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BEFORE THE ARIZONA CORPORATION COMMISSION

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IN THE MATTER OF THE APPLICATION OF )	DOCKET NO. G-04204A-07-0274
UNS GAS, INC. FOR APPROVAL OF ITS )	
PROPOSED DEMAND-SIDE MANAGEMENT )	<b>UNS GAS, INC.'S REQUEST FOR</b>
("DSM") PORTFOLIO FOR 2008-2012 )	<b>APPROVAL TO MODIFY ITS</b>
)	<b>ENERGY SMART HOMES</b>
)	<b>PROGRAM</b>

10           UNS Gas, Inc. ("UNS Gas" or "Company"), through undersigned counsel, hereby  
 11 respectfully requests that the Arizona Corporation Commission ("Commission") issue an order  
 12 approving a modification to the UNS Gas Energy Smart Homes Program ("ESH"), which will be  
 13 renamed the UNS Gas Joint Utility – Residential New Home Construction Program (the  
 14 "Program"). The redesigning of the Program will 1) enhance the Program, particularly in  
 15 coordination with Electric Utilities serving the same homes; 2) reduce the total costs of program  
 16 delivery; 3) allow UNS Gas to continue promotion of energy efficient new home construction; and  
 17 4) reduce the DSM Surcharge amount required for program delivery. The requested effective date  
 18 of the redesigned Program is January 1, 2010.

19 **I. INTRODUCTION.**

20           In Decision No. 70180 (February 27, 2008), the Commission approved the UNS Gas  
 21 Demand-Side Management ("DSM") Portfolio for 2008 through 2012 (the "DSM Portfolio"). The  
 22 DSM Portfolio included the Energy Smart Home Program which was launched to customers in the  
 23 UNS Gas service territory on June 16, 2008.

24           From June 16, 2008 through June 30, 2009, UNS Gas spent \$171,500 in total Energy  
 25 Smart Program costs. However, participation in that program for the first full year has been  
 26 limited due to the economy and the current state of the residential housing market. A total of 11  
 27 builders signed up, with only 8 homes benefiting from the program. Further, UNS Gas has

1 analyzed the current program and has determined that it is not cost-effective at this time. A  
 2 summary of the cost-effectiveness analysis is set forth in Table 1 below.

3 **Table 1: June 2008-June 2009 Cost Effectiveness:**

Year	June 2008 – June 2009 <sup>[u1]</sup>
Total budget	\$171,510
Incentives	\$3,200
Administrative Costs	\$168,310
Incentives as % of budget	2%
Actual ESH participants	8
Incentive per site	\$400
Admin to incentives	5260%
Incentives to total budget	2%
Non-coincident peak (kW)	0
Coincident peak (kW)	0
Energy Savings (kWh)	2,292
Energy Savings (Therms)	1,720
Societal Benefits	\$21,443
Societal Costs	\$176,612
Net Benefits	-\$155,169

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<b>At IRP Discount Rate</b>		
<b>Societal Benefits - IRP Table 1: June 2008-June 2009 Cost Effectiveness:</b>		
<b>Year</b>	<b>June 2008 - June 2009<sup>[u2]</sup></b>	
Total budget	\$171,510	
Incentives	\$3,200	
Administrative Costs	\$168,310	
Incentives as % of budget	2%	
Actual ESH participants	8	
Incentive per site	\$400	
Admin to incentives	5260%	
Incentives to total budget	2%	
Non-coincident peak (kW)	0	
Coincident peak (kW)	0	
Energy Savings (kWh)	2,292	
Energy Savings (Therms)	1,720	
Societal Benefits	\$21,443	\$16,283
Societal Costs		\$176,612
Net Benefits		-\$160,329

1 After reviewing the data, UNS Gas has identified two issues that have affected the  
2 Program's effectiveness:

- 3 1. The economic downturn and corresponding slow-down in new home construction;  
4 and
- 5 2. In part of UNS Gas' service territory, Arizona Public Service Company ("APS")  
6 launched an identical Energy Star Program several years in advance of the UNS  
7 Gas' offering. All production builders are already participating in the APS  
8 program.

9 UNS Gas has determined that it must either: 1) eliminate the Program from the DSM  
10 Portfolio of programs; or 2) find a creative solution and redesign the Program so it is  
11 complimentary to the APS program. UNS Gas would also need to re-design the Program to work  
12 compatibly and effectively with UNS Electric, Inc.'s ("UNS Electric") programs in areas of the  
13 UNS Gas service territory where electric service is provided by UNS Electric so that the same  
14 program can be used in both UNS Electric and APS' service territories.

15 UNS Gas is requesting Commission authorization to redesign the Program (included as  
16 Attachment 1) to *work in cooperation* with electric service providers. This new program design  
17 should deliver incrementally higher customer and societal benefits. Further, under the proposed  
18 redesigned program the electric and gas utilities will share both the cost and savings of the new  
19 program.

20 Both APS and UNS Electric (collectively the "Electric Utilities") worked closely with  
21 UNS Gas in developing the redesigned program. Due to the very successful implementation of the  
22 current APS program design, APS did request that there should be no changes required on the APS  
23 program for any solution designed by UNS Gas. UNS Gas and the Electric Utilities discussed  
24 such items as marketing, program requirements, calculations of energy savings and environmental  
25 impacts and agreed upon a solution that would benefit builders and homeowners, as well as a  
26 solution that would work well for the Electric Utilities and UNS Gas.

27

1 **II. JOINT-UTILITY PROGRAM SUMMARY.**

2 The result of this redesign work is a new program that offers builders two basic choices for  
3 participation.

4 A. Existing Energy Star Home Certification (Offered by Electric Utilities).

5 Builders can participate in the basic program by contracting with the electric service  
6 provider in the area, either APS or UNS Electric. Builders would receive only one incentive from  
7 either APS or UNS electric. Although the Electric Utilities could claim both electric and gas  
8 energy savings, APS does not claim any gas energy savings for homes that participate in their  
9 program at this time. UNS Electric is willing to follow the same model as APS to claim only  
10 electric energy savings and allow UNS Gas to claim gas energy savings for homes participating in  
11 the existing APS Energy Star Home Program and the current UNS Electric ESH Program.

12 B. Joint-Utility Energy Star Home Certification (New Offer by UNS Gas).

13 Builders can participate in this joint certification by contracting first with the Electric  
14 Utilities, signing an agreement to meet the Basic Energy Star Home Certification. Builders will  
15 then sign an additional agreement with UNS Gas to install even higher efficiency gas appliances  
16 than required by the Electric Utilities so they meet the UNS Gas Program requirements. Builders  
17 will then receive one incentive from either APS or UNS Electric and another incentive from UNS  
18 Gas. The Electric Utilities will claim only electric savings from the UNS Gas Joint Utility Energy  
19 Star Home Certification and UNS Gas will claim only gas savings from the Program.

20 **III. ORIGINAL PROGRAM VS. NEW (REDESIGNED) PROGRAM.**

21 Below are the key changes to the Program that UNS Gas respectfully requests the  
22 Commission to approve:

- 23 ○ UNS Gas and the participating Electric Utilities will each market both opportunities  
24 for builders to participate;
- 25 ○ If a builder chooses to participate only at the Existing Energy Star level, UNS Gas  
26 will transfer this builder opportunity to the appropriate electric service provider;
- 27



1 **VI. CONCLUSION**

2 Wherefore, for all the foregoing reasons, UNS Gas respectfully requests Commission  
3 approval of the redesign of the UNS Gas Energy Smart Home Program in order to 1) enhance the  
4 Program, particularly in coordination with Electric Utilities serving the same homes; 2) reduce the  
5 total costs of program delivery; 3) allow UNS Gas to continue promotion of energy efficient new  
6 home construction; and 4) reduce the DSM Surcharge amount required for program delivery. The  
7 requested effective date of the redesigned Program is January 1, 2010.

8  
9 RESPECTFULLY SUBMITTED this 12<sup>th</sup> day of November 2009.

10 UNS Gas, Inc.

11  
12 By   
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15 and

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20 Attorneys for UNS Gas, Inc.

21  
22 Original and 13 copies of the foregoing  
filed this 12<sup>th</sup> day of November, 2009 with:

23 Docket Control  
24 Arizona Corporation Commission  
1200 West Washington Street  
25 Phoenix, Arizona 85007  
26  
27

1 Copy of the foregoing hand-delivered/mailed  
2 this 12<sup>th</sup> day of November 2009 to:

3 Lyn Farmer, Esq.  
4 Chief Administrative Law Judge  
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By: Mary Appolite

**Attachment 1**

**UNSG-Joint Utility- Residential New Home Construction Program**

(Re-Design of Residential New Construction Program)

# UNSG-Joint Utility- Residential New Home Construction Program

## Table of Contents

Background.....	1
Program Concept and Description.....	3
Target Market .....	3
Baseline Conditions .....	3
Program Eligibility .....	4
Program Rationale .....	4
Program Objectives .....	4
Products and Services .....	5
Delivery Strategy and Administration.....	5
Marketing and Communications.....	5
Program Implementation Schedule.....	6
Monitoring and Evaluation Plan.....	6
Program Budget .....	7
Estimated Energy Savings .....	7
Program Benefits and Costs.....	8
Appendix 1.....	10
Appendix 2.....	12

## UNSG-Joint Utility- Residential New Home Construction Program

### Background

The Energy Smart Homes Program for UniSource Gas Co. (“UNSG”) was approved by the Arizona Corporation Commission (ACC), in Docket Number G-04204A-07-0274 Decision No. 70180 on February 27, 2008. UNSG launched the program to customers on June 16, 2008. From June 16, 2008 through June 30, 2009 UNSG spent \$171,500 in total program costs, however participation in the program for the first full year has been dismal with a total of 11 builders signed up representing a total of 8 homes. Two major issues have been identified as the cause of this problem.

- Economic downturn and slow-down in new home construction
- In the northern part of UNSG service territory, APS launched an identical Energy Star Program several years in advance of the UNSG offering and all production builders are already participating in the APS program.

It became obvious from analysis of the first full year of program participation that the program is not cost effective. Information is provided in Table 1. Either UNS Gas must eliminate the program from the DSM Portfolio of programs or find a creative solution and a program design that is complimentary to the APS program. UNS Gas also realizes the importance for the program re-design to work in other areas of the UNS Gas service territory where electric service is provided by UNS Electric so there are not two separate program designs in the UNS Gas territory.

**Table 1: June 2008-June 2009 Cost Effectiveness:**

Year	2009
Total budget	\$171,510
Incentives	\$3,200
Administrative Costs	\$168,310
Incentives as % of budget	2%
Actual ESH participants	8
Incentive per site	\$400
Admin to incentives	5260%
Incentive to total budget	2%
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Societal Benefits	\$21,443
Societal Costs	\$176,612
Net Benefits	-\$155,169
<b>At IRP Discount Rate</b>	
Societal Benefits - IRP	\$16,283
Societal Costs	\$176,612
Net Benefits	-\$160,329

*As such, this program re-design titled the “UNSG-Joint Utility Residential New Home Construction Program” is being offered as a creative way to work in cooperation with electric utilities to provide a program design that delivers incrementally higher customer and societal benefits where utilities share both the cost and savings.*

UNSG re-visited the overall design and delivery of the existing program and discussed the situation with members of the design and implementation teams for the APS Energy Star Program

## **UNSG-Joint Utility- Residential New Home Construction Program**

and the UNSE Energy Smart Home Program. Team members with both electric utilities were extremely willing to work with UNSG. Due to the very successful implementation of the current APS program design, APS did request that there should be no changes required on the APS program for any solution designed by UNSG. UNSG and the electric utilities discussed such items as marketing, program requirements, calculations of energy savings and environmental impacts and agreed upon a solution that would benefit builders and homeowners and a solution that would work well for APS, UNSG and UNSE.

The result of this re-design work is a new program that offers builders two basic choices for participation.

### Existing Energy Star Home Certification (Electric Utilities):

Builders can participate in the basic program by contracting with the 'electric service provider'. This could be APS (joint territory with UNSG) or UNSE (joint territory with UNSG) in areas where APS is not the electric service provider. Builders will receive only one incentive from the electric service provider. Although electric service providers could claim both 'electric' and 'gas' energy savings, at this time APS does not claim any gas energy savings for homes that participate in their program. UNSE is willing to follow the same model as APS to claim only electric energy savings and allow UNSG to claim gas energy savings for homes participating in the existing APS Energy Star Home Program and the existing UNS Electric Energy Smart Home Program.

### Joint-Utility Energy Star Home Certification (UNS Gas):

Builders can participate in this step by contracting first with the 'electric service provider' to sign an agreement to meet the Basic Energy Star Home Certification. They will then sign an additional agreement with UNSG to install even higher efficiency gas appliances than required by the electric utilities so they meet the UNSG Joint Utility Energy Star Home requirements. Builders will receive one incentive from the electric service provider and another incentive from UNSG. The electric service providers will claim only 'electric' savings from the UNSG Joint Utility Energy Star Home Certification and UNSG will claim only 'gas' savings.

### **Original Program versus Newly Redesigned Program:**

The major differences between the original Energy Smart Home Program design and the redesigned program include:

- UNSG and the participating electric utilities will each market both opportunities for builders to participate.
- If a builder chooses to participate only at the Existing Energy Star level, UNSG will transfer this builder opportunity to the appropriate electric service provider;
- If a builder chooses to participate at the Joint-Utility Energy Star level, electric utilities will sign the customer at the existing level and refer the builder also to UNSG for the additional opportunity.
- Increased minimum furnace efficiency from 90 AFUE to 95 AFUE;
- Added a new requirement for a minimum water heater efficiency from .58 EF to .62 EF;
- Used 2009 updated incremental costs for equipment;
- Reduced incentives offered to builders from \$400/home to \$200/home;
- Adjusted participation numbers due to economic downturn;

## UNSG-Joint Utility- Residential New Home Construction Program

- Changed the delivery mechanism to include promotion from both electric and gas utilities; and
  - Decreased the overall program budget from \$420,000 to \$235,475.
- 

### Program Concept and Description

UNSG will continue to market The Joint-Utility Residential New Construction Program for UNSG under the name of Energy Smart Homes (“ESH”). The Joint Utility reference will only be used during on-site meetings with builders to advise them of the opportunities available. All future references to the actual UNSG program will be ESH.

The UNSG ESH program will emphasize the whole-house approach to improving health, safety, comfort, durability and energy efficiency. The program will promote homes that meet the 2006 EPA/DOE Energy Star Home<sup>®</sup> performance requirements and will add additional requirements for 95 AFUE furnaces and .62 EF water heaters. To encourage program participation by builders, the program will provide incentives to home builders for each qualifying ESH. Required on-site inspections and field testing of a random sample of homes to meet Energy Star Home<sup>®</sup> performance requirements will be conducted by third-party RESNET certified energy raters selected by each builder. New homes constructed through the program will be eligible to display the Energy Star Home<sup>®</sup> seal.

Builders will sign on as an Environmental Protection Agency / Department of Energy (“EPA/DOE”) Energy Star Home<sup>®</sup> partners and agree to adhere to all requirements of that program. Within the APS territory, this will include meeting the additional requirements of the APS Energy Star Homes program including room pressure balancing and fresh air ventilation. UNSG will partner with APS and UNSE, the electric service providers in the UNSG territory, to provide training and education about building science and the whole-house approach to building homes, marketing and builder incentives. The training and education will be offered to homebuyers, builders, sub-contractors and realtors/builder sales agents. Training is aimed at increasing the applied knowledge of building science and energy efficient building practices to transform the market and improve construction practices in the UNSG service territories.

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### Target Market

The target market will include all individually metered residential properties that receive gas service from UNSG. The program will be marketed to all builders within the UNSG service territory.

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### Baseline Conditions

A baseline study was completed by Ecos Consulting in February 2006 for UNSE and UNSG to determine potential savings from a residential new construction program. Results were used to develop a baseline condition home called “User Defined Reference Home” in the REM/Rate Residential Energy Analysis and Rating Software v12.7. Each time UNSE develops the Home Energy Rating Score (HERS) for a home, the User Defined Reference Home construction standards will be used to determine the ‘gas only’ energy savings for heating that results from envelope upgrades. UNSG also evaluated the incremental decrease in ‘gas only’ energy consumption using the REM/Rate Residential Energy Analysis and Rating Software v12.7 to determine energy savings from additional UNSG equipment standards that require the furnace to

## UNSG-Joint Utility- Residential New Home Construction Program

have a 95AFUE and raise the water heater efficiency to.62EF. Simulation results are included in Appendix 1.

In 2007, it was estimated that an average of 5,435 new units per year would be built from 2008 through 2012. The 2008/2009 economic downturn has had a significant impact on future new home construction. Based on economic outlooks in new home construction in other parts of Arizona, UNSG estimates a 60% reduction in this projection from 2010 through 2012. UNSG will base the savings estimates on 2,175 new units in 2010 with a 1 ½% growth in 2011 and 2012.

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### Program Eligibility

- Must be a builder of newly-constructed residential single-family residences, townhomes or condominiums each served by an individual gas meter. New homes must be located within the UNSG certificated service territory.

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### Program Rationale

In December 2004 and 2005 the residential sector of the UNSG customer base made up approximately 91% of total accounts and 67% total therm sales. It is useful to offer this type of energy efficiency program as the load will continue to be present on UNSG's system for 50 plus years after initial construction. It is much easier and more cost effective to work with builders to implement energy efficiency at the time of construction rather than attempt retrofit efficiency after a home has been built. For many new home measures, such as building improvements, the benefits of energy efficiency upgrades will be sustained for the life of the home to produce cost effective savings.

---

### Program Objectives

- Develop a *cooperative program design with electric and gas utilities* to reduce peak demand and overall energy consumption (gas and electric) in new homes;
- Add higher efficiency requirements than those required by Energy Star<sup>®</sup> for furnaces and water heaters to reduce energy consumption related to equipment.
- Stimulate construction of new homes that are inspected and tested to assure energy performance;
- Stimulate the installation of even higher AFUE (95% or greater) furnaces in heating climates;
- Stimulate the installation of high efficiency water heaters (.62 EF);
- Stimulate the installation of Energy Star<sup>®</sup> products;
- Achieve an annual participation of 15% of new home units, with approximately 326 homes in 2010;
- Assist sales agents with promoting and selling of energy efficient homes;
- Provide *co-operative training with electric service providers* to train builder construction staff and sub-contractors in advanced building science concepts to increase energy efficiency through improved design and installation practices;
- Provide *co-operative marketing and advertising with electric service providers* to increase homebuyer awareness and understanding of the benefits they receive from energy efficient building practices; and

## UNSG-Joint Utility- Residential New Home Construction Program

- Provide *co-operative education with electric service providers* for builders who: 1) are not familiar with savings potential; 2) may be uncertain about performance associated with energy efficient construction standards; 3) may be concerned about high first costs for construction measures.

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### Products and Services

The Energy Smart Homes Program provides several products and service, including;

- Promotion of builders and subdivisions that meet or exceed Energy Star® performance standards;
- Builder and sub-contractor education and training;
- Educational and promotional materials for builders and new home buyers; and
- Builder incentives for meeting Energy Star Homes® standards, as shown in Table 1.

**Table 1: Joint Utility-Residential New Home Construction Builder Incentives**

UES Energy Smart Home Program Incentives	
Meets Energy Star Homes® construction standards and UNSG high efficiency equipment standards.	\$200 per home

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### Delivery Strategy and Administration

The Energy Smart Homes Program will be implemented by employing the services of Conservation Services Group (“CSG”) a qualified implementation contractor (IC) selected through a competitive bidding process. CSG will provide program administration, marketing, planning, coordination of builder and contractor training and consumer education activities. CSG will also work closely with electric service providers in the UNSG service territory and coordinate all co-operative features of the Joint Utility sales and promotion of new homes.

Key industry relationships include: (1) EPA/DOE Energy Star Homes® for program branding and certification standards; (2) building Science trainers for training and education; (3) testing and inspection contractors approved by RESNET for third party performance verification and energy ratings; (4) the Arizona Energy Office for support in all areas;(5) local code officials; (6) Arizona Public Service; and (7) UniSource Electric, Inc.

CSG and UNSG representatives will develop key trade ally relationships including: (1) builders; (2) energy experts able to provide design assistance and building energy simulation modeling; (3) HVAC Contractors for sizing, installation and start-up of HVAC systems; (4) framing Contractors for framing and blocking detail to enhance insulation performance; and (5) insulation Contractors for insulation installed according to specifications.

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### Marketing and Communications

The goal for marketing the ESH is to educate consumers on the benefits of Energy Star Home® performance standards and promote builders who provide Energy Star Home® products including higher efficiency standards for furnaces and water heaters. Marketing is necessary to drive consumers to homebuilders who adhere to these performance standards. As more consumers demand the product, more builders will choose to build to ESH standards. Higher participation by builders results in higher quality and more energy efficient homes being built in the UNSG service territory.

## UNSG-Joint Utility- Residential New Home Construction Program

CSG and UNSG will provide the following marketing and promotional support:

For Builders:

- Advertisements and article placements in builder trade publications;
- Direct sales through builder account representatives;
- Point-of-Sale materials and sales tools;
- UNSG Web-site; and
- UNSG builder training events.

For Homebuyers:

- Advertisement or articles in targeted homebuyer publications;
- UNSG Web-site;
- Outreach and education at community events;
- Point-of-Sale materials at sales offices and model homes; and
- Brochures or bill-stuffers.

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### Program Implementation Schedule

The New Home Construction Program was implemented in 2008. It will be very easy to transition immediately into the new standards outlined in this Joint Utility Residential New Home Construction Program. UNS Gas estimates the new program details and implementation will take place within 30 days of program approval by the ACC.

---

### Monitoring and Evaluation Plan

UNSG has already adopted a strategy for integrated data collection that is designed to provide a quality data resource for program tracking, management and evaluation. This approach will entail the following primary activities:

- **Database management** - As part of program operation, UNSG collects necessary data elements to populate the tracking database and provide periodic reporting.
- **Integrated implementation data collection** - UNSG works with the implementation contractor to collect the data needed to support effective program management and evaluation.
- **Field verification** - UNSG conducts field verification on the installation of a sample of measures throughout the implementation of the program.
- **Tracking of savings using REM/Rate – Residential Energy Analysis and Rating Software v12.7.** - UNSG and the CSG utilize actual REM/Rate files for each home and produces a report showing the actual savings for heating and water heating that has resulted from program standards for each individual home.

This approach provides UNSG with ongoing feedback on program progress and enables program management to adjust or correct the program so as to be more effective, provide a higher level of service, and be more cost beneficial. Integrated data collection also provides a high quality data resource for evaluation activities.

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## UNSG-Joint Utility- Residential New Home Construction Program

### Program Budget

The 2010 ESH annual budget of \$228,550 will be allocated as shown in Table 2, while Table 3 provides the expected program budgets through 2012. It is expected that marketing and administrative costs may be higher because of the largely rural population than if the program were offered in a metropolitan area. On average over the life of the program, incentives are expected to account for 28% of the total budget.

**Table 2: 2010 Program Budget**

<b>Total Program Budget</b>	<b>\$228,550.00</b>	<b>(%)</b>
<b>Total Administrative and O&amp;M</b>	<b>\$19,500</b>	<b>8.53%</b>
Internal Utility Oversight (Labor)	\$15,000	76.92%
Travel & Direct Expenses	\$1,500	7.69%
Overhead	\$3,000	15.38%
<b>Total Administrative Cost</b>	<b>\$19,500</b>	<b>100.00%</b>
<b>Total Marketing Allocation</b>	<b>\$22,000</b>	<b>9.63%</b>
Internal Marketing Expense	\$22,000	100.00%
Subcontracted Marketing Expense	\$0	0.00%
<b>Total Marketing Cost</b>	<b>\$22,000</b>	<b>100.00%</b>
<b>Total Direct Implementation</b>	<b>\$170,250</b>	<b>74.49%</b>
Financial Incentives	\$65,250	38.33%
Implementation Contractor (Labor)	\$65,000	38.18%
Hardware & Materials	\$25,000	14.68%
Rebate Processing & Inspection	\$15,000	8.81%
<b>Total Direct Installation Cost</b>	<b>\$170,250</b>	<b>100.00%</b>
<b>Total EM&amp;V Cost Allocation</b>	<b>\$16,800</b>	<b>7.35%</b>
EM&V / Research Activity	\$15,120	90.00%
EM&V Overhead	\$1,680	10.00%
<b>Total EM&amp;V Cost</b>	<b>\$16,800</b>	<b>100.00%</b>
<b>Total Program Cost</b>	<b>\$228,550</b>	<b>100.00%</b>

**Table 3: 2010 – 2012 Program Budgets**

<b>Year</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
Total budget	\$228,550	\$235,407	\$242,469
Incentives	\$65,250	\$66,229	\$67,222
Administrative Costs	\$163,300	\$169,178	\$175,247
Incentives as % of budget	29%	28%	28%

### Estimated Energy Savings

APS advised UNSG that they do not claim any gas savings from the APS Energy Star Program so it is acceptable with APS to allow UNSG to claim all gas savings related to both the envelope upgrades and the higher efficiency gas furnaces and water heaters. UNSE agrees that this format is acceptable also. It was therefore agreed that APS and UNSE will claim all electric savings and UNSG would claim all gas savings related to homes in the individual programs.

UNSG utilized the REM/Rate Residential Energy Analysis and Rating Software v12.7 to determine the 'gas only' energy savings for both envelope upgrades and higher efficiency equipment upgrades. Simulations were completed using Flagstaff weather data and an actual home recently built in Flagstaff. Results of the REM/Rate analysis provide the basis for the

## UNSG-Joint Utility- Residential New Home Construction Program

energy savings used for the benefit cost analysis. A summary of this information is provided in Table 4.

**Table 4: Estimated per home energy savings**

	Heating Therms	Heating kWh	Cooling kWh	Water Heating Therms	Heating kW	Cooling kW	Water Heating Savings from Baseline	Heat Therm Savings from Baseline	Heat kWh Savings from Baseline
Elect Utility Equipment Only Baseline - 90 AFUE & .58 EF H2O	904	748	0	267	0.2	0			
UNSG Equipment Only - 95 AFUE & .62 EF H2O (Prorated from .64)	857	690	0	254	0.2	0	13	47	58
UDRH Baseline - Envelope Only - Heat Only	1315	852	0	0	0.2	0	0		
UNSG - Envelope Only - Heat Only	904	690	0	0	0.2	0	0	411	162
							<b>Total Savings</b>		<b>471</b>

Total annual participation goals and energy savings are presented in Table 5. The program expects, on average, 331 units annually will participate in the program. Appendix 2 provides the Measure Analysis Worksheet which includes information about estimated energy savings.

**Table 5. Joint Utility New Home Construction Program Annual Energy Savings**

Year	2010	2011	2012
Projected Number of Permits	2,175	2,208	2,241
Projected ESH Program %	15%	15%	15%
Projected ESH participants	326	331	336
Incentive per site	\$200	\$200	\$200
Per Home Non-Incentive Program Cost	\$511	\$526	\$542
Incentive tot total budget	29%	28%	28%
Energy Savings (kWh)	0	0	0
Energy Savings (Therms)	153,664	155,969	158,308

Based on the projected energy savings shown in Table 5, the program will also produce environmental benefits through avoided CO2 emissions. The estimated benefits from 2010 – 2012 are presented in Table 6.

**Table 6. Projected Environmental Benefits, 2010 - 2012**

Environmental Benefits 2010 - 2012	
CO2 Emissions Avoided	2,761 Tons

### Program Benefits and Costs

Table 7 shows results of the Total Resource Cost (“TRC”) test and the Societal Cost (“SC”) Test. The detailed benefit/cost analysis is presented in Appendix 2.

**Table 7. Benefit-cost analysis results**

Cost Benefit Test	
Total Resource Cost Test	2.39
Societal Cost Test	2.88

In addition to estimating the savings from each measure, this analysis relies on a range of other assumptions and financial data provided in Table 8.

**UNSG-Joint Utility- Residential New Home Construction Program**

**Table 8. Other Financial Assumptions**

Conservation Life (yrs)	20
Program Life (yrs)	3
Avoided Cost – No Carbon (\$/Therm)	0.84
Avoided Cost – Medium Carbon (\$/Therm)	1.01
TRC Discount Rate	7.0%
Social Discount Rate	7.00%
NTG Ratio	95%

# UNSG-Joint Utility- Residential New Home Construction Program

## Appendix 1

### Energy Use Calculation for Baseline and UNS Gas Standards

#### FUEL SUMMARY

Date: August 14, 2009 Rating No.: test\_01  
Building Name: 95 AFUE + 0.64 WH Rating Org.: E3 Energy (modified by VR)  
Owner's Name: Phone No.: (928) 226-0056  
Property: Rater's Name: Justin Erickson  
Address: Flagstaff, AZ 86001 Rater's No.:  
Builder's Name:  
Weather Site: Flagstaff, AZ Rating Type: Based On Plans  
File Name: 2830\_95AFUE\_64WH\_UNSG.blg Rating Date: 7-21-09  
**REM/Rate - Residential Energy Analysis and Rating Software v12.7**  
This information does not constitute any warranty of energy cost or savings.  
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#### UDRH envelope UNSG 95 AFUE + 0.64 WH DIFF % DIFF

##### **Annual Energy Cost (\$/yr)**

Natural gas \$ 1106 \$ 771 \$ 335 30.3%

Electric \$ 1008 \$ 996 \$ 13 1.2%

##### **Annual End-Use Cost (\$/yr)**

Heating \$ 983 \$ 651 \$ 333 33.8%

Cooling \$ 123 \$ 112 \$ 11 8.8%

Water Heating \$ 187 \$ 172 \$ 15 8.0%

Lights & Appliances \$ 822 \$ 832 \$ -10 -1.3%

Photovoltaics \$ -0 \$ -0 \$

Service Charges \$ 176 \$ 176 \$

Total \$ 2291 \$ 1943 \$ 348 15.2%

##### **Annual End-Use Consumption**

Heating (Therms) 1315 857 458 34.8%

Heating (kWh) 852 690 163 19.1%

Cooling (kWh) 1223 1119 104 8.5%

Water Heating (Therms) 267 246 21 8.0%

Lights & Appliances (kWh) 9612 9743 -131 -1.4%

##### **Annual Energy Demands (kW)**

Heating 0.2 0.2 0.0 19.1%

Cooling 1.7 1.7 0.0 2.5%

Water Heating (Winter Peak) 0.0 0.0

Water Heating (Summer Peak) 0.0 0.0

Lights & Appliances (Winter Peak) 0.8 0.8 -0.0 -1.0%

Lights & Appliances (Summer Peak) 2.1 2.1 -0.0 -1.4%

Total Winter Peak 1.1 1.0 0.0 3.6%

Total Summer Peak 3.8 3.8 0.0 0.3%

##### **Utility Rates:**

Electricity: APS 1/07st\*\*

Gas: Uni-Source 4/07 st\*\*

NOTE: Gas water heating energy use for 0.62 EF was pro-rated from baseline of 0.58 EF and above estimate for 0.64 EF.

# UNSG-Joint Utility- Residential New Home Construction Program

## Appendix 1

### Energy Use Calculation for Baseline and UNS Gas Standards

#### FUEL SUMMARY

Date: August 10, 2009 Rating No.: test\_01  
Building Name: 95 AFUE + 0.64 WH Rating Org.: E3 Energy (modified by VR)  
Owner's Name: Phone No.: (928) 226-0056  
Property: Rater's Name: Justin Erickson  
Address: Flagstaff, AZ 86001 Rater's No.:  
Builder's Name:  
Weather Site: Flagstaff, AZ Rating Type: Based On Plans  
File Name: 2830\_95AFUE\_64WH\_UNSG.blg Rating Date: 7-21-09  
**REM/Rate - Residential Energy Analysis and Rating Software v12.7**  
This information does not constitute any warranty of energy cost or savings.  
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#### baselinerevised UNSG 95 AFUE + 0.64 WH DIFF % DIFF

##### **Annual Energy Cost (\$/yr)**

Natural gas \$ 819 \$ 771 \$ 48 5.9%

Electric \$ 1000 \$ 996 \$ 5 0.5%

##### **Annual End-Use Cost (\$/yr)**

Heating \$ 688 \$ 651 \$ 38 5.5%

Cooling \$ 112 \$ 112 \$ 0 0.0%

Water Heating \$ 187 \$ 172 \$ 15 8.0%

Lights & Appliances \$ 832 \$ 832 \$ 0 0.0%

Photovoltaics \$ -0 \$ -0 \$

Service Charges \$ 176 \$ 176 \$

Total \$ 1996 \$ 1943 \$ 53 2.6%

##### **Annual End-Use Consumption**

Heating (Therms) 904 857 48 5.3%

Heating (kWh) 748 690 58 7.8%

Cooling (kWh) 1119 1119

Water Heating (Therms) 267 246 21 8.0%

Lights & Appliances (kWh) 9743 9743

##### **Annual Energy Demands (kW)**

Heating 0.2 0.2 0.0 7.8%

Cooling 1.7 1.7

Water Heating (Winter Peak) 0.0 0.0

Water Heating (Summer Peak) 0.0 0.0

Lights & Appliances (Winter Peak) 0.8 0.8

Lights & Appliances (Summer Peak) 2.1 2.1

Total Winter Peak 1.0 1.0 0.0 1.6%

Total Summer Peak 3.8 3.8

##### **Utility Rates:**

Electricity: APS 1/07st\*\*

Gas: Uni-Source 4/07 st\*\*

NOTE: Gas water heating energy use for 0.62 EF was pro-rated from baseline of 0.58 EF and above estimate for 0.64 EF.

# UNSG-Joint Utility- Residential New Home Construction Program

## Appendix 2

### MEASURE ANALYSIS - BENEFIT/COST ANALYSIS

Cost-Benefit Analysis  
UNSG-Joint Utility New Home Construction Program  
Tier 2 - UNSG- Incremental Increase to Electric Service Providers

**UNSG RES PROGRAM**

PROGRAM DATA	OPERATING DATA	OTHER FACTORS
Measure Life (Yrs): 20	90 AFUE to Min 95 AFUE FURNACE	Application: Upgrade
Program Life (Yrs): 18	.58 EF to Min .62 EF WATER HEATER	Cost Basis: Installed Cost
Winter Off-Peak (\$/kWh): 0.0000 Note 2		Winter On-Peak Ratio: N/A
Winter On-Peak (\$/kWh): 0.0000 Note 2		Winter Off-Peak Ratio: N/A
Avoided Cost Levelized \$/Therm (Med Carbon): \$1.01		
Avoided Cost Levelized \$/Therm (No Carbon Impact): \$0.84		
Per Home Non-Incentive Program Costs - Average: \$511		
IRP Discount Rate: 7.00%		
Social Discount Rate: 7.00%		
NTG Ratio: 95%		

  

RATE DATA	Note 3
\$/Therm	\$ 1.23

Measure Type	DEMAND/ENERGY SAVINGS				INCENTIVE CALCULATIONS				CUSTOMER COST/SAVINGS			WGT.	% Incent	TRC	SC
	UNSG Tier 2 - Requirements	Current Practices Heating and H2O Therms	UNSG Annual Savings Heat/H2O (Therms/home)	UNSG Heat/H2O (Therms)	IRP PV Benefit (\$/Unit)	Social PV Benefit (\$/Unit)	Recommended Incentive (\$/Unit)	PV Program Cost (\$/Unit)	Incr. Cost (\$/Unit)	Cost Savings (\$/Unit)	Payback w/Inc. (Yrs)				
Equipment upgrade to UNSG level from 90 & .58 Flagstaff	95 AFUE & .62 EF	1,171	1,111	60	\$509	\$612	\$200	\$1,471	-\$963	\$838	\$74	100%			
Envelope upgrade from UDRH to Energy Star	Area standard to Energy Star	1,315	904	411	\$3,483	\$4,194	\$0	\$647	\$2,836	\$170	\$506	100%			
<b>Total Savings per Home for Benefit/Cost Analysis</b>				<b>471</b>	<b>\$3,992</b>	<b>\$4,808</b>	<b>\$200</b>	<b>\$2,118</b>	<b>\$1,873</b>	<b>\$1,008</b>	<b>\$579</b>	<b>1.0</b>	<b>0.2</b>	<b>2.39</b>	<b>-2.88</b>

(1) See REMRATE Attachments for calculation parameters  
 (2) Avoided Cost of Energy from Levelized Cost \$/therm for UNSG (2009)  
 (3) Cust Cost of gas includes \$0.3270 delivery and estimated average of \$0.80 gas cost and does not include monthly minimum charge.  
 (4) See worksheet 'Cost Assumptions' for information of incremental cost for equipment upgrade. No incremental cost addition on envelope as this is covered by electric utility program  
 (5) NTG Ratio and discount rate based on ACC guidance 2/20/2009