



IMPACT AND PROCESS EVALUATION OF AMEREN ILLINOIS COMPANY'S RESIDENTIAL ENERGY STAR NEW HOMES PROGRAM (PY5)

Final

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1. EXECUTIVE SUMMARY

The Ameren Illinois Company (AIC) ENERGY STAR® New Homes Program targets builders through a package of services consisting of training, technical information, marketing assistance, and incentives to encourage the construction of ENERGY STAR new homes. Implemented by Conservation Services Group (CSG), the program is available to builders of new single-family and multifamily homes that are heated with a fuel (natural gas or electricity) provided by AIC.

In Program Year 5 (PY5), the program adopted a stricter energy efficiency standard, ENERGY STAR Version 3.0. The program also introduced an entry-level tier, providing incentives to cover the cost of the HERS rating for buildings that meet only Version 2.5's standards while the builder becomes more familiar with the program.

AIC and CSG recruit both builders and HERS raters to participate in the program. HERS raters are also asked to recruit builders into the program. AIC, CSG, HERS raters, and builders all promote the program to customers interested in building new homes. Builders participating in the program work with HERS raters, providing building plans for them to review and assign an initial (plan-based) energy efficiency rating. Once an initial rating has been established, CSG approves the home and reserves incentive funding. The HERS rater inspects the home during construction and creates an energy analysis model (REM/Rate™ model) to estimate the home's energy savings as compared to the reference home. CSG pays the builder an incentive based on the actual rating received by the home, once the home has been completed and given a final rating. The categories for the HERS ratings include a rating of 71-85, 56-70, and 55 or lower. The PY5 ENERGY STAR New Homes Program had the greatest participation since the program started, with 174 new homes built compared to 65 in PY4.

CSG historically managed this program through one assigned staff member, who became increasingly stretched in PY5 due to increased program interest. CSG is adding two additional staff members to the team for PY6.

This report addresses AIC's fifth year, which covered the period June 1, 2012, through May 31, 2013. The expected savings from this program were 0.1% of the overall PY5 portfolio of electric savings and 0.3% of PY5 portfolio therm savings. To support the evaluation, we conducted in-depth interviews with program staff, reviewed REM/Rate model results, and analyzed the tracking database.

Impact Results

The evaluation team verified participating homes and savings estimates by reviewing energy analysis models for a random sample of 22 participating homes in the tracking database. We verified that the model runs were consistent with identifying information in the tracking database, and that HERS Ratings levels matched the model outputs. With the exception of one project that was mislabeled in its efficiency status, all savings estimates were verified. Table 1 below applies these results to the project population, showing 100% verification overall.

Table 1. Summary of Program Verification Results

Home Type	Incentive Level	Fuel Type	Participants	Verified Participants	Verification Rate
Single-Family	HERS 71-85, Single Bonus	Electric	38	38	100%
		Gas	8	9	113%
		Combo	14	14	100%
	HERSs 56-70, Double Bonus	Electric	10	10	100%
		Gas	6	5	83%
		Combo	15	15	100%
	HERS <=55, Triple Bonus	Electric	4	4	100%
		Gas	-	-	-
		Combo	1	1	100%
Multifamily	HERS 71-85, Single Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	78	78	100%
	Hers 56-70, Double Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	-	-	-
	HERS <=55, Triple Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	-	-	-
Total			174	174	100%

One gas project out of the participant population was incorrectly categorized as HERS 56-70 instead of 71-85, which explains the two verification rates higher and lower than 100%. The evaluation team applied a deemed per-unit savings for each participant, based on the home’s HERS rating level. We then applied a deemed 0.8 net-to-gross ratio (NTGR) to estimate net savings. As shown in Table 2, ex ante and ex post net savings are nearly the same.

Table 2. PY5 ENERGY STAR New Homes Program Net Savings

Program	PY5 Ex Ante Net Savings			PY5 Ex Post Net Savings		
	MW	MWh	Therms	MW	MWh	Therms
ENERGY STAR New Home	0.11	303.2	11,669	0.11	303.2	11,557
Net Realization Rate*				100%	100%	99%

*Net Realization Rate = Ex Post Net Savings / Ex Ante Net Savings.

We compared a sample of building modeling files to the deemed savings estimates. Because the program is based on HERS ratings, which do not differentiate between electric and gas savings, builders are capitalizing on gas measures over electric measures. Due to this, across the sampled 22 projects, we found more gas savings than the deemed values and less electric savings.

Process Results

In PY5, the program exceeded its gas savings target of 10,694 therms. The program fell slightly short of meeting its electric savings target of 352 MWh (303 MWh net achieved). This was due to a few projects not finishing on schedule. Overall, the program ran smoothly and participation increased from PY4's 65 participants to PY5's 174 homes (an increase of 168%). Much of this increase is from a large multifamily project with 78 units. Just comparing single-family units, PY4 increased from 62 to 96 in PY5, an increase of 55%, which is significant considering single-family construction permits increased by only 23% between July 2012 and July 2013.

The number of different builders represented actually dropped from 28 in PY4 to 17 in PY5. One builder who did not submit any projects in PY4 submitted 48 single-family projects in PY5. AIC's participation increases also compare favorably to other utility-run new construction programs. AIC expanded its outreach efforts in PY5, contacting more home builders and raters than in previous years, and also minimally advertised the program directly to potential home buyers.

AIC's incentives are in line with offerings by other similar programs, although program specifics and requirements vary considerably by program administrator.

Based on the PY5 evaluation, the team provides the following recommendations:

- **Continue to increase marketing to builders.** Much marketing emphasis has been placed on the HERS raters in the past, but as the housing market continues to regain strength, there is a good opportunity to increase the percentage of homes that are being built to meet the ENERGY STAR 3.0 requirements by engaging further with the builders. Builders are recognizing the competitive advantage of offering energy-efficient homes, so we recommend making efforts to recruit new builders.
- **Continue plans to assist HVAC contractors in completing their ENERGY STAR Version 3.0 credential.** As part of the new ENERGY STAR 3.0 requirements, HVAC contractors must complete a training class and receive accreditation documenting their qualifications to install HVAC systems under the program. We concur with CSG's plans to offer free training to the contractors and assistance with the yearly accreditation fee. Ultimately, training will make the process of building ENERGY STAR 3.0 rated homes easier.
- **Continue plans to implement a new program-tracking database.** Thus far, program data have been tracked in an Excel spreadsheet. As the program continues to expand, a database system will increase program-tracking efficiency.

2. INTRODUCTION

This report presents results from the Program Year 5 (PY5) evaluation of the ENERGY STAR New Homes Program. To support the evaluation, the evaluation team reviewed and analyzed the program database, reviewed REM/Rate energy simulation model runs for a sample of homes, and interviewed program management staff.

Program Description

The ENERGY STAR New Homes Program targets builders using a package of services, including training, technical information, and marketing assistance and incentives for construction of ENERGY STAR new homes that meet ENERGY STAR 3.0 guidelines. CSG implements the program for AIC.

The Residential Energy Services Network (RESNET) created the HERS Index scoring system, which rates homes using the HERS Index. A lower HERS Index score indicates higher energy efficiency.¹ Each one-point decrease in the HERS Index corresponds to a 1% reduction in energy consumption, compared to the HERS Reference Home. Thus, a home with an 85 HERS Index would be 15% more energy-efficient than the HERS Reference Home, and a home with an 80 HERS Index would be 20% more energy-efficient. AIC's ENERGY STAR New Homes incentive seeks to defray the additional costs associated with building more-efficient homes.

The program targets builders of new single-family and multifamily homes, heated with a fuel (natural gas or electricity) provided by AIC. In PY5, the program adopted ENERGY STAR 3.0 as its standard. In PY5, builders receive the lowest incentive tier, even if they don't meet ENERGY STAR 3.0, simply for having the home rated by a HERS rater. These participants savings are tracked in the program database based on the HERS rating the home received. . The intent behind the offer is to introduce builders to the HERS rating process and the benefits of participating in the program.

- For a home with a 71 to 85 HERS rating, builders receive \$450 (\$250 for a multifamily unit) for a gas-only home, and \$750 (\$450 for multifamily) for a gas-and-electric home or an electric-only home.
- For a 56 to 70 HERS rating, bonuses double: \$900 (\$500 for multifamily) for gas, and \$1,500 (\$900 for multifamily) for gas-and-electric or electric-only.
- For homes with a 55 HERS rating or less, bonuses triple: \$1,350 (\$750 for multifamily) for gas, and \$2,250 (\$1,350 for multifamily) for gas-and-electric or electric-only.

Incentives offered under the first tier have been designed to cover only the costs builders incur in having homes rated. Further incentives contribute to covering the cost of time spent installing more expensive measures. Homes that have not received an ENERGY STAR 3.0 certification are still accepted under the program; however, they receive a maximum of \$450 (\$250 for multifamily) as long as the home meets ENERGY STAR 2.5 requirements and achieves a HERS score of less than 70. ENERGY STAR 2.5 was designed to be a transition between ENERGY STAR 2.0 and 3.0. ENERGY

¹ A net-zero energy home that consumes zero energy not generated onsite scores a HERS Index of 0, while a home built to the IECC 2006 standard would receive a score of 100 (the HERS Reference Home has been based on the 2006 International Energy Conservation Code (ISBN-13.978-1-58001-270-6)).

STAR 2.5 has nearly all of the same requirements as 3.0, but does not require complete compliance with several checklists implemented under 3.0.

AIC and **CSG** recruit builders and **HERS** raters to participate in the program. **HERS** raters also recruit builders. To receive an incentive payment, builders must work with raters, providing building plans for raters to review and assign an initial (plan-based) rating. Once an initial rating has been established, **CSG** approves the home and reserves incentive funding. The **HERS** rater inspects the home during construction, and then creates an energy analysis model (**REM/Rate** model) to estimate the home's energy savings. **CSG** pays the builder based on the home's actual rating once construction has been completed.

3. EVALUATION METHODS

3.1 DATA SOURCES AND ANALYTICAL METHODS

The evaluation team assessed the ENERGY STAR New Homes Program using the research activities outlined in Table 3.

Table 3. Summary of Evaluation Methods

Task	PY5 Impact	PY5 Process	Forward Looking	Details
Program Staff In-Depth Interviews		√		Conducted two interviews with program and implementation staff, gaining insights into design and delivery.
REM/Rate Model Reviews	√		√	Reviewed a sample of 22 model runs from the database, verifying participation and estimating savings for future evaluations.
Tracking Database Analysis	√	√		Summarized database information to determine participation and key statistics about the program.

The following sections summarize the methodology employed for each activity.

3.1.1 PROCESS ANALYSIS

The evaluation team analyzed information from the program staff interviews, the tracking database, and the REM/Rate model runs to inform the process evaluation.

Program Staff Interviews

The evaluation team conducted interviews with AIC's program manager and CSG's implementation manager. These interviews addressed topics such as program operations, builder and HERS rater recruitment and training, marketing, and market factors affecting the program. The interviews addressed the program's design, implementation and delivery, marketing efforts, implementation barriers, and communications.

3.1.2 IMPACT ANALYSIS

REM/Rate Model Review

For this program, participating homes qualified under the ENERGY STAR 3.0 program, with a HERS rater performing data collection and analysis to ensure that homes qualified for the program and provided the builder or owner with a HERS score. HERS raters receive training and certification

under the RESNET Standard,² and are subject to an internal, third-party quality assurance program, which is implemented by RESNET. Each HERS rater has a third-party “Provider” that is responsible for the quality assurance of each rating performed.

The evaluation team’s review focused on determining whether tracking database savings and home size are consistent with REM/Rate model inputs and HERS ratings. REM/Rate is a software program developed for HERS raters to determine a home’s HERS score. A score of 100 represents a home built to International Energy Conservation Code (IECC) 2006.³ A score of 0 represents net-zero homes, which offset annual energy consumption with on-site generation. Balancing evaluation budget and the level of rigor, the evaluation team reviewed 22 randomly chosen participant files out of the 174 participants.

Table 4. Completed REM/Rate File Review Sample Points

Customer Type	Database Population	Sample Projects
Electric Only	52	5
Gas Heat	14	1
Gas Heat and Electric Combination	108	16
Total	174	22

To inform future savings estimates, we also compared the REM/Rate model predictions of the sample to a reference home modeled to meet IECC 2009 building code.

Database Analysis

CSG tracks information about each participating home using an Excel worksheet, including homeowners, builders, and HERS raters involved, home square footage, HERS rating, and project completion dates. The evaluation team summarized and analyzed the projects to compute relevant totals for PY5.

Gross Impacts

The evaluation team verified program participation by reviewing a sample of the REM/Rate model runs, and comparing estimated savings to those in the tracking database. The team also examined the program-tracking database and computed overall program savings.

Net Impacts

The evaluation team applied the deemed NTGR value of 0.8 to determine net impacts.

² The RESNET Standard was developed by the Residential Energy Services Network, a group of mortgage lenders and building science professionals, to develop a nationwide standard on scoring the relative energy efficiency of a residential building.

³ Kelly Schultz. Evaluating Residential Energy Efficiency Programs with a Universal Metric. <http://www.fas.org/programs/energy/btech/policy/Evaluation%20energy%20efficiency%20programs.pdf>.

4. RESULTS AND FINDINGS

4.1 PROCESS FINDINGS

Program Participation

Each year, internal program targets are decided upon by AIC and CSG. Targets are set low enough to be realistic, yet high enough to challenge the program to stretch its reach. In PY5, the program exceeded its internal gas target of 10,694 therms (11,669 therms achieved). The program fell slightly short of meeting its electric target of 352 MWh, achieving 303 net MWh. The reason for this gap, as explained by the program implementer, was that a few projects did not finish on time and thus could not be attributed to PY5 completes. The program targets for upcoming PY6 are even higher than PY5, in anticipation of an improved housing market and increasing program reach.

As shown in Table 5, PY5 has been the most successful year to date for the program, with the 174 participants resulting in a 168% increase over PY4's 65 completed projects. Much of that increase was due to the increase in multifamily projects from 3 in PY4 to 78 in PY5. Even looking at only the single-family increase of 55%, results are significant because the number of building permits issued in Illinois increased by 25% from 2012 to 2013, with a 23% increase in single-family homes and 35% for multifamily homes.⁴ CSG notes that they are seeing increases in consumer demand and builders are realizing a competitive advantage through their participation in the program. CSG believes participating builders see the opportunity to differentiate themselves from standard builders.

Table 5. Completed Projects

Project Type	PY4	PY5
Single-Family	62	96
Multifamily	3	78
Total	65	174

As noted by the program manager, the number of builders in the state has expanded as the housing market recovered. AIC's project participation rates show second to third year increases similar to other programs implemented around the same time (see Table 6 below).

⁴ National Association of Home Builders. State and Local Data, Building Permits: States and Metro Areas. 26 Aug. 2013. Web. 02 Sep. 2013.

Table 6. Participation Rate Comparison among New Construction Programs

Program Administrator	State	Launch Year	1st Year Participation	2nd Year Participation	3rd Year Participation	% Increase 2 nd /3 rd Year
AIC Combined Single-Family and Multifamily	IL	2010	59	65	174	168%
AIC Single-Family Only	IL	2010	59	62	96	55%
EmPOWER Maryland (Baltimore Gas & Electric)	MD	2009*	49	1,416	1,681	19%
Midwest Utility (Electric-Only)	MN	2007**	45	95	296	212%
NYSERDA	NY	2001	58	611	1,697	178%
Rocky Mountain Power	UT	2005	53	1,758	2,272	29%
EmPOWER Maryland (Southern Maryland Electric Cooperative)	MD	2010	245	355	553	56%

*Program began midway through 2009.

Program Baseline

In PY4, the program was tied to building guidelines from ENERGY STAR Version 2.0. In PY5, the requirement was increased to ENERGY STAR Version 3.0. Like Version 2.0, Version 3.0 requirements can be met either through a prescriptive or performance path. Both options are based on a set of specifications called the ENERGY STAR Reference Design. While the prescriptive path requires building according to the Reference Design specifications—which are more rigorous in the Version 3.0 requirements—the performance path has been significantly changed from the Version 2.0 approach. Version 3.0 requires a more detailed verification of efficiency measures, greater savings per home (approximately 15% more efficient than homes built to Version 2.0), and more definitive savings (less opportunity for builders to omit important energy efficiency improvements).

CSG stated that it is an ongoing challenge to ensure that program requirements are exceeding the state's building code (the program's baseline). For PY5, the program's baseline is set to the International Code Counsel's (ICC) 2009 code. Illinois didn't adopt the ICC 2012 code until January 1, 2013. By then many building permits were in place, and the state has taken a while to enforce the updated code. Therefore, CSG has assumed the ICC 2009 requirements as the baseline for PY5. CSG monitors active building codes in comparison to ENERGY STAR standards to ensure that the program is incenting efforts beyond currently enforced building codes. For PY5, ENERGY STAR 3.0 program requirements exceed the current building code ICC 2009.

CSG acknowledged that ENERGY STAR will continue to increase its efficiency requirements over time, however CSG anticipates increasing the program's requirements even faster. CSG targets a 40% market penetration as a trigger for increased requirements: "We want to maintain a good level of savings. We need a good gap between baseline and what we are rewarding the builders for

doing.” CSG believes market penetration is currently about 8% to 10%,⁵ and they do not expect to adjust guidelines for the next two or three years. AIC and CSG are also looking for evidence of program spillover, which could occur if builders constructed ENERGY STAR homes without program incentives. This may occur if builders see the benefits of constructing energy-efficient homes but do not wish to comply with all of the certification requirements.

CSG also monitors emerging technologies in new construction to assist in defining appropriate efficiency levels and baselines, citing New York State Energy Research and Development Authority (NYSERDA) as an entity that has experimented with net-zero buildings.

ENERGY STAR 3.0 Training Requirements

Due to the increased rigor of ENERGY STAR 3.0 stipulations, HVAC contractors must be trained and accredited by an HVAC Quality Installation Training and Oversight (H-QUITO) organization. The accreditation qualifies an HVAC contractor to install HVAC systems under the more-rigorous requirements of Version 3.0. Only two H-QUITOs offer services in Illinois. The training for HVAC contractors includes learning about the detailed, mandatory checklist that they must follow during each site visit. Although CSG began offering formal trainings on the new, general Version 3.0 requirements at the end of PY5, they plan to offer free H-QUITO training in the future. CSG does not yet know if the H-QUITOs will allow contractors to be certified under CSG’s training, but expects the training to be helpful, regardless. In addition to training costs, HVAC contractors must also pay a yearly fee to receive the accreditation. CSG also plans to help offset the cost to contractors for their first year accreditation.

Program Incentives

Table 7 below shows this year’s program incentive levels. The baseline measures are those that CSG paid as incentives to builders who applied for a HERS rating but did not meet Version 3.0 requirements. The offer encouraged builders to become familiar with the HERS rating process and learn more about the benefits of the program, especially the increased marketability of an ENERGY STAR rated home. This entry-level tier was added to the program in PY5. If builders’ homes did meet the standard and achieved HERS ratings of 70 or less, the amount paid was double or triple that baseline amount.

Table 7. Program Incentive Levels

Measure Level	Multifamily Incentive	Single-Family Incentive
Gas baseline,* HERS 71-85	\$250	\$450
Gas and electric baseline,* HERS 71-85	\$450	\$750
Electric baseline,* HERS 71-85	\$450	\$750
HERS 56-70	\$500 or \$900	\$900 or \$1,500
HERS 55 or less	\$750 or \$1,350	\$1,350 or \$2,250

⁵ The website www.NAHB.org reports 5,420 building permits issued through the end of 2013. We estimate that slightly more than 900 are in AIC service area, which is consistent with CSG’s estimate of 8-10% market share.

*To achieve the baseline incentive, contracts must have their home receive a HERS inspection. Contractors may also receive the baseline incentive payout if they meet ENERGY STAR Version 2.5 requirements and a HERS rating of 70 or less.

The incentive is structured to reimburse the builder for the cost of the HERS rating, but does not provide any additional compensation. AIC and CSG do not pay additional incentives to builders, as the marketability advantages of energy-efficient homes encourage program participation.

We compared single-family AIC incentive levels to those offered for single-family homes by other utilities. AIC's incentives appear to be in-line with those offered by other utilities. As shown in Table 8, combined gas and electric utilities at the highest level of compliance vary from \$1,400 to \$3,000, and AIC's incentives fall in the middle of the other two benchmarks.

Table 8. New Homes Programs Incentives Comparison

Measure Level	Single-Family Incentive
Combined Gas and Electric	
AIC Baseline, HERS 56-70, HERS 55 or less	\$750, \$1,500, \$2,250
MidAmerican Energy: Version 3	\$3,000
Xcel Energy Colorado: Version 3, HERS 60 or less	\$1,400
Electric Only	
AIC Baseline, HERS 56-70, HERS 55 or less	\$750, \$900, \$1,350
Entergy Arkansas: Version 2.5, Version 3.0	\$600, \$1,000
PNM Resources: Version 2.5	\$750
CPS Energy Texas: HERS 58-75, HERS 57 or less	\$800, \$1,500
Empower Maryland: HERS 71-75, HERS 66-70, HERS 65 or less	\$1,000, \$1,300, \$1,600

The program manager noted that one continual challenge was getting timely paperwork from builders or HERS raters, causing delays in incentive payments. AIC and CSG have discussed modifying the process to either reduce paperwork or create an incentive for timely paperwork. However, a plan has yet to be finalized. AIC is not the first utility to encounter this issue. A few years back, Salt River Project gave a small incentive (around \$50) to raters who turned in their paperwork within a designated timeframe. This worked well until the paperwork process was modified and the incentives were discontinued as a result.

Program Marketing

The ENERGY STAR New Homes Program is mostly marketed to HERS raters and home builders, but it is also marketed on a smaller scale to home buyers to create consumer demand that builders will notice. CSG provides email marketing letters to HERS raters and meets with them at least annually. CSG also conducts direct marketing to home builders through home builder association meetings and other local meetings, and offers training seminars with a free breakfast. CSG is also available to meet with builders on request. Whenever CSG finds out about new building plans, they reach out to the builder on the project.

CSG provides builders with a package of training and technical marketing assistance along with the incentives. Since HERS raters earn a living by providing analysis and ratings evaluations, they are a

logical source for builder recruiting. CSG markets to raters through in-person group or one-on-one meetings. CSG provides HERS raters with educational materials for builders that highlight cost-effective ways to improve a home's energy efficiency rating.

CSG spends most of its energy nurturing existing relationships with builders, rather than recruiting new builders. By working with existing builders, CSG can influence builders' future projects and encourage them to build homes that are more energy-efficient. CSG noted that recruiting new builders is time-consuming and can be challenging when they have little to no interest in building energy-efficient homes. CSG markets through keyword searches on Google for in-state search phrases relating to "energy-efficient homes" or "ENERGY STAR homes," which triggers a banner ad for the ActOnEnergy website. CSG believes this to be a very effective strategy. CSG does not target specific geographic regions or builders. Instead, CSG follows raters who are excited about adopting the program.

In PY5, CSG made a concerted effort to reach out to multifamily contractors because one large multifamily project can add to program savings quickly. While this effort did help the program increase its results, CSG does not generally favor one segment of the market over another. In the words of the implementer: "All segments of the market are worth taking time to go after."

CSG learned that builders do not respond to written marketing material, but rather in-person meetings. As explained by the implementer: "With builders, the last thing they want is to be told what they have to do. What they want is someone who can explain their options, listen to their concerns. Someone who will work with them...You really need to listen to them to earn their trust. They want you to address their concerns and acknowledge that you appreciate the effort that it will take for them to change." CSG is also making inroads with real estate professionals to assess the increased home value of ENERGY STAR certification. CSG would like to see the value quantified and conveyed to home buyers to further drive builders to the program.

CSG markets to home buyers through lawn signs placed at participating homes, and on AIC's website, which lists participating builders. CSG also participates in five to six home shows each year, and has purchased print advertising in magazines or in newspapers with special new homes editions. Home builders market the program to potential home buyers by emphasizing that energy-efficient homes are more comfortable. They also suggest that ENERGY STAR homes have higher resale values due to lower energy bills and higher-quality construction.

Program Staffing

Due to the slow housing market, CSG had been managing this project with one staff person. In PY5, this staff member was challenged keeping up with builder and HERS rater interest in the program. As the market comes back and program participation increases, CSG plans to assign two additional staff members for PY6.

Tracking Database

CSG plans to complete a more sophisticated and efficient database to assist them as program participation increases. Historically, with a low number of participants, an Excel spreadsheet was sufficient for data tracking. Information currently tracked includes contact information for the builder, HERS rater, and home purchaser; incentive paid; home size; HERS rating; rating category; key dates; and estimated savings. A relational database will allow CSG to more easily track program results by region, builder, or HERS rater.

4.2 *IMPACT RESULTS*

4.2.1 PARTICIPANT VERIFICATION

For verification purposes, we reviewed the REM/Rate files for a sample of 22 projects and reviewed the tracking database, including all 174 homes. We compared model-predicted HERS ratings against the database, and reviewed model inputs and outputs for reasonableness. We found that with the exception of one project categorized at the wrong HERS level, the project database reflected individual records. We also summarized participation in each HERS category. One single-family gas-only home was categorized as a HERS 56-70 home with a HERS score of 72. That home was verified to be a HERS 71-85 incentive-level home, and we adjusted verified gross savings accordingly.

Table 9. ENERGY STAR New Homes Verified Participation

Home Type	Incentive Level	Fuel Type	Program-Tracking	Verified	Verification Rate
			Participants	Participants	
Single-Family	HERS 71-85, Single Bonus	Electric	38	38	100%
		Gas	8	9	113%
		Combo	14	14	100%
	HERS 56-70, Double Bonus	Electric	10	10	100%
		Gas	6	5	83%
		Combo	15	15	100%
	HERS <=55, Triple Bonus	Electric	4	4	100%
		Gas	-	-	-
		Combo	1	1	100%
Multifamily	HERS 71-85, Single Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	78	78	100%
	HERS 56-70, Double Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	-	-	-
	HERS <=55, Triple Bonus	Electric	-	-	-
		Gas	-	-	-
		Combo	-	-	-
Total			174	174	100%

4.2.2 GROSS IMPACTS

The PY5 gross impacts associated with all 174 participants were 379.1 MWh, 138 kW, and 14,446 therms. The evaluation team estimated energy savings by applying deemed fixed savings estimates as provided in Table 10, based on the type of AIC fuel used and final HERS rating.

Table 10. PY5 Per-Unit Deemed Savings Estimates

Program Category	Therms	kWh
Combined Gas and Electric		
Baseline	140	2,100
HERS 56-70	280	4,200
HERS 55 or less	400	6,000
Multifamily	67	950
Electric Only		
Baseline	N/A	2,975
HERS 56-70	N/A	5,950
HERS 55 or less	N/A	8,500
Gas Only		
Baseline	140	N/A
HERS 56-70	280	N/A
HERS 55 or less	400	N/A

We applied a TRM-deemed coincidence factor of 27% to estimate demand savings. Table 11 below presents verified participation and gross impacts using the TRM-deemed savings estimates. We reviewed the detailed analysis from the 22 REM/Rate models and found that the actual modeled savings were different than predicted. The models indicate that gas and electric participating homes are capitalizing on gas savings measures to reduce gas consumption more than electric measures. These homes still save similar magnitudes of overall energy (as required by ENERGY STAR 3.0), but much of the savings are achieved on the gas side. Further details are discussed in Section 4.3.

**Table 11. PY5 ENERGY STAR New Homes Program Gross Savings
Based on Deemed Values**

Home Type	Incentive Level	Fuel Type	<i>Ex Ante</i> Gross Savings			<i>Ex Post</i> Gross Savings ^a			Verification Rate
			kWh	kW	Therms	kWh	kW	Therms	
Single-Family	HERS 71-85, Single Bonus	Electric	113,050	33	-	113,050	33	-	100%
		Gas	-	-	1,120	-	-	1,260	112.5%
		Combo	29,400	12	1,960	29,400	12	1,960	100%
	HERS 56-70, Double Bonus	Electric	59,500	18	-	59,500	18	-	100%
		Gas	-	-	1,680	-	-	1,400	83.3%
		Combo	63,000	26	4,200	63,000	26	4,200	100%
	HERS <=55, Triple Bonus	Electric	34,000	10	-	34,000	10	-	100%
		Gas	-	-	-	-	-	-	-
		Combo	6,000	3	400	6,000	3	400	100%
Multifamily	HERS 71-85, Single Bonus	Electric	-	-	-	-	-	-	-
		Gas	-	-	-	-	-	-	-
		Combo	74,100	36	5,226	74,100	36	5,226	100%
	HERS 56-70, Double Bonus	Electric	-	-	-	-	-	-	-
		Gas	-	-	-	-	-	-	-
		Combo	-	-	-	-	-	-	-
	HERS <=55, Triple Bonus	Electric	-	-	-	-	-	-	-
		Gas	-	-	-	-	-	-	-
		Combo	-	-	-	-	-	-	-
Total			379,050	138	14,586	379,050	138	14,446	100%

^a Ex post verified results are based on a review of the program-tracking database.

4.2.3 NET IMPACTS

Table 12 below presents net savings by measure attributable to the ENERGY STAR New Homes Program. As described in the methodology section, the team applied a deemed NTGR of 0.8 to determine PY5 net impacts.

Table 12. PY5 ENERGY STAR New Homes Program Net Impacts (Gas)

Program	<i>Ex Ante</i> Gross Savings (Therms)	<i>Ex Post</i> Gross Savings (Therms)	NTGR	<i>Ex Ante</i> Net Savings (Therms)	<i>Ex Post</i> Net Savings (Therms)
ENERGY STAR New Homes	14,586	14,446	0.8	11,669	11,557
Net Realization Rate*					99%

*Net Realization Rate = *Ex Post* Net Savings / *Ex Ante* Net Savings.

Table 13. ENERGY STAR New Homes Net Program Impacts (Electric)

Program	<i>Ex Ante</i> Gross Savings		<i>Ex Post</i> Gross Savings		NTGR	<i>Ex Ante</i> Net Savings		<i>Ex Post</i> Net Savings	
	kWh	kW	kWh	kW		kWh	kW	kWh	kW
ENERGY STAR New Homes	379,050	138	379,050	138	0.8	303,240	110	303,240	110
Net Realization Rate*								100%	100%

* Net Realization Rate = *Ex Post* Net Savings / *Ex Ante* Net Savings.

4.3 INPUTS FOR FUTURE PROGRAM PLANNING

The evaluation team reviewed the REM/Rate models of the 22 selected homes and compared savings estimates to a User-Defined Reference Home (UDRH) meeting IECC 2009.⁶ We developed a REM/Rate model for the UDRH to assess how well deemed savings compare to modeled savings. The custom UDRH baseline was defined using IECC 2009 U-Values for the building envelope and federal minimum HVAC and water heating efficiencies. Lighting and appliance baseline values were a combination of IECC 2009 requirements and REM/Rate baseline assumptions. The results contrasting planning-estimate savings from the model-predicted savings are detailed in Table 14 below. The corresponding achieved levels of confidence and precision for these realization rates are detailed in Table 15 below.

This modeling exercise indicates that the TRM-deemed electricity and demand savings are higher than the model predicts. It also indicates that deemed gas savings are lower than the model predicts. Since the program allows for trade-offs of gas versus electricity savings measures, we found that gas-saving measures are more commonly implemented to meet program requirements.

⁶ IECC 2012 is the current energy code in Illinois, put into effect on January 1, 2013. Homes started before that date must meet the previous code, which was IECC 2009.

The deemed gross savings estimates assume that half (50%) of the savings will be gas and half (50%) will be electric. However, because many participating homes are gas-heated and Illinois is a heating-dominated climate, much of the savings from envelope enhancement translate to gas savings.

Table 14. Model-Predicted Savings for Reviewed Sample

Project ID	Deemed Gross Savings			Model-Predicted Gross Savings		
	kWh	kW	Therms	kWh	kW	Therms
P00000089171	4,200	1.75	280	1,072	0.57	142
P00000094133	4,200	1.75	280	1,417	1.43	343
P00000103513	8,500	2.50	-	11,502*	0.44	-
P00000103515	950	0.47	67	240	0.11	107
P00000103530	950	0.47	67	190	0.06	101
P00000105041	4,200	1.75	280	1,076	0.62	193
P00000105050	2,100	0.88	140	1,529	0.65	208
P00000105051	2,100	0.88	140	1,207	0.41	82
P00000105052	2,100	0.88	140	1,492	0.49	83
P00000107201	-	-	140	-	-	91
P00000107204	950	0.47	67	190	0.06	101
P00000107211	950	0.47	67	205	0.12	121
P00000107221	950	0.47	67	190	0.06	101
P00000107226	950	0.47	67	205	0.12	121
P00000107245	950	0.47	67	240	0.11	107
P00000107249	950	0.47	67	190	0.06	101
P00000107250	950	0.47	67	190	0.06	101
P00000107254	950	0.47	67	153	0.12	120
P00000109635	2,975	0.88	-	1,887	0.32	-
P00000109653	2,975	0.88	-	1,887	0.32	-
P00000109655	2,975	0.88	-	1,887	0.32	-
P00000109672	2,975	0.88	-	1,887	0.32	-
Average	2,324	0.88	122	1,373	0.32	131
Percent of Deemed Savings				59%	37%	107%

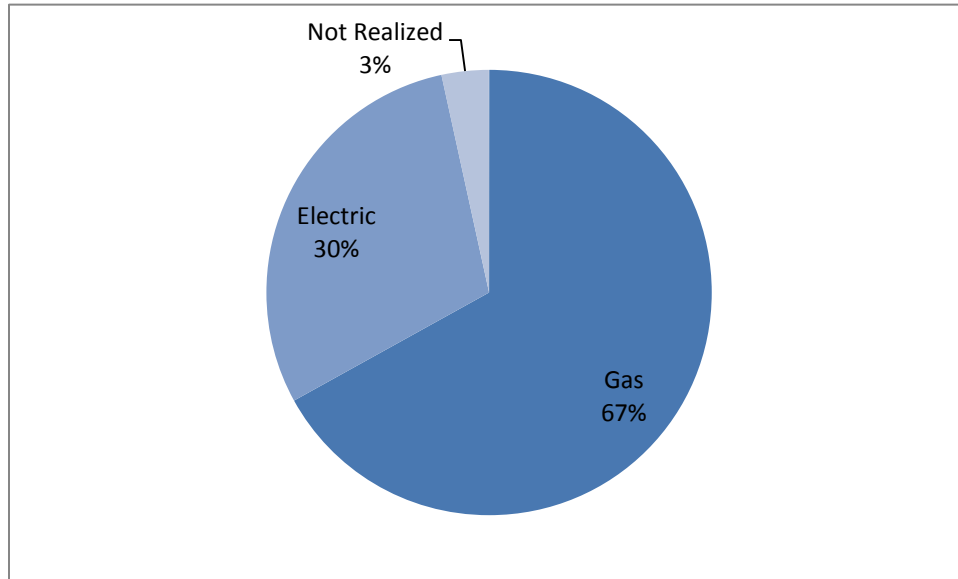
* This home was 5,000 square-foot with a ground source heat pump, and had a very low HERS score (49). The extremely large electric saving are also due to it being an electric-heated home.

Table 15. Achieved Level of Confidence and Precision for Realization Rates

Savings	Gross Savings Realization Rate	Standard Error	90% Confidence Level	Precision \pm
kWh	0.42	0.0649	0.32 to 0.53	0.11 (25.2%)
kW	0.32	0.0420	0.25 to 0.39	0.07 (21.4%)
Therms	1.29	0.1153	1.10 to 1.48	0.19 (14.7%)

Figure 1 shows the total energy savings estimated from the sample of homes (independent of fuel). The 3% savings, not realized, represents the combined gas and electric savings predicted by the deemed savings estimates but not found when estimating the savings using the energy models.

Figure 1. Modeled Savings (Combined Energy) as a Percentage of Deemed Estimates By Fuel



A. APPENDIX: PROGRAM IMPLEMENTER GUIDE

Program Design and Roles

1. What do you believe are the primary goals/objectives of the Residential ENERGY STAR New Homes Program?
2. Please describe what your role is in the program.
3. What do you want to know about the program from this evaluation?
4. Has anything about the program design changed since PY4? (Probe for changes in the base case standards.)
5. Which building code is being used as the base case (e.g., IECC 2012 or IECC 2009)? Why is that?
6. Do you have sufficient staff needed to support program delivery? If not, what else is needed to support program delivery?
7. What Program Packages have been the most successful, in terms of both level of participation and level of savings?
8. Is the distribution of participation in the different levels what you expected?
9. Was the program budget for PY5 sufficient to support implementation and achievement of the program goals?

Program Delivery

10. Has the program delivery approach changed at all since PY4?
11. Does the program delivery process work well in your opinion? (Probe for interactions with builders and raters.)
12. Are there areas in program delivery that could be improved?
13. Are you satisfied with the rebates being offered by the program? Are they as effective as you think they could be?
 - If not, what do you think should be modified?
14. Do you think the program incentives have been set at the right price point?

Marketing and Outreach

15. How is the program marketed to HERS raters?
16. How is the program marketed to builders?
17. How is it marketed to customers?

18. Do you target specific geographic regions?
19. Do you target specific home buyer segments (e.g., luxury home versus starter homes)?
20. Generally, how are potential participants identified and targeted?
21. How do home builders provide customers with information regarding cost-effective, comprehensive measure packages? How do they market their more-energy-efficient homes? Or do they?
22. Do you have a marketing plan for this program? (Ask for a copy.)
 - Did you conduct or use research on market barriers to inform the plan?
23. Have you identified specific market barriers for this program, and if so, have you developed specific approaches to mitigate those barriers?
24. How do you tailor tactics and messages to different customer segments?
25. Do any program promotional efforts refer customers to non-utility incentives such as federal or state tax credits?

Program Administration, Enrollment, Data Tracking

26. Has your data-tracking approach changed since PY4?
27. Please describe the verification process with home builders.
28. Have there been any problems or issues with HERS verification process?
29. How has the relationship been with builders and HERS raters this past year?
30. How do you think their relationship is with each other?

Trade Ally Response

31. Has the number of home builders and HERS raters participating in the program changed since PY4? If so, to what extent?
32. Have you changed anything about the recruiting process from last year?
33. Are there enough participating home builders to achieve the program's goals?
34. What do HERS raters and home builders say about the program?
 - Are they satisfied with the program?
 - Have there been any major problems or complaints?
 - Have there been any major successes?
35. Have you identified any barriers to builder and rater participation? [*Probe: Are there enough trained trade allies? What are the barriers?*]

Customer Response

36. What do customers say about the program?
37. Have there been any major problems or complaints?
 - How were these addressed, and what are the trends?
38. Have there been any major successes? What were they?
39. Do you think that customers' awareness of the program has increased this past year?

Wrap Up

40. How has the relationship been with CSG/AIC this past year?
41. How have communications been with CSG/AIC?
42. How frequently do you communicate?
 - Using what methods?
 - What has worked well, what has not, and why?
43. Are there any specific questions or issues that you think we should investigate during this evaluation, or for next year?
44. In summary, what are the program's biggest challenges and successes?
45. What will happen with the program in the future? Will it be expanded?
46. Is there anything else we should know?