefits from measures installed in year	$60,516,370	$156,454,183	$124,846,000	$194,581,000	$536,397,553
7. Avoided SO_2 emissions over lifetime of measures installed in year (metric tons)	4	7	7	10	28
8. Avoided NOx emissions over lifetime of measures installed in year (metric tons)	161	135	141	192	629
9. Avoided CO_2 emissions over lifetime of measures installed in year (metric tons)	857,752	1,433,367	1,500,953	2,037,104	5,829,176

Table 2. Annual Value of Ecosystem Services Provided by Municipal Trees in Glendale Study ($ per tree per year)*

Species	Net CO_2 sequestration**	Pollutant uptake by foliage net of BVOC *emissions*†	Storm water reduction††	Total $/tree per year
Chilean Mesquite	$0.15 to $0.22	$0.25 to $0.32	$1.34 to $1.86	$1.74 to $2.39
Blue Palo Verde	$0.24 to $0.31	$0.67 to $0.70	$1.77 to $2.06	$2.72 to $3.04
Sonoran Palo Verde	$0.12	-$0.04	$0.88	$0.96
Feather Tree	$0.12	$0.13	$1.06	$1.31
Sweet Acacia	$0.17 to $0.25	-$0.04 to $0.10	$0.58 to $0.88	$0.71 to $1.23

* Table includes only typical trees that may be distributed in APS' shade tree program. Data from Greg McPherson, James Simpson, Paula Peper, Scott Maco, and Qingfu Xiao, *City of Glendale, Arizona Municipal Forest Resource Analysis*, Report CUFR-7, USDA Forest Service, Pacific Southwest Research, Center for Urban Forest Research, 2005. The ranges shown in the table reflect the values in the Glendale study for street versus park trees. The Glendale study did not include yard trees.
** CO_2 sequestration excludes CO_2 emissions avoided by reduced power generation attributable to shade as these benefits are included in APS' analysis. See text for definition of "net." CO_2 valuation assumes $15 per ton.
† Consists of deposition and particulate interception for O_3, NO_2, PM10 and SO_2. The value of biogenic volatile organic compounds (BVOCs) emitted by trees is subtracted. Air quality benefits exclude avoided emissions attributable to reduced power generation since these benefits are reflected in APS' current analysis.
†† Storm water reduction pertains to the value of reduced runoff based on Glendale's cost for detention and retention basins.