Tucson Electric Power Company

One South Church, P.O. Box 711
Tucson, AZ 85702

June 30, 2009

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

Re: Tucson Electric Power Company Zero-Net Energy Homes Pilot Program
Docket Nos. E-01933A-07-0402 and E-01933A-05-0650, Decision No. 70628

In Decision No. 70628 (November 25, 2008), the Arizona Corporation Commission ("Commission") ordered Tucson Electric Power Company ("TEP") to evaluate the feasibility and cost-effectiveness of a pilot program to promote a "zero-net residential energy efficiency program." Attached, please find the TEP "Zero-Net Energy Homes Pilot Program" ("ZEH") which documents the results of an analysis to explore the feasibility and cost-effectiveness of promoting a ZEH program and the proposed program design and incentive levels.

The attached pilot program presents a program design that expands the existing New Home Construction Program through the addition of two high performance tiers. By using this recommended program design, the existing Tier 1 energy efficient new home construction scenario, the new Tier 2 energy efficient home construction scenario and the new Tier 3 near zero-net energy homes scenario will be integrated into a single New Home Construction Program. Homes will qualify for one of the three tiers in the program based on a Home Energy Rating System ("HERS") Index score. Tier 1 will require a minimum of a HERS that is <= 85, Tier 2 will require a minimum of HERS <= 70, and Tier 3 will require a minimum of HERS <=45. This program design will allow TEP to utilize existing delivery infrastructure and marketing to promote all three energy efficient home construction tiers. While the additional tiers significantly enhance the energy efficiency of the New Home Construction Program, they do not achieve 100% zero-net energy due to cost-effectiveness concerns.

If you have any questions or comments, please contact me at (530) 884-3708. An electronic copy of the Program and its appendices will be provided upon request.

Respectfully submitted,

Philip Dion
Vice President, Legal and Environmental Services

Enclosure: Program

cc: Chairwoman Kristin K. Mayes
Commissioner Paul Newman
Commissioner Gary Pierce
Commissioner Sandra D. Kennedy

Commissioner Bob Stump
Ernest Johnson, ACC
Barbara Keene, ACC
Julie McNeely-Kirwan. ACC
Compliance, ACC

Tucson Electric Power Company
Zero-Net Energy Homes Pilot Program

June 30, 2009

Table of Contents

Program Concept and Description

In Decision No. 70628 (November 25, 2008), the Arizona Corporation Commission ("Commission") ordered Tucson Electric Power Company ("TEP") to evaluate the feasibility and cost-effectiveness of a pilot program to promote a "zero-net residential energy efficiency program." The TEP "Zero-Net Energy Homes Pilot Program" ("ZEH") documents the results of an analysis regarding the feasibility and cost-effectiveness of promoting the proposed ZEH program design and incentive levels. This pilot program presents a program design that expands the existing New Home Construction Program through the addition of two high performance tiers. By using this recommended program design, the existing Tier 1 energy efficient new home construction scenario, the new Tier 2 energy efficient home construction scenario and the new Tier 3 near zero-net energy homes scenario will be integrated into a single New Home Construction Program. Homes will qualify for one of the three tiers in the program based on a Home Energy Rating System ("HERS") Index score. Tier 1 will require a minimum of a HERS that is <= 85, Tier 2 will require a minimum of HERS <= 70, and Tier 3 will require a minimum of HERS <=45. This program design will allow TEP to utilize existing delivery infrastructure and marketing to promote all three energy efficient home construction tiers. While the additional tiers significantly enhance the energy efficiency of the New Home Construction Program, they do not achieve 100% zero-net energy due to cost-effectiveness concerns.

For the purposes of this report, the term "zero-net energy" is the ratio between annual energy generated by the house through on-site renewable devices and the total annual energy used by the house.

Thus if 50% of the annual energy a building uses comes from on-site generation, it is considered to be a 50% ZEH. There will be times when the building is exporting to the grid (more electricity being generated than being used), times when it is importing energy from the grid (more energy being used than being generated), and periods when there is no import or export (all the energy the building needs is being generated on-site).

Target Market

The target market is comprised of all individually metered new homes that receive electric service from TEP. This includes home developments, townhomes and condominium projects where individual units are sold to homeowners and custom home projects. The program would be marketed to all builders within the TEP service territory for homes that are either all electric or have a combination of electric and natural gas energy supplies.

For the purposes of the Tier 2 energy efficient homes and 3 near zero-net energy homes options, TEP focused the enclosed savings and cost analysis on homes that are all-electric, because a home using gas for space heating or water heating cannot be 100% zero-net, as the renewable devices cannot replace all of the energy used by the house. However, by providing a tiered program approach, TEP will have the opportunity to promote the second tier of efficiency for homes constructed with a combination of electric and natural gas energy supplies even if these homes cannot achieve the Tier 3 near zero-net approach.

Relation to TEP's Current Residential New Construction Programs

Currently, the TEP Residential New Construction Program offers three construction approaches, as described below. The Guarantee Solar Program described below will most likely be replaced by the new Tier 3 near zero-net option if approved by the Commission.

- **Guarantee Homes Program** – This program has been offered since 1997. Although homes in this program must meet the minimum HERS Index score of 85 required by Energy Star, the program requirements also include steps to achieve a higher energy performance standard than regular Energy Star homes. This is accomplished by not only making sure insulation is properly installed, and that air barriers are installed, but additional requirements ensure that air pressures are managed, and that each home includes fresh-air ventilation. In order for TEP to guarantee heating and cooling costs and provide the R201, electric heat pumps and electric water heaters are required in each home.
- **Guarantee Solar Program** – Homes built to Guarantee Home Program standards (Minimum HERS Index Score of 85) with the addition of solar thermal or Photovoltaic ("PV"), which may lead to certifying the home as a LEED for Home, NAHB Green Building Program, or other green certification. All guidelines in the Renewable Energy Credit Purchase Program (RECPP) must be followed for the solar thermal or PV additions. TEP started this offering in December 2008.
- **Energy Star® Program** – For homes constructed to Energy Star® standards (Minimum HERS Index Score of 85) that include combined gas and electric energy supplies. This section was added in 2008 to satisfy Decision No. 70458 (August 6, 2008) that TEP provide the same builder incentives for homes built with gas as those incentives provided to builders in the Guarantee Home Program.

The levels of efficiency for the new tiers will be based on how the homes perform based on a HERS Index score, which awards a numerical value gauging the homes performance. Higher performing homes achieve a lower HERS score.

In order for homes to qualify for each tier, they must meet the minimum HERS Index Scores from on-site testing by certified HERS Raters as shown in Exhibit 1.

Exhibit 1: HERS Index Scores for Residential New Home Construction Program

Tier 1 (Existing Program)	HERS Index Score of <= 85
Tier 2 (New Level Energy Efficiency Only)	HERS Index Score of <= 70
Tier 3 (New Level 50% Zero-Net Energy)	HERS Index Score of <= 45

A number of additional items will be added to the construction standards in order for builders to achieve the second tier (HERS 70) and the third tier (HERS 45). As a result of these necessary additions, the incremental cost to build homes to the higher tiers will increase and so will the recommended incentive to the builder. Modifications to the construction standards to achieve the Tier 2 and 3 homes are likely to include:

- Greater envelope and HVAC energy efficiency standards;
- Ducts are located within conditioned space;
- Both PV and solar water heating on the ZEH;
- Passive solar design that incorporates passive solar heating in the winter and shading in the summer for the highest efficiency homes;
- Energy star fixed appliances; and
- CFL lighting.

Program Objectives

The objectives of the Program are:

- Reduce peak demand and overall energy consumption (electric) in new homes;
- Implement programs that include more aggressive energy efficiency standards that produce savings of at least 20% above baseline (HERS 70) and a near zero-net percentage of at least 50% (HERS 45) where approximately 50% of annual energy used by the home will come from on-site renewable generation;
- Stimulate the installation of solar photovoltaic systems and solar water heaters in new homes;
- Stimulate energy efficiency standards that are higher than EPA/DOE Energy Star Homes® performance standards;
- Stimulate construction of new homes that are inspected and tested to assure energy performance;
- Stimulate the installation of high efficiency heating and cooling systems, envelope, lighting, and fixed appliances (Energy Star® products);

- Assist sales agents with promoting and selling of zero-net energy homes;
- Provide information to help explain the benefits of zero-net energy home features;
- Train builder construction staff and sub-contractors in advanced building science concepts to reach zero-net energy goals through improved design and installation practices, and through the installation of renewable energy devices;
- Increase homebuyer awareness and understanding of the benefits they receive from living in a zero-net energy home and how they can improve the performance of their home; and
- Educate builders who: 1) are not familiar with energy savings and on-site generation potential; 2) may be uncertain about zero-net energy performance; 3) may be concerned about high first costs for construction measures.

Products and Services

The ZEH Pilot Program design would provide several products and services, including:

- Promotion of builders and subdivisions that achieve energy savings of at least 20% above baseline (HERS 70) and/or near zero-net energy levels of approximately 50% (HERS 45), through maximizing energy efficiency opportunities and including renewable energy systems;
- Builder and sub-contractor education and training;
- Educational and promotional materials for builders and new home buyers; and
- Homeowner or builder incentives for achieving increasing energy efficiency and zero-net energy levels as measured by a HERS Index score of either <=70 or <=45.

Program Budget

This section presents an estimate of only the additional incremental cost associated with promotion of a multi-tiered program that includes the Tier 2 and 3 options. Exhibit 2 and 3 present estimated budgets over a three year period, from 2010-2012. This budget represents only the incremental increase in budget over the budget approved for the current Residential New Construction Program. Overall, the Company anticipates 100 homes per year will participate in the pilot program in 2010, of which 70% will be at Tier 2 and 30% at Tier 3, with overall participation increasing at 10% per year overtime.

On average, over the life of the program, incentives are expected to account for 85% of the total budget.

Exhibit 2: 2010 - 2012 Program Budget by Category For Tier 2 and Tier 3 Homes

Year	2010	2011	2012
Financial Incentives	$195,000	$214,500	$235,500
Total Direct Implementation	$19,514	$19,945	$20,420
Total Marketing Allocation	$7,921	$8,713	$9,584
Total Administrative and O&M Cost Allocation	$6,598	$7,258	$7,984
Total EM&V Cost Allocation	$1,486	$1,634	$1,798
Total Program Budget	$230,518	$252,050	$275,285

Exhibit 3: Incentives as a Percentage of Program Costs For Tier 2 and Tier 3 Homes

Year	2010	2011	2012
Total Budget	$230,518	$252,050	$275,285
Incentives	$195,000	$214,500	$235,500
Administrative Costs	$35,518	$35,518	$35,518
Incentives as % of Budget	85%	85%	86%

Pilot Program Design Methodology

The approach used in the feasibility assessment for the ZEH pilot program included the development of a baseline simulation model of a new home, and then several versions of the baseline model with increasing levels of energy efficiency, and, finally, several versions of the energy efficient models with increasing levels of zero-net energy goals.

The four stages of the study were:

1) Define and simulate a baseline home reflecting current practice for new single family homes in Tucson, Arizona. The home was modeled as all-electric.
2) Define and simulate three homes with increasing levels of efficiency. The targets for the models were a 20%, 30% and 35% reduction in annual energy use based on efficiency savings alone.
3) Simulate three homes with increasing levels of zero-net by adding both solar water heating and solar PV. The targets for the models were 50%, 75%, and 100% –zero-net levels. These models were based on either the 20% or the 35% energy efficiency home.
4) Combine estimated demand and energy savings from all of the models, incremental costs over baseline costs, and other utility data to produce a benefit-cost test result for each model. This was done in the format of a Measure Analysis Sheet.

The models were developed with the eQuest™ simulation software to generate savings estimates, and, in addition, the homes were modeled with REM/Rate simulation software in order to determine what HERS index they would achieve.

The baseline home simulation model was an all-electric, 1,850 square-foot home in Tucson, Arizona. The level of efficiency in the baseline model was based on a combination of two sources: the 2007 Enovity Report[1], and the 2006 International Energy Conservation Code for residential new construction.

Nine cases were developed altogether – three with only energy efficiency, three zero-net models based on a 20% energy efficient house, and three zero-net models based on a 35% energy efficient house.

In developing the energy efficiency-only models, a goal of 20%, 30% and 35% reduction in annual energy use over the baseline was initially set. Various efficiency measures were added to the baseline to produce increasing levels of savings, including the following:

- **Orientation:** Orienting a house in a north-south direction. (this is normally not possible when working with production builders in subdivision design and can typically only be applied to custom projects);
- **Windows:** Reducing the total window area, increasing window area on south-facing wall to increase passive solar heating, improving glass U and SHGC values;
- **HVAC measures:** Reducing infiltration, reducing duct leakage, heat pump quality installation[2], increasing heat pump SEER and COP or HSPF values, moving ducts into conditioned space;
- **Envelope:** Increasing R values in the walls and ceiling;
- **Lighting:** Reducing lighting power density with the use of CFLs; and
- **Appliances:** Replacing standard fixed appliances with Energy Star® fixed appliances.

In developing the zero-net energy home models, estimated hourly output from a solar water heating system and a solar PV system were subtracted from the hourly total energy use of the 20% EE or 35% EE model results, giving the net hourly use of the home and the net annual use. The solar output was estimated using PVWatts simulation software for the solar PV system, and an in-house built spreadsheet model for the solar water heating system. The hourly model results were used to determine coincident and non-coincident peak demand for each case.

Finally, incremental costs were researched for each combination of measures in each model and are detailed in the Measure Analysis Sheet ("MAS") sheets, as shown in Appendices 1, 2 and 3.

Study Results

As detailed in Exhibit 4, the baseline home model consumption is 14,228 kWh per year (an all electric home), and the HERS Index for this model is 90. As noted in the description of the different tiers, energy consumption decreases and the HERS Index improves as the number and amount of efficiency measures and efficient design increases and renewables are added. After reviewing a variety of different modeling scenarios, with varying levels of efficiency and percentages of zero-net energy, and associated HERS index scores and cost-effectiveness, the

[1] *Residential Home Standards: Energy Analysis and DOE-2 Simulation,* Prepared by Enovity Inc for Tucson Electric Power Company, February 12, 2007

[2] HVAC quality installation includes the following four measures: Correct sizing of AC unit; correct airflow over the coil: correct refrigerant charging, and correct pressure balancing in ducts.

pilot program design proposes two higher performing Tiers (additional detail on model results for different scenarios is included in the MAS sheets, as shown in Appendices 1, 2 and 3)

Tier 1 is the current Residential New Home Construction Program – Guarantee Home approach – with qualifying standard at a HERS index of <= 85. Re-analysis of the existing Residential New Home Construction Program was not included in this pilot program design.

Tier 2 is a proposed new Guarantee Homes Plus approach (electric) and/or a new Energy Star® Plus approach (electric and gas) with a qualifying HERS index score of <=70. This home is modeled to be approximately 20% more efficient than the baseline home.

Tier 3 is a proposed new Guarantee Homes Near Zero-Net approach and has a qualifying HERS index score of <=45. This home is modeled to be approximately 50% zero-net energy based on the home that is 35% higher efficiency than a baseline home.

As stated above, no analysis is included on the existing Energy Star® Program approach using natural gas for water heating and space heating because a home using gas for space heating and water heating cannot be 100% zero-net, as the renewable devices cannot replace all of the energy used by the house.

Analysis results of the nine different scenarios are included in Appendix 1. TEP chose one level of energy efficiency and one level of near zero-net energy as the best definition for Tier 2 and Tier 3 based on the cost effectiveness analysis. TEP will limit our recommendation to these two options for inclusion in this program.

Exhibit 4: Results of Simulation Modeling for Tier 2 and Tier 3

	Baseline Home	Tier 2: HERS Index <=70	Tier 3: HERS Index <=45
Modeled Annual Consumption (kWh)	14,228	11,355	4,770
Peak Demand – Coincident (kW)	5.72	3.75	2.54
Annual kWh Savings	n/a	2,873	9,458
Annual Peak kW Savings	n/a	1.97	3.18

Total annual participation goals and energy savings are presented in Exhibit 5.

The current status of home construction causes TEP to believe there would be a limited number of builders and/or customers willing to incur the additional costs of the higher levels of efficiency at this time. Therefore, for the purpose of this analysis, TEP expects to start with a maximum of 100 participants, about 70% of whom will achieve the Tier 2 requirement of HERS <= 70, with the remaining participants (30%) achieving Tier 3 - a 50% near zero-net energy level with a HERS <= 45. An annual increase in participation of 10% per year has been included in the forecast. Exhibit 5 provides further information about estimated incremental energy savings for the program. This forecast does not include participants in Tier 1 – the existing Residential New Home Construction Program.

Exhibit 5: Tier 2 and 3 Homes Participation and Energy Savings

Year	2010	2011	2012	Total
Participants at Tier 2: Guarantee Homes Plus or Energy Star Plus (HERS Index <= 70)	70	77	85	232
Participants at Tier 3: Guarantee Homes Near Zero (50% Zero-Net and HERS Index <=45)	30	33	36	99
Projected Total Tier 2 and 3 participants/year	100	110	121	331
Annual Energy Savings (MWh)	485	533	585	1,603
Cumulative Energy Savings (MWh)	485	1,018	1,603	3,106

Program Benefits and Costs

A MAS was developed for the nine different cases that were assessed, to gauge the benefit/cost results of different ZEH scenarios and assist in the selection of the Tier 2 and Tier 3 standards and is included as Attachment 1. A separate MAS was developed for the two cases that represent the Tier 2 and Tier 3 standards and is included as Attachment 2. In addition to estimating the savings from each measure, this analysis relies on a range of other assumptions and financial data provided in Exhibit 6.

Exhibit 6: Other Financial Assumptions*

	Value		
Carbon AC $/kWh	Low	Medium	High
	$0.0266	$0.0476	$0.0818
Summer On-pk Energy AC ($/kWh):	$0.0796		
Summer Off-pk Energy AC ($/kWh):	$0.0323		
Winter On-pk Energy AC ($/kWh):	$0.0539		
Winter Off-pk Energy AC ($/kWh):	$0.0324		
IRP Discount Rate	7.00%		
Conservation Life (yrs):	20		
NTG Ratio:	100%		
Program Administration Costs**	$350		

* TEP, UNS Gas, Inc. and UNS Electric, Inc., met on three occasions during 2009 with Commission Staff to 1) develop a methodology to determine cost-effectiveness, based on the use of the societal test, that would be comparable to the methodology used by Commission Staff in their own analysis, 2) gain agreement that the values used in cost-effectiveness calculations for DSM/EE Programs should be the same as those values reported in the Company's Integrated Resource Plan, and 3) provide Commission Staff with updated avoided cost tables for TEP, UNS Electric, Inc. and UNS Gas, Inc. As a result of these meetings TEP modified cost-effectiveness calculations to represent a more realistic Societal Cost test. The three most significant changes in the TEP evaluation of cost effectiveness now include:

- Use of load-curves in addition to on-peak and off-peak levelized energy costs to calculate avoided cost of energy to match Commission Staff calculations.\;
- Use a point-in-time methodology that does not include carrying costs of capital, to calculate avoided cost of capacity to match Commission Staff calculation of the societal test. Note: while the California Standard Practice Manual, 2002 version, is explicit on this approach, TEP would like to continue conversations with Commission Staff on whether this approach is actually consistent with how the societal cost tests are actually calculated by the California utilities; and

- A valuation of Carbon Dioxide (CO2) at a low, medium, and high projection starting at $14, $25, or $43/ton and inflating over time based on information that will be reported in the 2009 IRP. Inclusion of an estimated carbon value as an externality cost is consistent with the societal cost test methodology.

** Represents the estimated incremental administration and implementation costs per home.

Although Commission Staff advised the Company to include a valuation of CO2 in the benefit-cost calculations, Commission Staff and TEP also understand it is up to the Commissioners to accept or deny this value. Until the Commission provides a formal acceptance regarding inclusion of CO2 in the calculation of the Societal Cost test, TEP will continue to provide results of the Total Resource Cost ("TRC") test for Commission review.

Exhibit 7 provides a summary of program costs and benefits for the proposed Tier 2 and Tier 3 homes, including the TRC test and the Societal Cost ("SC") test results[3]. Savings are net based on 100% net-to-gross ratio.

Exhibit 7: Benefit-Cost Analysis Results

	Tier 2: HERS Index <=70	Tier 3: HERS Index <=45 (50% Zero-Net)
Incremental Costs	$3,995	$17,926
State/Federal Tax Credits	$0	$3,011
Unisource Solar Rebates	$0	$4,004
Total Resource Cost ("TRC")	1.41	0.86
Societal Test ("SC") – Low Carbon Avoided Costs	0.87	0.58
Societal Test ("SC") – High Carbon Avoided Costs	1.32	0.93

Recommendations for the Pilot Program

Given the results of the benefit-cost tests, TEP recommends proceeding with Tier 2 and Tier 3 standard as an investment in market transformation for the residential new construction sector even though the cost-effectiveness is marginal. Because of the significant increase in incremental costs, TEP is also recommending a significant increase in the incentive offered to builders who choose to participate at the Tier 2 or Tier 3 level. Over time, TEP will monitor estimated incremental costs and re-screen the program. Exhibit 8 below presents the proposed tiers, qualifying standards, and incentive levels.

[3] State and Federal tax credits for solar PV and solar water heating were added to the TRC benefits according to the methodology outlined in the California Standard Practice Manual as a one-time benefit to the avoided costs. Tax credits were not included in the SC test, as they are considered to be a pass-through. Solar rebates were not included at all in the benefit-cost calculations.

Exhibit 8: TEP Energy Efficient Homes Program Prescriptive Incentives

Participation Requirement	HERS Index	Incentive
Tier 1: Guarantee Homes (Current Program)	<=85	$400 per home
Tier 2: Guarantee Homes Plus	<=70	$1,500 per home
Tier 3: Guarantee Homes Near Zero-Net (50% ZEH)	<=45	$3,000 per home

Note: The HERS index takes into account all the energy efficiency and renewable energy measures in the house. The lower the HERS index, the more energy efficient and closer the home is to zero-net. Also note that the incentives are not designed to be additive to the $400 incentive for the Guarantee Homes program, but a stand-alone incentive per qualifying tier.

Appendix 1 – Measure Analysis Sheet – 9 cases

PROGRAM DATA	Low	Medium	High
Conservation Life (yrs):			20
Carbon $/kWh	$0.0271	$0.0478	$0.0818
Summer On-pk Energy AC ($/kWh):			$0.0796
Summer Off-pk Energy AC ($/kWh):			$0.0328
Winter On-pk Energy AC ($/kWh):			$0.0539
Winter Off-pk Energy AC ($/kWh):			$0.0324
Weighted Avoided Cost			$0.0464
Ratio Measure Administrative Costs to Incentive Costs			NA
IRP Discount Rate			7.00%
NTG Ratio:			100%
Program Admin Costs per Participant:			$350

RATE DATA		
Rate:		
$/kW:		0.00
$/kWh, On-Peak:		0.09092
$/kWh, Off-Peak:		0.07897

OPERATING DATA	
Summer Ratio:	50%
Winter Ratio:	50%
Summer On-Peak Ratio	34.5%
Summer Off-Peak Ratio	65.5%
Winter On-Peak Ratio	17.1%
Winter Off-Peak Ratio	82.9%
Coincidence Factor:	100%

OTHER FACTORS	
Line Loss Factor:	9.50%
Capacity Reserve Factor:	0.00%
Application	ROB
Cost Basis:	Incremental Equip

	BASELINE AND MEASURE PERFORMANCE						DEMAND/ENERGY SAVINGS					INCENTIVE AND PV CALCULATIONS							CUSTOMER COSTS/SAVINGS				WGT.	% Incent	B/C		
	Current	Current	Current	ZEH	ZEH	ZEH	Non-Coincident	On-pk	Off-pk	PV	PV	PV					PV	PV									
	Practices	Practices	Practices				Demand	Energy	Energy	Energy	Capacity	Carbon			Recommended		Customer	Admin		Incr.	Cost	Payback			Societal Cost Test		
Measure Type	Total Annual	Coin. Demand	Non-Coin. Demand	Total Annual	Coin. Demand	Non-Coin. Demand	Savings	Savings	Savings	Benefit	Benefit	Benefit - Low	Benefit - Med	Benefit - High	Incentive		Cost	Cost	NPV (low case)	Cost	Savings	wo/inc.	w/inc.	Weighting	Incent as % of Incr Costs	Low Carbon ($14)	Med Carbon ($25)	High Carbon ($43)
	kWh	kW	kW	kWh	kW	kW	(kW)	(kWh)	(kWh)	($)	($)	($)	($)	($)	($)	% PV	($)	($)	($)	($)	($)	(yrs)	(yrs)	Factor	(%)			
[redacted]	14,228	5.72	5.72	11,355	3.75	3.75	1.97	744	2,129	$1,656	[redacted]				$1,500	40%	$3,995	$350	-$559	$3,995	$236	16.9	10.6	11%	38%	0.87	1.04	1.32
30% EE Case (no solar)	14,228	5.72	5.72	10,245	3.48	3.48	2.24	1,031	2,951	$2,296					$1,500	30%	$5,519	$350	-$912	$5,519	$327	16.9	12.3	11%	27%	0.84	1.02	1.31
35% EE Case (no solar)	14,228	5.72	5.72	9,483	3.21	3.21	2.51	1,229	3,517	$2,736					$1,500	26%	$6,646	$350	-$1,179	$6,646	$389	17.1	13.2	11%	23%	0.83	1.00	1.29
50% ZEH Case based on 20% EE	14,228	5.72	5.72	5,634	3.14	3.14	2.58	2,225	6,969	$4,955					$3,000	32%	$19,153	$350	-$10,132	$19,153	$705	27.2	22.9	11%	16%	0.48	0.59	0.78
75% ZEH Case based on 20% EE	14,228	5.72	5.72	2,845	3.14	3.14	2.58	2,947	8,436	$6,562					$3,000	25%	$29,714	$350	-$18,146	$29,714	$934	31.8	28.6	11%	10%	0.40	0.49	0.65
100% ZEH Case based on 20% EE	14,228	5.72	5.72	54	3.14	3.14	2.58	3,675	10,519	$8,183					$3,000	21%	$40,106	$350	-$25,970	$40,106	$1,165	34.4	31.9	11%	7%	0.36	0.45	0.60
[redacted]	14,228	5.72	5.72	4,770	2.54	2.54	3.18	2,449	7,009	$5,452					$3,000	29%	$17,926	$350	-$7,761	$17,926	$776	23.1	19.2	11%	17%	0.58	0.71	0.93
75% ZEH Case based on 35% EE	14,228	5.72	5.72	2,367	2.54	2.54	3.18	3,071	8,790	$6,838					$3,000	24%	$27,117	$350	-$14,757	$27,117	$973	27.9	24.8	11%	11%	0.46	0.57	0.76
100% ZEH Case based on 35% EE	14,228	5.72	5.72	7	2.54	2.54	3.18	3,682	10,539	$8,198					$3,000	20%	$35,964	$350	-$21,449	$35,964	$1,167	30.8	28.2	11%	8%	0.41	0.51	0.68
Weighted Average						3.05	2.66	2339	6695	$5,208					$2,500	27%	$20,682	$350	-$11,207	$20,682	$741	25.1	21.8	100%	17%	0.58	0.71	0.92

Appendix 2 – Measure Analysis Sheet – Tier 2 and Tier 3 Only

PROGRAM DATA	Low	Medium	High
Conservation Life (yrs):			20
Carbon $/kWh	$0.0272	$0.0478	$0.0818
Summer On-pk Energy AC ($/kWh):			$0.0796
Summer Off-pk Energy AC ($/kWh):			$0.0519
Winter On-pk Energy AC ($/kWh):			$0.0539
Winter Off-pk Energy AC ($/kWh):			$0.0324
Weighted Avoided Cost			$0.0664
Ratio Measure Administrative Costs to Incentive Costs			NA
IRP Discount Rate			7.00%
NTG Ratio:			100%
Program Admin Costs per Participant			$350

RATE DATA	
Rate:	
$/kW:	0.00
$/kWh, On-Peak:	0.09092
$/kWh, Off-Peak:	0.07897

OPERATING DATA	
Summer Ratio:	50%
Winter Ratio:	50%
Summer On-Peak Ratio	34.5%
Summer Off-Peak Ratio	65.5%
Winter On-Peak Ratio	17.1%
Winter Off-Peak Ratio	82.9%
Coincidence Factor:	100%

OTHER FACTORS	
Line Loss Factor:	9.50%
Capacity Reserve Factor:	0.00%
Application	ROB
Cost Basis:	Incremental Equip

	BASELINE AND MEASURE PERFORMANCE						DEMAND/ENERGY SAVINGS			INCENTIVE AND PV CALCULATIONS									CUSTOMER COSTS/SAVINGS				WGT.	% Incent	B/C		
	Current Practices	Current Practices	Current Practices	ZEH	ZEH	ZEH	Non-Coincident Demand	On-pk Energy	Off-pk Energy	PV Energy	PV Capacity	PV Carbon			Recommended Incentive		PV Customer Cost	PV Admin Cost	NPV (low case)	Incr. Cost	Cost Savings	Payback wo/Inc.	Payback w/Inc.			Societal Cost Test		
Measure Type	Total Annual kWh	Coin. Demand kW	Non-Coin. Demand kW	Total Annual kWh	Coin. Demand kW	Non-Coin. Demand kW	Savings (KW)	Savings (KWh)	Savings (KWh)	Benefit ($)	Benefit ($)	Benefit - Low ($)	Benefit - Med ($)	Benefit - High ($)	($)	% PV	($)	($)	($)	($)	($)	(yrs)	(yrs)	Weighting Factor	Incent as % of Incr Costs (%)	Low Carbon ($14)	Med Carbon ($25)	High Carbon ($43)
[redacted]	14,228	5.72	5.72	11,355	3.75	3.75	1.97	744	2,129	$1,656	[redacted]				$1,500	40%	$3,995	$350	-$558	$3,995	$235	16.9	10.6	70%	38%	0.87	1.04	1.32
	14,228	5.72	5.72	4,770	2.54	2.54	3.18	2,449	7,009	$5,452					$3,000	29%	$19,153	$350	-$8,986	$19,153	$776	24.7	20.8	30%	16%	0.54	0.66	0.87
Weighted Average						3.39	2.33	1255	3593	$2,795	[redacted]				$1,950	36%	$8,542	$350	-$3,087	$8,542	$398	19.3	13.7	100%	31%	0.77	0.93	1.18

Appendix 3 – Measure Analysis Sheet- Total Resource Cost Calculations

Incentive Calculations

Zero-Net Energy Homes (New Construction Only)

PROGRAM DATA	
Conservation Life (yrs):	20
Program Life (yrs):	3
Demand AC ($/kW):	162.27
Summer On-pk Energy AC ($/kWh):	$0.0796
Summer Off-pk Energy AC ($/kWh):	$0.0323
Winter On-pk Energy AC ($/kWh):	$0.0539
Winter Off-pk Energy AC ($/kWh):	$0.0324
Administrative and Implementation Cost	$350
IRP Discount Rate*****:	7.0%
Social Discount Rate	5.0%
NTG Ratio:	100%

RATE DATA	
Rate:	
$/kW:	0.00
$/kWh, Summer:	0.0935
$/kWh, Winter:	0.0839

OPERATING DATA	
Summer Ratio:	50%
Winter Ratio:	50%
Summer On-Peak Ratio	34.5%
Summer Off-Peak Ratio	65.5%
Winter On-Peak Ratio	17.1%
Winter Off-Peak Ratio	82.9%
Coincidence Factor:	100%

OTHER FACTORS	
Line Loss Factor:	10.69%
Application	New
Cost Basis:	Incremental

							DEMAND/ENERGY SAVINGS			INCENTIVE CALCULATIONS					CUSTOMER COST/SAVINGS							WGT.	% Incent	TRC
Measure Type	Current Practices Total Annual kWh	Current Practices Coin. Demand kW	Current Practices Non- Coin. Demand kW	ZEH Total Annual kWh	ZEH Coin. Demand kW	ZEH Non-Coin. Demand kW	Coincident Demand Savings (KW)	Coincident Demand Savings (KWh)	Total Annual Energy Savings (KWh)	IRP PV Benefit ($)	Recommended ZEH Program Incentive ($)	Recommended ZEH Program Incentive % PV	PV Program Cost ($)	PV Program NPV ($)	Gross Incremental Cost ($)	Unisource Solar Rebates ($)	Federal/ State Solar Tax Credits ($)	Net Incremental Costs (with rebates) ($)	Cost Savings ($/yr)	Payback wo/inc. (yrs)	Payback w/inc. (yrs)	Weighting Factor	% of Total Incr Cost (%)	BC Ratio
[redacted]	14,228	5.72	5.72	11,355	3.75	3.75	1.97	1.97	2,873	6,128	2000	33%	4,345	1,784	3,995	-	-	3,995	255	15.7	7.8	0.0%		1.41
30% EE Case (no solar)	14,228	5.72	5.72	10,245	3.48	3.48	2.24	2.24	3,983	7,383	2000	27%	5,869	1,514	5,519	-	-	5,519	353	15.6	10.0	0.0%		1.26
35% EE Case (no solar)	14,228	5.72	5.72	9,483	3.21	3.21	2.51	2.51	4,745	8,456	2000	24%	6,996	1,460	6,646	-	-	6,646	421	15.8	11.0	0.0%		1.21
50% ZEH Case based on 20% EE	14,228	5.72	5.72	5,634	3.14	3.14	2.58	2.58	8,594	15,046	4000	27%	19,503	(4,458)	19,153	5,683	4,175	13,470	763	12.2	6.9	16.7%	20.9%	0.77
75% ZEH Case based on 20% EE	14,228	5.72	5.72	2,845	3.14	3.14	2.58	2.58	11,383	19,857	4000	20%	30,064	(10,207)	29,714	10,328	7,343	19,387	1,010	11.9	8.0	16.7%	13.5%	0.66
100% ZEH Case based on 20% EE	14,228	5.72	5.72	34	3.14	3.14	2.58	2.58	14,194	24,630	4000	16%	40,456	(15,826)	40,106	15,008	10,461	25,099	1,260	11.6	8.4	16.7%	10.0%	0.61
[redacted]	14,228	5.72	5.72	4,770	2.54	2.54	3.18	3.18	9,457	15,746	4000	25%	18,276	(2,530)	17,926	4,004	3,011	13,922	839	13.0	8.2	16.7%	22.5%	0.86
75% ZEH Case based on 35% EE	14,228	5.72	5.72	2,367	2.54	2.54	3.18	3.18	11,860	19,919	4000	20%	27,467	(7,548)	27,117	8,005	5,769	19,111	1,053	12.7	8.9	16.7%	14.8%	0.73
100% ZEH Case based on 35% EE	14,228	5.72	5.72	7	2.54	2.54	3.18	3.18	14,220	23,963	4000	17%	36,314	(12,351)	35,964	11,935	8,423	24,029	1,262	12.4	9.2	16.7%	11.1%	0.66
Weighted Average							2.9	2.9	11,618	19,860	4000	21%	28,680	(8,820)	28,330	9,161	6,530	19,170	1,031	12.3	8.3	100.0%	20.9%	0.69