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SOUTHWEST GAS CORPORATION

Arizona Corporation Commission
DOCKETED

November 28, 2007

NOV 28 2007

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007-2996

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Subject: Docket No. G-01551A-04-0876, Decision No. 69918
Multi-family New Construction DSM Program

In compliance with Decision No. 69918, Southwest Gas Corporation (Southwest) is submitting an original and 15 copies of its Multi-family New Construction Demand Side Management (DSM) Program. Southwest is required to docket a report regarding the feasibility of reallocating the proposed Multi-family program funding to the LIEC program; in addition, a plan for how the funding is to be reallocated in an alternate program is included. The attached document describes Southwest's plan to implement a DSM program targeting multi-family dwellings using a prescriptive approach.

If there are any questions regarding this matter, please contact me at (702) 876-7163.

Respectfully,

Debra S. Jacobson *DS*
Debra S. Jacobson, Director
Government & State Regulatory Affairs

Enclosures

- C: Ernest Johnson, ACC
- Barbara Keene, ACC
- Julie McNeely-Kirwan, ACC
- Compliance Section, ACC
- Stephen Ahearn, RUCO
- David Berry, WRA
- Jeff Schlegel, SWEEP
- Charlie Gohman, AZ DoC, Energy Office

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**SOUTHWEST GAS CORPORATION
MULTI-FAMILY NEW CONSTRUCTION
DEMAND SIDE MANAGEMENT PROGRAM**

In Compliance with Decision No. 69918
in Docket No. G-01551A-04-0876

November 28, 2007

MULTI-FAMILY NEW CONSTRUCTION

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INTRODUCTION

On June 26, 2006, pursuant to Commission Decision No. 68487, dated February 23, 2006, Southwest Gas Corporation (Southwest) filed detailed descriptions of the Demand Side Management (DSM) programs required to be filed for Commission approval. In Decision No. 69918 dated September 27, 2007 the Commission ordered Southwest to docket a report regarding the feasibility of reallocating the proposed Multi-family program funding to the LIEC program, in addition, a plan for allocating the multi-family funding to an alternative DSM program or programs.

FEASIBILITY OF REALLOCATING FUND TO LIEC PROGRAM

The Low-Income Energy Conservation (LIEC) program began in 1998 with a budget of \$236,000. This budget was subsequently increased to \$350,000 and more recently to \$500,000 on April 16, 2007 in Decision No. 69405. During meetings held with the Arizona Department of Commerce – Energy Office and the nine agencies implementing the LIEC program, they verified additional funding is not needed at this time. Southwest continues to monitor this program, including the appropriate funding level.

PROGRAM OVERVIEW

Southwest plans to implement a DSM program targeting multi-family apartment homebuilders beginning in 2008. The program requirements will help meet established high energy performance guidelines via a prescriptive approach, requiring envelope improvement measures and a hydronic heating system. Envelope measures include duct testing for proper sealing and reduced leakage, and inspection of insulation to ensure proper installation with no gaps, voids, or compression that lessen effective R-value.

Financial incentives will be provided directly to multi-family apartment builders to assist with the incremental costs and drive program participation.

Program promotional efforts will include a print campaign for general awareness and education. This will help provide a background for the building community necessary to promote overall energy efficiency and sustainable efficiency improvement in the Arizona rental marketplace.

This program will increase Arizona's energy savings and assist the multi-family market in the transformation to higher performance standards that has already occurred in residential single-family new construction, and continues to evolve. It will expand energy savings benefits to a new set of consumers who are typically

very difficult to reach. Overall, the program will result in a positive societal benefit.

Program Objectives and Rationale

New apartment construction contributes significantly to the annual load growth for energy and water throughout the large metropolitan areas of Phoenix and Tucson, and is expected to remain strong. Recent economic metrics show: ¹

- Continued employment and population growth for Phoenix and Tucson
- Elevated home prices & lower affordability, creating a broader rental pool
- Increased demand for rentals due to stricter lending requirements for homes
- Decreased vacancies, contributing to increased rents
- Reduction in condo and apartment conversions to for-sale products
- Continued investor interest in multi-family developments

Apartment construction is typically targeted at all consumer groups, since units range from high-rent properties to properties designed for the lower income population who are unable to afford the high home prices evident in both markets.

Consumers who live in multi-family housing, whether by choice or necessity, require low-cost alternatives for their ongoing costs, such as monthly utility bills and rent. On the other hand, builders prefer low "first-cost" construction techniques, minimizing installation price of the units while maximizing their financial returns. This builder strategy can be counter to the construction of energy-efficient buildings and the installation of energy-efficient products, since these improvements typically have a cost premium associated with purchase and installation.

Currently, natural gas is installed in many multi-family apartment projects, at a minimum, to serve the common use amenities provided for the tenants. Projects typically install gas service for clubhouse use, community barbecues, and pool/spa heating needs. However, the majority of individual apartment units are typically constructed with no internal gas piping, faulty ductwork, electric resistance heating, and improperly installed insulation.

For natural gas installations by Southwest, all new construction projects must be determined to be economically feasible using the methodology outlined in the Arizona Gas Tariff Rule No. 6. Due to the high-density nature of multi-unit developments, and the fact that the gas main infrastructure is already in place adjacent to apartment developments, individual apartment unit gas service costs can be minimized. Apartment projects typically occupy the perimeter parcels in

¹ Marcus & Millichap Real Estate Investment Brokerage Co., Apartment Research Report, 2007.

master-planned communities and follow where single-family and commercial retail development already exist.

This program, therefore, is targeted to apartment builders to help improve the installation of energy-efficient measures in the individual units to reduce energy costs from the inefficient "status quo" building practices. Through prudent financial incentives for prescriptive high-efficiency measures, coupled with an educational and marketing approach, Southwest will gain acceptance of higher efficiency standards for some of the new apartment construction planned in 2008 and beyond. The two primary objectives of the program are as follows:

1. Increase the energy efficiency standard in approximately 500 apartment units constructed in Arizona in 2008 and 1,000 in 2009, by using a prescriptive approach
2. Create an increased awareness of high-efficiency measures for use by apartment builders in Arizona

Products and Services to Be Provided

Financial incentives will be provided to apartment builders to assist with the incremental costs associated with improved envelope measures and installation of a hydronic system. The program will also provide inspections and verification on a sampling of the individual units to confirm that the proper installation of measures is being accomplished. Education and outreach on the benefits of energy efficiency will be provided to apartment leasing staffs and to apartment renters through brochures. A print campaign will be used to drive end-users to participating developments and to educate the public.

Opportunities

Because of the continued high population growth and increased demand for rental units expected in the major metropolitan areas of Arizona, there will be an ongoing, and potentially increasing, need for new apartment rental units. These units are necessary to provide housing for population segments that cannot afford or choose not to purchase homes. These consumers stand to benefit greatly from the lower utility costs realized from higher-efficiency equipment and quality construction, thereby increasing their disposable income and positively impacting the local economy. In addition, consumers establish the habit of living with greater efficiency, which can affect their purchase decisions in the future, when some of them may move into single-family housing.

The program is designed to provide a sufficient level of incentives to builders to overcome installation cost barriers and assist in the cost differential to upgrade to higher-efficiency measures. It is anticipated that such incentives, over time, can engender a market transformation very similar to what has occurred with the prevalence of new ENERGY STAR single-family homes. Eventually, higher-

efficiency equipment and construction techniques can become the norm in new apartments, rather than the exception.

Societal benefits to Arizona from savings in energy, water, and emissions will also result from this program.

Barriers to Program Acceptance, Adoption, and Deliverability

Significant barriers exist in the new construction apartment market. The following is a list of obstacles, based on past experience and discussions with apartment developers:

- Long lead time for planning and approval of new projects
- Developer may not be the ultimate owner of the property
- Higher costs associated with energy efficient construction
- Higher cost of energy-efficient equipment
- Higher costs associated with natural gas equipment
 - Added piping and venting costs
 - Space considerations due to venting requirements
 - Higher appliance purchase price
 - Added time for construction and utility installation
- Lack of awareness about higher-efficiency practices and equipment
- Reluctance to change established practices
- Additional construction costs which do not necessarily equate to increased rental income for the project owner

TARGET MARKET

The target market for this program is multi-family apartment builders in Arizona. The ultimate beneficiaries of the program will be the renters of the units that are constructed. They will benefit from lower utility costs throughout the rental life of the unit. A secondary beneficiary will be the owner, who will improve the value of the property through improved efficiency systems, and is likely to see less tenant turnover because utility bills are lower.

The apartment renter has demographic characteristics that can vary tremendously depending on the unit type, cost, and location. Renters typically have not been beneficiaries of high-efficiency DSM programs in the past, since they are difficult to reach and are not inclined, nor usually able in a rental situation, to make capital investments related to energy efficiency.

The target markets for this program are as follow:

- Primary target – multi-family apartment builders operating in the Phoenix and Tucson areas. These developers can be encouraged to improve their market position through offering higher-efficiency units for rent.
- Secondary target – the tenants of the units in these multi-unit apartment developments. They will have lower utility bills and a higher quality living environment throughout their time occupying the unit.

Program Eligibility Requirements

All builders of apartment dwellings in the greater Phoenix and Tucson areas will be the first set of participants eligible for this program. Once the program is fine tuned, it may be expanded to other areas in Arizona serviced by Southwest.

Number of Potential Customers

The number of potential customers during the first two years of this program is listed in Table 1.

Table 1 – Apartment Permit Activity¹

Year	Phoenix	Tucson	Total
2008 – Program Year 1	4,000 ¹ (est.)	400 ² (est.)	4,400
2009 – Program Year 2	4,000 ¹ (est.)	400 ² (est.)	4,400

¹ Phoenix – Elliott Pollack, Metropolitan Housing Study, 2005-2007.

Tucson – Economic Outlook 2006/2007, Eller College of Management, University of Arizona.

² Southwest Demand Planning and Service Planning Departments, 2007.

Estimated Level of Program Participation

Southwest estimates the following levels of program participation during the first two years of this program:

Year 1	2008 – 500 units (limited participation is due to long lead time for development of multi-family projects)
Year 2	2009 – 1,000 units

ENERGY MEASURES

Baseline (Standard) Measures

The program is designed to improve the energy efficiency of the targeted multi-family apartments. The baseline, therefore, is defined as multi-family apartment units that would have been constructed without the program and incentives. Detailed information on the baseline measures is provided in Appendix A.

Of the projected 4,400 estimated apartment permits for 2008 in the Phoenix and Tucson metropolitan areas, it is assumed that almost all of these would typically be constructed with improperly installed, uninspected insulation and faulty, untested ductwork while a large portion of them would also be constructed with electric resistance heating and electric water heating. The majority of new apartments in all classes install laundry facilities in the individual units, rather than in a common area.

The Phoenix and Tucson multi-family markets are predominantly built to all-electric specifications, including all current participants in the Arizona Department of Housing Low-Income Housing Tax Credit program. Any use of natural gas in individual units is limited to small percentage of grade A (luxury) apartments. Further information on the baseline equipment found in Phoenix-area apartments is provided in Tables 2 and 3 below.

Table 2 – Estimated Standard Measures in Phoenix-Area Apartments

Equipment/Measure	Energy Factor (EF)	Natural Gas Apts.	Electric Apts.	Total
Standard ductwork	12% leakage	440	3,960	4,400
Electric resistance heating	n/a	n/a	3,960	3,960
Natural gas heating	80% AFUE	440	n/a	440
Standard insulation	Grade 3 ¹	440	3,960	4,400

¹ REM/Rate software for building performance modeling uses Grades 1-3 to identify and factor quality of insulation installation into energy performance. Grade 3 is the lowest level and Grade 1 is the highest.

Table 3 – Baseline Measure Information ^{1,2,3,4}

Equipment/Measure	Energy Use	Demand kW	Useful Life (Years)	Cost for Gas Apts.	Cost for Electric Apts.
Envelope measures: Standard ductwork & insulation	7,396 kWh 204 therms	7.19 2.69	37	\$4,250	\$3,645
Heating – electric resistance; electric water heating; electric A/C	7,396 kWh	7.19	20	n/a	\$3,645
Heating – natural gas 80% AFUE; gas water heating EF=0.58; electric A/C	3,520 kWh 204 therms	2.69	20	\$4,250	n/a

¹ Assumes a two-bedroom, 1,130 square foot apartment

² REM/Rate building performance modeling; November 2007

³ Database of Energy Efficiency Resources (DEER), California Energy Commission, October 2005.

⁴ Energy Information Administration and manufacturer websites (General Electric and Sears).

DSM Measures

Information on the DSM measures is provided in Table 4 below. More detailed information is available in Appendix A.

Table 4 – High-Efficiency Measure Information ^{1,2,3}

Measure	Number Installed (Per Year)	Useful Life	Energy Savings per Gas Unit	Energy Savings per Electric Unit	Measure Cost	Incremental Cost per Gas Apt.	Incremental Cost per Electric Apt.
Envelope measures ¹ with standard heating & water heating	500 (2008) 1000 (2009)	37	286 kWh 18 therms	629 kWh	\$3,645 electric \$4,250 gas	\$180	\$180
Natural gas hydronic system	500 (2008) 1000 (2009)	20	48 kWh 32 therms	3,581 kWh	\$4,315 electric \$4,315 gas	\$65	\$670

¹ Envelope measures consist of duct sealing and testing to 6% leakage; insulation inspection and installation improvement from Grade 3 to Grade 1

² REM/Rate building performance modeling; November 2007

³ Costs based on interviews with Mike Lostis; multi-family HVAC contractor, November 2007

IMPLEMENTATION PLAN

Marketing and Delivery Strategy

Key marketing and delivery tasks will include the following:

- Program eligibility requirements – Develop final program qualifications for builders, including prescriptive requirements, and customized payment process for rebate dollars.
- Marketing material development – Develop brochures promoting the program and a flyer for builders' leasing agents to use. Include program information on Southwest website. Print media will also be used for program outreach.
- Segmentation and targeting – Southwest Phoenix and Tucson Service Planning employees, possibly with contractor assistance, will identify and target key builders to drive the desired volume of participating units.
- Direct builder notification – Service Planning employees, possibly with contractor assistance, will focus on concentrated direct negotiation with key builders to drive program participation.
- Ongoing rebate management – As units are constructed and verified, possibly with contractor assistance, payment of rebates will be made to qualifying builders (process to be determined once program is approved).
- Measurement and verification – Ongoing measurement and verification will ensure that the program is meeting its goals.

Communication

The audience for this program is the major multi-family apartment builders in Phoenix and Tucson during Years 1 and 2. Communication measures will include a print campaign focused on the rental market, brochures, banners, and signage.

Consumers will be educated through the apartment builders' leasing staff. Renters will be provided with educational materials which create awareness and explain the benefits of energy efficiency.

Program Incentives

Currently, the majority of the multi-family units are all-electric, while a smaller number are dual-energy (both electricity and natural gas). Southwest believes this practice may disadvantage lower-income residents by giving them disproportionately higher energy costs. Thus, incentives in this program are designed to motivate builders to provide more fairness in energy choice to

consumers. Moving, and ultimately transforming, the market cannot be easily accomplished without meaningful incentives.

The incentive levels for the two different segments (dual-energy and all-electric) in the multi-family market are indicated below in Table 5. Because the two segments within the multi-family market would incur different costs if they upgrade to the standards in this DSM program, Southwest has set two different incentive levels for the two segments.

Table 5 – Incentives for Multi-Family Apartments

Measure Description	Incentive for Dual-Energy Apts.	Incentive for All-electric Apts.
Envelope measures (duct sealing and testing, insulation inspection) PLUS Hydronic heating system	\$300	\$700

Education and Training

Many multi-family developers and the trades-people who work with them are unfamiliar with proper energy-efficient construction techniques. They have even less familiarity with hydronic systems. Southwest plans to offer education and training in two ways. One would be ongoing on-site training through the services of the program contractor who is performing the duct testing and insulation inspections. This is an effective method used successfully in the ENERGY STAR Home program. The second is formal classes such as *Houses That Work*, offered through the Energy and Environmental Building Association (EEBA), and sessions with manufacturers of hydronic equipment.

Staffing Requirements

Awareness-building and communications will be handled by existing Southwest staff, possibly with the assistance of contracted help. A contractor may be used to consult with builders on proper construction and installation techniques, provide education/training, and perform inspections as well as duct-testing on a sampling of units to ensure compliance prior to payment of rebates. A contractor may also be used to process rebates in conjunction with those of other DSM programs.

Timeline of Activities

The program will be developed and submitted to the Arizona Corporation Commission for review in late 2007. Program activity is expected to commence in early- to mid-2008, as soon as practicable pending Commission approval.

MEASUREMENT AND EVALUATION

Southwest will track and measure:

- Number of program participants
- Number of units constructed
- Measures installed
- Number and results of inspections performed
- Number and results of duct testing performed
- Rebates processed
- Energy savings in therms and kilowatt-hours (kWh)
- Demand reduction (kW)
- Emissions and water savings
- Communication activities
- Education/training activities
- Website activity
- Consumer and builder inquiries

BUDGET

The suggested budget for this program is \$300,000 in 2008 and \$700,000 in 2009. The 2008 budget represents approximately 9 percent of the total 2008 DSM budget of \$3.4 million, while the 2009 budget represents approximately 19 percent of the \$3.8 million. More detail can be found in Appendix B. Although a two-year program horizon was used for planning purposes, the 2009 level of spending is expected to continue until the Commission determines otherwise or decides to take further action. Program dollars are collected through a Demand Side Management Adjustor Mechanism (DSMAM), payable by all full-margin customer classes.

Program costs are estimates based on currently available information. Program dollars may be adjusted among categories of expenditures, based on program effectiveness. This flexibility will ensure optimal allocation of the total budget amount.

COST-EFFECTIVENESS TEST RESULTS

The cost-effectiveness test ratio for the Multi-Family New Construction program is 2.16 in 2008 and 1.49 in 2007 excluding the added environmental benefits. More cost-effectiveness information, including the results of the societal evaluation, is provided in Appendix C.

Societal Costs

Energy production has a great impact on resources—particularly water—and the environment. In fact, the Arizona Department of Environmental Quality regulates

the environmental effects of energy production. Reduced energy requirements resulting from DSM programs provide quantifiable societal benefits in terms of water savings and less pollution. Less energy needed, therefore, equates to a better quality of life for Arizonans.

Economic Impacts

Especially during hot weather, Arizona's news can be full of stories about escalating energy prices, blackouts, brownouts, and the fragility of the Western power grid. DSM programs that lessen energy demand due to increased energy efficiency can help reduce the strain on energy infrastructure, and minimize vulnerability.

With Arizona's population growing at an estimated three percent annually, reduced energy requirements slow the need for additional infrastructure and the resources required to produce and deliver energy. This helps to stabilize the region's economy and assure sufficient resources to meet future growth.

Human Impacts

Builders would have more incentive to construct energy-efficient apartments under this program. Therefore, it is believed that without the incentives provided by this DSM program, apartments will continue to be built to less efficient standards. As a result, the units may have faulty ductwork (which wastes heating and cooling energy), low-efficiency equipment, and improperly installed insulation, which reduces its effective R-value, thereby also wasting heating and cooling energy. Inefficient construction actually leads to increased cooling load, which can be significant during peak periods when the existing power grid is especially vulnerable to overload. The net result is that without this program, multi-family consumers would otherwise continue to pay higher utility bills.

MULTI-FAMILY NEW CONSTRUCTION

APPENDIX A
Equipment and Measures

**APPENDIX A
Multi-Family New Construction Program
Equipment and Measures
2008**

	Column I		Column II	
	Envelope measures (sealed ducts and improved insulation) with standard HVAC and water heater		Gas hydronic heating in addition to envelope measures in Column I	
	Gas	Electric	Natural Gas	Electric
BASELINE (STANDARD) EQUIPMENT/MEASURES				
Number of Baseline Equipment/Measures	440	3,960	440	3,960
Useful Life (years)	37	37	20	20
Natural Gas Consumption (therms)	204		186	
Winter (5 months, November-March)	141		123	
Summer (7 months, April-October)	63		63	
Electric Consumption (kWh)	3,520	7,396	3,234	6,767
Winter (5 months, November-March)	181	3,082	142	2,820
Summer (7 months, April-October)	3,339	4,314	3,092	3,947
Electric Demand (kW)	2.69	7.19	2.69	7.19
Baseline Equipment/Measure Cost	\$4,070	\$3,465	\$4,250	\$3,645
Initial cost	\$3,860	\$3,465	\$4,040	\$3,645
Installation cost (gas piping and venting)	\$210		\$210	
Annual maintenance cost				
DSM (HIGH EFFICIENCY) EQUIPMENT/MEASURES				
Number of DSM (High Efficiency) Natural Gas Measures Installed Due to Program	440	60	440	60
Useful Life (in years)	37	37	20	20
Natural Gas Consumption (therms)	186		154	154
Winter (5 months, November-March)	123		WH 60 H 46	WH 60 H 46
Summer (7 months, April-October)	63		WH 48	WH 48
Electric consumption (kWh)	3,234	6,767	3,186	3,186
Winter (5 months, November-March)	142	2,820	94	94
Summer (7 months, April-October)	3,092	3,947	3,092	3,092
Electric demand (kW)	2.69	7.19	2.49	2.49
DSM Equipment/Measure Cost	\$4,250	\$3,645	\$4,315	\$4,315
Initial cost	\$4,040	\$3,645	\$4,105	\$4,105
Installation cost (gas piping and venting)	\$210		\$210	\$210
Annual maintenance cost				

APPENDIX A
Multi-Family New Construction Program
Equipment and Measures
2009

	Column I		Column II	
	Envelope measures (sealed ducts and improved insulation) with standard HVAC and water heater		Gas hydronic heating in addition to envelope measures in Column I	
	Gas	Electric	Natural Gas	Electric
BASELINE (STANDARD) EQUIPMENT/MEASURES				
Number of Baseline Equipment/Measures	440	3,960	440	3,960
Useful Life (years)	37	37	20	20
Natural Gas Consumption (therms)	204		186	
Winter (5 months, November-March)	141		123	
Summer (7 months, April-October)	63		63	
Electric Consumption (kWh)	3,520	7,396	3,234	6,767
Winter (5 months, November-March)	181	3,082	142	2,820
Summer (7 months, April-October)	3,339	4,314	3,092	3,947
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Initial cost	\$3,860	\$3,465	\$4,040	\$3,645
Installation cost (gas piping and venting)	\$210		\$210	
Annual maintenance cost				
DSM (HIGH EFFICIENCY) EQUIPMENT/MEASURES				
Number of DSM (High Efficiency) Natural Gas Measures Installed Due to Program	440	560	440	560
Useful Life (in years)	37	37	20	20
Natural Gas Consumption (therms)	186		154	154
Winter (5 months, November-March)	123		WH 60 H 46	WH 60 H 46
Summer (7 months, April-October)	63		WH 48	WH 48
Electric consumption (kWh)	3,234	6,767	3,186	3,186
Winter (5 months, November-March)	142	2,820	94	94
Summer (7 months, April-October)	3,092	3,947	3,092	3,092
Electric demand (kW)	2.69	7.19	2.49	2.49
DSM Equipment/Measure Cost	\$4,250	\$3,645	\$4,315	\$4,315
Initial cost	\$4,040	\$3,645	\$4,105	\$4,105
Installation cost (gas piping and venting)	\$210		\$210	\$210
Annual maintenance cost				

MULTI-FAMILY NEW CONSTRUCTION

**APPENDIX B
Budget**

APPENDIX B**Multi-Family New Construction
Estimated Budget - 2008 and 2009**

Note: Budget dollars are estimates and may be shifted among categories for flexibility based on program effectiveness

	2008	2009
Implementation		
Outside contractors	\$ 45,000	\$ 90,000
Communication		
Publications	35,000	57,000
Production for publications	8,000	5,000
Banners	1,000	1,500
Signs	1,000	1,000
Brochures	10,000	
Incentives		
Incentive amounts	174,000	524,000
Education & Training		
EEBA classes	12,000	12,000
On-site training	1,000	1,000
Manufacturer training	5,000	1,000
Measurement and Evaluation		
Measurement & evaluation	1,000	1,000
Other Administrative Costs		
Office supplies	1,000	500
Travel expenses	1,000	1,000
Miscellaneous	5,000	5,000
TOTAL	\$ 300,000	\$ 700,000

MULTI-FAMILY NEW CONSTRUCTION

APPENDIX C
Cost-Effectiveness Test Results

**APPENDIX C
Multi-Family New Construction
Cost-Effectiveness Test Results**

COST-EFFECTIVENESS OVERVIEW		
	2008	2009
Annual Budget	\$ 300,000	\$ 700,000
Present Value Benefits	\$ 1,033,779	\$ 3,696,328
Present Value Costs	\$ 477,880	\$ 2,485,319
Present Value Net Benefits	\$ 555,899	\$ 1,211,009
Cost-Effectiveness Ratio	2.16	1.49

UNITS	
2008	2009
500	1,000

CUMULATIVE ENERGY SAVINGS (Three-Year Program)		
Kilowatt-hour (kWh)	Kilowatt (kW)	Therms (Th)
76,790,220	3,090	1,149,280

ENVIRONMENTAL BENEFITS [1]				
Annual Savings	CO₂ (lbs)	NOx (lbs)	SOx (lbs)	H₂O (gallons)
2008	401,004	75	2	101,891
2009	2,619,686	491	12	665,634
Lifetime Savings	70,416,632	13,208	330	17,892,121
Annual Avoided Costs	CO₂ (\$)	NOx (\$)	SOx (\$)	H₂O (\$)
2008	\$ 3,883	\$ 984	\$ 1,837	\$ 121
2009	\$ 25,368	\$ 6,428	\$ 11,999	\$ 792
Lifetime Avoided Costs	\$ 681,897	\$ 172,778	\$ 322,519	\$ 21,292

[1] Sources:

- Avoided emission costs data from National Renewable energy Laboratory January 2005 report on Emerging Markets for Renewable Energy Certificates Opportunities and Challenges, as augmented by Bill Schrand/Southwest Administrator/Environmental Programs, and as augmented and commented on by David Berry/WRA.
- Conversion factor for CO₂ from Rocky Mountain Institute website on Energy and Carbon Dioxide Conversion Factors (5/23/05).
- Water values from Central Arizona Water Conservation District/Central Arizona Project, City of Phoenix and City of Tucson websites.
- Environmental benefits (conversion factors per kWh) listed in APS' DSM Portfolio Plan 2005-2007 (7/1/05)