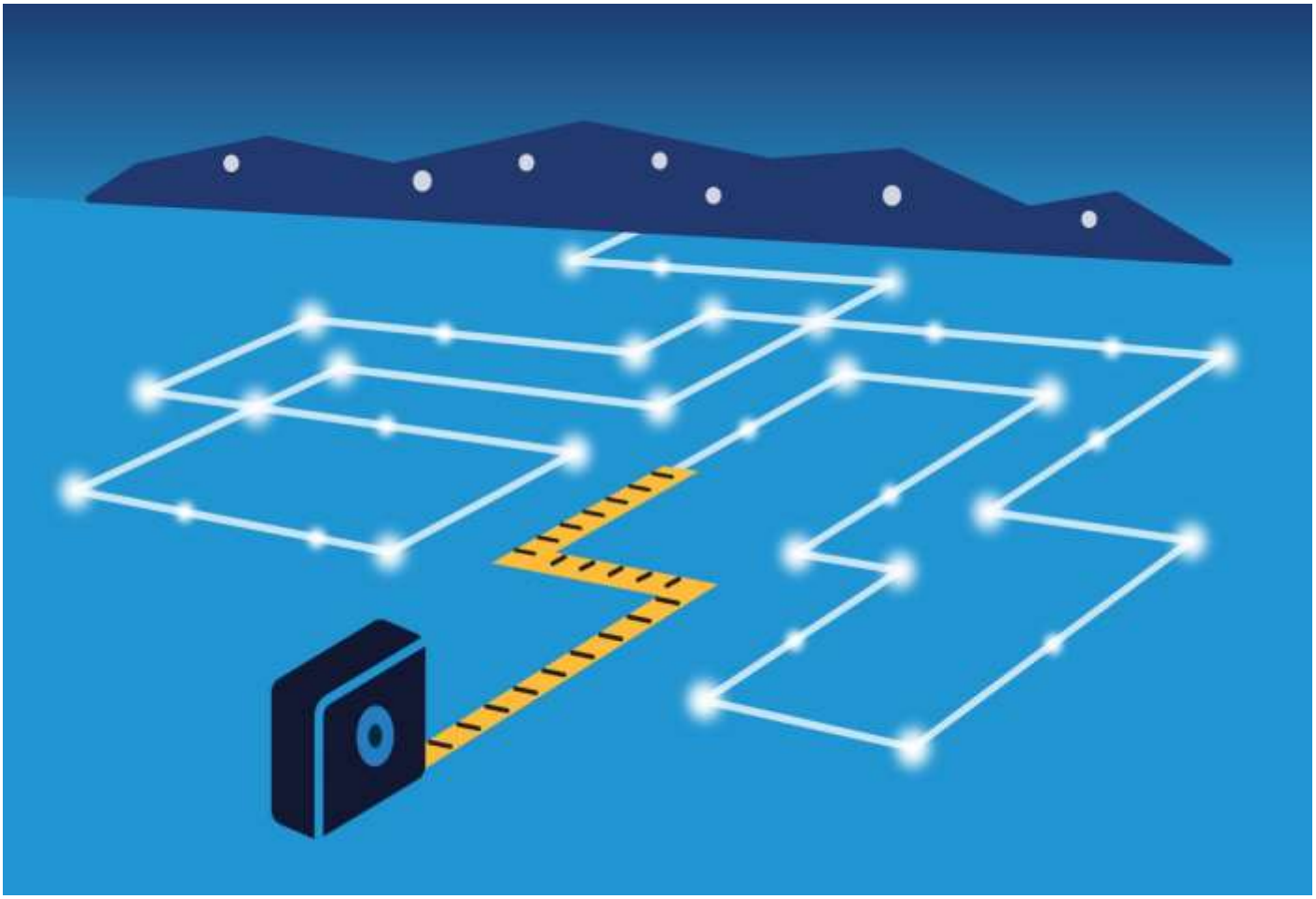
Opinion Dynamics

Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451



Impact and Process Evaluation of 2014 (PY7) Ameren Illinois ENERGY STAR® New Homes Program

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CADMUS

NAVIGANT

MichaelsEnergy

Opinion Dynamics

Contributors

Jane Colby
Principal, Cadmus

Shannon Donohue
Associate, Cadmus

Emily Miller
Associate, Cadmus

Jeana Swedenburg
Associate, Cadmus

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1. Executive Summary

The Ameren Illinois Company (AIC) ENERGY STAR® New Homes Program, implemented by CLEAResult (formerly Conservation Services Group), offers builders training, technical information, marketing materials, and incentives for the construction of eligible homes. Specifically, the program offers incentives for single family homes and multifamily duplexes that meet the ENERGY STAR 3.0 standards or that achieve a Home Energy Rating System (HERS) index of 65 or lower (a lower HERS index indicates a more efficient home). Builders constructing single-family homes and duplexes heated with any fuel provided by AIC are eligible for program incentives. Participating builders must hire a HERS rater to verify savings achieved through energy-efficient practices and equipment. In most cases, the rater also provides technical assistance and program application processing throughout the building process.

This report summarizes the evaluation activities and associated findings for the ENERGY STAR New Homes Program during its seventh year of operation (PY7). To assess program performance, the evaluation team conducted in-depth interviews with program staff, HERS raters, and building inspection departments; reviewed REM/Rate models (REM/Rate is a building modeling software that calculates heating, cooling, hot water, lighting, and appliance energy loads for new and existing homes); assessed the program's market share; and analyzed the tracking database. Based upon AIC's PY7 implementation plan, the expected savings from this program are 0.4% of the overall PY7 portfolio electric savings and 0.5% of PY7 portfolio natural gas savings.

Program Impacts

Table 1 summarizes the net electricity and demand savings from the PY7 ENERGY STAR New Homes program, which includes 457 MWh and 0.13 MW along with net gas savings of 51,376 therms. Differences between the ex post gross and ex ante results exist because program staff calculated the ex ante gross savings based on expected characteristics of participating homes. The evaluation team, however, calculated ex post gross savings using REM/Rate simulations for a sample of 70 participant homes using local code and federal minimum standards as the baseline for each home. The evaluation team did not receive the specific data used by the program implementer to calculate ex ante gross savings. The evaluation team assumes that because program staff developed the ex ante savings inputs before participating homes were constructed, the exact characteristics of participant homes likely differ from the characteristics initially expected by program staff. The evaluation team applied the NTGR agreed upon by the Stakeholder Advisory Group (SAG).

Table 1. PY7 ENERGY STAR New Homes Program Net Savings

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	732	78%	571	0.8	457
Demand Savings (MW)					
Total MW	0.188	87%	0.163	0.8	0.13
Therms Savings					
Total Therms	52,120	123%	64,220	0.8	51,376

Note: Realization rate = ex post gross savings ÷ ex ante gross savings.

Program Participation

The program significantly exceeded its target, achieving 130% of goal: 72 participating builders completed 547 homes for program incentives in PY7. This represents an 81% increase over homes completed in PY6.

Further, program-eligible homes accounted for approximately 12% of all new single-family homes built within AIC's service territory.

Key Findings and Recommendations

After two transitional years in PY5 and PY6, designed to allow builders a gradual transition to ENERGY STAR 3.0 and the 2012 Illinois energy code, AIC increased the energy efficiency requirement in PY7 by lowering the maximum allowable HERS score. Even so, the program experienced significant growth in PY7, which is likely due to a combination of program maturity and improvement in the central Illinois new construction market.

While the HERS raters interviewed were generally satisfied with the program, they did recommend improvements to program communication.

As a follow up to PY6 research on the 2012 Illinois energy code and to gather more comprehensive data about the baseline code (by jurisdiction) in AIC's territory, the evaluation team conducted additional interviews with building code officials in jurisdictions with program homes. According to these interviews, there was more widespread enforcement of the 2012 code in PY7 than in PY6.

Based on the PY7 evaluation, the evaluation team offers the following key findings and recommendations:

- **Key Finding #1:** Raters reported inadequate communication with program staff. While program staff reported that monthly communication with raters helped them better manage the project pipeline, all but one rater expressed dissatisfaction with the level of communication received through the program.
  - **Recommendation:** Establish regular communication with raters who can then communicate project status (i.e., application received, approved, denied, or more information needed) to builders. If the relational database is not robust enough to generate monthly status reports to raters, send monthly e-mails to raters communicating project status. Furthermore, establish proactive response protocols whereby program staff confirms receipt of applications and notifies raters immediately if the information is incomplete.
- **Key Finding #2:** The availability of qualified HVAC contractors has limited the ability of builders to use the ENERGY STAR option.
  - **Recommendation:** Offer special trainings on ENERGY STAR to HVAC contractors to help increase the pool of qualified contractors.
- **Key Finding #3:** While the program achieved total combined gas and electricity energy reductions, program homes achieved more gas savings and less electric savings than expected.
  - **Recommendation:** Assess the cost-effectiveness of the relative savings. If electricity savings provide higher relative benefits, AIC could require certain mandatory electric energy savings measures on the program homes (note that this may reduce participation in the program). Modify the incentive structure to provide additional incentives for electric energy savings measures. Conduct outreach and education with builders and HERS raters to highlight benefits of energy-efficient cooling, lighting, and appliances. Since the program is currently participation limited, optimizing the cost effectiveness of those participants by adjusting requirements could improve the program's net benefits.

2. Evaluation Approach

2.1 Research Objectives

The primary objectives of the PY7 ENERGY STAR New Homes Program evaluation were to estimate ex post gross and net electric and gas savings associated with the program.

Through the process evaluation, the evaluation team investigated program changes, program progress, trade ally interactions, and the current state of the new home market. We designed the evaluation to answer the following questions:

2.1.1 Impact Questions

- What is the appropriate baseline for estimating program savings?
- What are the estimated gross energy and demand impacts from this program?
- What are the estimated net energy and demand impacts of this program?

2.1.2 Process Questions

- How well did the program perform against its goals and in the context of the Illinois new home market?
- How did the level of builder participation and engagement change in PY7?
- What other program changes occurred in PY7? What were the impacts of those changes?
- How well did program processes work? What opportunities for improvement exist?
- How did the level of understanding and enforcement of the recently adopted 2012 Illinois energy code change among market actors, such as building officials, since PY6?
- How satisfied were HERS raters with the program? How do HERS raters think the program could be improved?
- What program changes could AIC make to improve customer or trade ally experiences and generate greater participation or savings?

2.2 Evaluation Tasks

Table 2 summarizes the activities conducted during the PY7 program evaluation.

Table 2. Summary of ENERGY STAR New Homes Evaluation Activities for PY7

Activity	PY7 Impact	PY7 Process	Forward Looking	Details
Program Staff Interviews		✓	✓	One interview with AIC's program manager and one with CLEAResult's program manager to discuss program design, implementation, marketing, and market trends
Materials and Data Review		✓		Review of marketing materials, the program database, and program fact sheets
REM/Rate™[1] File Review/Simulations	✓			Review of 70 REM/Rate project files and ran simulations to verify savings for each as-built home against an appropriate PY7 baseline for each jurisdiction
HERS Rater Interviews		✓	✓	Interview participating HERS raters about program design, satisfaction, and observations about participating builders and the new home market
Building Inspector Interviews	✓	✓	✓	Interviews with building code departments in AIC's territory regarding enforcement and implementation of the 2012 Illinois energy code, and to define an appropriate PY7 baseline for each jurisdiction
Market Share Assessment		✓		Assess the percentage of program homes as a share of the new home market in participating jurisdictions

The evaluation team conducted the following activities as a part of the PY7 ENERGY STAR New Homes Program evaluation.

2.2.1 Program Staff Interviews

The evaluation team conducted two interviews with program staff: one with AIC's program manager and one with CLEAResult's program manager. These interviews explored questions about the program's design, implementation, application processes, marketing tactics, and trends in the new homes market. We also inquired about data tracking related to the program.

2.2.2 Review of Program Materials and Data

The evaluation team reviewed program marketing materials and the program-tracking database.

2.2.3 REM/Rate File Review

Our team reviewed a sample of 70 REM/Rate files and compared the results to home characteristics and HERS index information in the tracking database to ensure consistency of information. The review included simulating each home in the sample against local code and federal standards. This analysis produced gross realization rates, which the evaluation team applied to the remaining homes in the tracking database.

[1] REM/Rate is software developed by NORESCO that calculates heating, cooling, hot water, lighting, and appliance energy loads for new and existing homes.

2.2.4 HERS Rater and Building Inspector Interviews

The evaluation team conducted interviews with participating HERS raters and with representatives from building, zoning, and code departments within AIC service territory. Program staff provided a partial list of contacts for the HERS raters and building inspectors, and our team gathered publicly available contact information for the remaining building inspectors. We attempted to reach every building department and participating HERS rater contact up to three times. We selected building departments based on whether participating builders constructed homes in the jurisdiction during PY7. We prioritized the communities by those with the greatest number of program homes, and did not call building departments in communities where we conducted interviews in PY6 (Table 3).

Table 3. Summary of Interview Response Rates

Activity	Number in Sample	Number in Sample Attempted to Contact	Refused/ Bad Number	Quota	Interviews Completed	Overall Response Rate[a]
Participant Raters	10	10	0	5	5	50%
Building Inspectors	24[b]	24	2	10	10	42%

[a] Number of completed interviews divided by the number of individuals the evaluation team attempted to contact (up to three times).
[b] We excluded five interviewees from PY6.

Interviews with participating HERS raters covered such topics as program satisfaction, building practices, the transition to the 2012 Illinois energy code, and program processes. Interviews with building code officials explored the different enforcement practices of the 2012 energy code within jurisdictions inside AIC's service territory and code officials' observations about how builders adapted to the change in energy code.

2.2.5 Market Share Analysis

The evaluation team calculated an estimate of program homes as a share of the new home building activity in AIC's service territory. We compared the number of homes built through the program with the total number of homes built in each county in AIC's territory, as reported by the U.S. Census.[2] Because the program year does not match perfectly with the reporting year for the U.S. Census, the comparison is imperfect, but serves as a qualitative indicator of the program's share of the residential new construction market. The evaluation team only assessed the single-family market because of AIC's plans to discontinue the Multifamily Program in PY8.

2.2.6 Impact Analysis

Gross Impacts

The evaluation team determined ex post gross impacts by completing a thorough review of the program database and a review of REM/Rate files for a sample of 70 program homes. The database review consisted of cross-referencing program requirements (e.g., HERS index, home type, and incentive levels) to appropriate

[2] Available online: http://www.census.gov/construction/nrc/index.html

savings categories. The REM/Rate review consisted of comparing a program home to its equivalent baseline home (this report refers to these home conditions as as-built and baseline, respectively).[3]

Database Review

The program-tracking database contained project names and addresses, builder information, fuel types, incentive information, ex ante energy savings, and associated tracking identification and account numbers. In PY6, the database also included information regarding home type, home size, HERS index, and fuel type(s). However, program staff did not include HERS index or home size in PY7; instead, the evaluation team determined these data points based on the REM/Rate file review for only the sample of homes. The database lists ex ante energy and demand savings for each project based on the fuel type(s) and HERS index. We cross-referenced tracked energy and demand savings by home type, fuel type, and ENERGY STAR certification to the appropriate ex ante savings values to verify correct categorization. We also examined the database for duplicate entries and out-of-range values.

REM/Rate Review

The evaluation team reviewed a random sample of 70 REM/Rate files. Each sample file contained all energy-related features of the subject home such as insulation levels, HVAC information, and lighting and appliances installed. We designed a user defined reference home (UDRH) for each sampled home to compare an as-built home to both the minimum requirements of the energy code and minimum federal standard for appliances and HVAC.

The UDRH contains a set of baseline parameters used to compare a home to an equivalent home built to another standard. The UDRH is an automated feature of REM/Rate that only requires the user to define the baseline parameters and a sample of participant REM/Rate models. REM/Rate uses the UDRH parameters to build another energy model of the home, at the same size and orientation, but modifies all the components. The evaluation team used the UDRH models to compare the relative energy usage of 70 sampled homes.

Net Impacts

To estimate net savings, the evaluation team applied the net-to-gross ratio (NTGR) of 0.8 agreed upon by the Stakeholder Advisory Group (SAG) to the ex post gross savings, as specified in the PY7 evaluation plan.

2.3 Sources and Mitigation of Error

Table 4 lists a summary of possible sources of error associated with data collection methods used for the program evaluation. A detailed discussion of each item follows the table.

[3] Further detail regarding how the evaluation determined a baseline home is reported below in the REM/Rate File Review section.

Table 4. Potential Sources of Error

Analytical Task	Survey Errors		Non-Survey Errors
	Sampling Errors	Non-Sampling Survey Errors	
Code Official Interviews	No (census was attempted)	• Measurement errors • Nonresponse bias and self-selection bias	• N/A
HERS Rater Interviews	No (census was attempted)	• Nonresponse bias	• N/A
Market Share Analysis	N/A	N/A	• Comparing county data with AIC territory map • Accuracy of building permit data reported to U.S. Census
Gross Savings Calculations (REM/Rate files review)	Yes	N/A	• Data processing errors • Modeling errors
Net Savings Calculations	N/A	N/A	• Data processing errors

The evaluation team took a number of steps to mitigate the potential sources of error throughout the planning and implementation of the PY7 evaluation.

Survey Errors

- Sampling Errors
  - The evaluation team attempted to contact all HERS raters and building code officials on our list resulting in no sampling error.
  - **REM/Rate File Review:** We reviewed a sample of 70 REM/Rate models out of 547 participants selected to obtain a suitable representation of builders and HERS ratings. The sample was a simple random sample of homes, assuming a CV of 0.5, leading to better than 10% precision at 90% confidence.
- Non-Sampling Errors
  - **Non-Response Bias:** Given that the response rate for the code official interviews was 42% and the response rate for raters was 50%, there was the potential for non-response bias. However, we attempted to mitigate this possible bias by attempting to contact each inspector in the sample up to three times (unless we received a hard refusal) and by calling at different times of the day as appropriate.
- Data Processing Errors
  - **Gross Impact Calculations:** We estimated gross impacts by comparing REM/Rate models of a sample of participant as-built homes to a model of a similar home that just met the local building codes. To minimize data processing errors, the evaluation team had all calculations reviewed by a team member who did not perform the original calculation to verify accuracy of the computation.

- **Net Impact Calculations:** We applied the deemed NTGR agreed upon by the Stakeholder Advisory Group (SAG) to estimate the program's net impacts. To minimize data processing errors, the evaluation team had all calculations reviewed by a team member who did not perform the original calculation to verify accuracy of the computation.
- **Modeling Errors:** We used REM/Rate's automated UDRH feature to process the files and minimize user errors. Additionally, we processed the modeling results using a Microsoft Access database and exported the results into Microsoft Excel to minimize data entry errors.

3. Evaluation Findings

3.1 Program Description and Participation

The AIC ENERGY STAR New Homes Program offers builders training, technical information, marketing materials, and incentives for the construction of homes meeting ENERGY STAR 3.0 standards or a HERS index of 65 or lower. In PY6, the program adopted ENERGY STAR 3.0 guidelines and the 2012 Illinois energy code took effect. To allow builders time to adapt to the new ENERGY STAR 3.0 requirements, the program allowed builders to build to the previous ENERGY STAR standard (2.5) or to have the home rated by a HERS rater as an introductory step to participating in the program. In PY7, AIC removed the ENERGY STAR 2.5 option and builders could only build to ENERGY STAR 3.0 requirements or a HERS score of 65 or lower to receive a program incentive.

Builders constructing single-family homes and duplexes heated with fuel provided by AIC are eligible to participate in the program. Builders hire a HERS rater to verify savings achieved by energy-efficient practices and equipment and, as needed, provide technical assistance about energy-efficient practices. Typically, the HERS rater completes the program application for the builder and interfaces with CLEAResult on project status.

Additionally, through a base-, double-, and triple-incentive structure, the program defrays costs of hiring HERS raters and additional costs of energy-efficient equipment and materials. The base incentive offsets the cost of hiring a rater, while the double and triple incentives contribute to covering expenses and time required to install more expensive or technically advanced measures.

In PY7, AIC decided to plan on discontinuing the Multifamily Program incentives in PY8 due to the high freeridership found in the PY6 evaluation; multifamily duplexes were still eligible in PY7. Program staff also implemented a more stringent HERS requirement for all homes in PY7, having given builders a few years to adapt to the 2012 Illinois energy code. Table 5 and Table 6 detail incentives and associated tiers offered through the program from PY6 to PY7. The program incentive increased anywhere from $150 to $750 per home, depending on the level of energy efficiency demonstrated.

Table 5. Single-Family Home Incentive Structure

Tier	Heat Provider	PY6		PY7	
		HERS Rated	ENERGY STAR Rated	HERS Rated	ENERGY STAR Rated
Base Incentive	AIC Gas Heat	$450	$450	$500	$600
	AIC Electric Service other Gas Provider	-	-	$500	$600
	AIC Gas and Electric Heat	$750	$750	$800	$1,000
	AIC Electric Heat	$750	$750	$800	$1,000
Tier II	AIC Gas Heat	-	$900	$1,000	$1,200
	AIC Electric Service other Gas Provider	-	-	$1,000	$1,200
	AIC Gas and Electric Heat	-	$1,500	$1,600	$2,000
	AIC Electric Heat	-	$1,500	$1,600	$2,000
Tier III	AIC Gas Heat	-	$1,350	$1,500	$1,800
	AIC Electric Service other Gas Provider	-	-	$1,500	$1,800
	AIC Gas and Electric Heat	-	$2,250	$2,400	$3,000
	AIC Electric Heat	-	$2,250	$2,400	$3,000

Table 6. Multifamily Unit Incentive Structure

Tier	Heat Provider	PY6		PY7	
		HERS Rated	ENERGY STAR Rated	HERS Rated	ENERGY STAR Rated
Base Incentive	AIC Gas Heat	$250	$250	$300	$400
	AIC Electric Service other Gas Provider	-	-	$300	$400
	AIC Gas and Electric Heat	$450	$450	$500	$600
	AIC Electric Heat	$450	$450	$500	$600
Tier II	AIC Gas Heat	-	$500	$600	$800
	AIC Electric Service other Gas Provider	-	-	$600	$800
	AIC Gas and Electric Heat	-	$900	$1,000	$1,200
	AIC Electric Heat	-	$900	$1,000	$1,200
Tier III	AIC Gas Heat	-	$750	$900	$1,200
	AIC Electric Service other Gas Provider	-	-	$900	$1,200
	AIC Gas and Electric Heat	-	$1,350	$1,500	$1,800
	AIC Electric Heat	-	$1,350	$1,500	$1,800

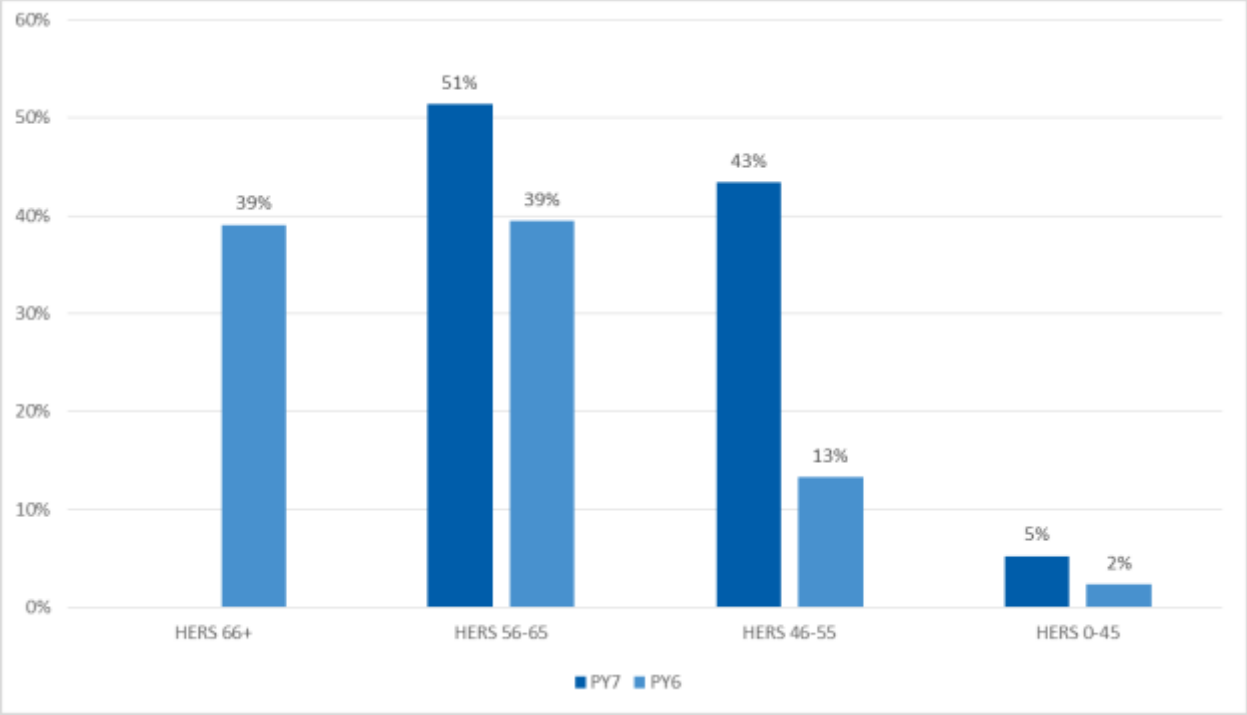
AIC and CLEAResult set annual participation goals based on the prior year's participation and market as well as program changes, while balancing realistic and best-case scenarios. In PY7, the program had a participation goal of 420 homes (240 multifamily units and 180 single-family homes). The program significantly exceeded its target: 72 participating builders completed 547 homes for program incentives in PY7. This represents an 81% increase over homes completed in PY6. Table 7 compares actual participation to the corresponding PY7 goal.

Table 7. Program Participation

Home Type	Goal (Number of Homes)	Actual (Number of Homes)	Percentage Achieved
Single-Family	180	417	232%
Multifamily	240	130	54%
Total	**420**	**547**	**130%**

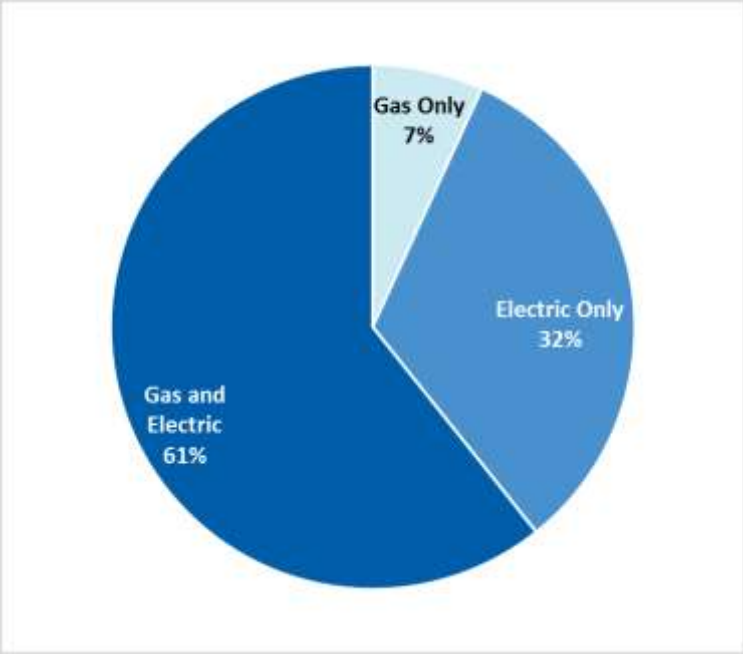
The PY7 program tracking data showed 10 HERS raters and 72 builders participated in the program. The majority of completed homes (51%) achieved a HERS index of 56–65, with 65 as the maximum rating needed to receive a program incentive (Figure 1**Error! Reference source not found.**). The change in minimum rating in PY7 had a considerable impact on the efficiency of the homes built through the program; in PY6 39% of program homes had a HERS rating of 66 or greater. As shown in Figure 2, the majority of program homes (61%) have AIC as both their gas and electric provider.

Figure 1. HERS Indices of PY6 and PY7 Program Homes (PY6, n=302; PY7, n=547)



Note: In PY7, homes with a HERS score greater than 65 were not eligible for program incentives.

Figure 2. Program Home AIC Services



3.2 Process Assessment

Illinois New Homes Market

The new homes market improved in Illinois from PY6 to PY7, as did the share of program-eligible homes. In PY7, the evaluation team estimated that the program included 12% of the singe-family new home market in AIC's service territory. In PY6, the evaluation team estimated the program included approximately 11% of the single-family home market in AIC's service territory, which was up from 8% to 10% in PY5.

We compared program tracking data for PY7 with single-family new construction starts in the roughly 82 counties in AIC's territory, as tracked by the U.S. Census' Building Permits Survey for 2014. The Census data was available for the calendar year 2014, while the program data reflects new homes in the June 2014 to May 2015 period. Table 8 lists the data gathered from the U.S. Census and the program tracking data for PY7.

Table 8. Single-Family New Housing Starts

County	2014 Housing Starts	PY7 Program Homes	County	2014 Housing Starts	PY7 Program Homes	County	2014 Housing Starts	PY7 Program Homes	County	2014 Housing Starts	PY7 Program Homes
Adams	69	0	Fayette	4	0	McDonough	2	1	Randolph	21	0
Alexander	0	0	Ford	11	1	McLean	232	7	Richland	4	0
Bond	12	0	Franklin	7	0	Macon	41	1	St. Clair	475	262
Boone	11	0	Fulton	44	1	Macoupin	47	0	Saline	0	0
Brown	0	0	Gallatin	NR	0	Madison	336	38	Sangamon	276	2
Bureau	15	0	Greene	27	0	Marion	0	0	Schuyler	NR	0
Calhoun	12	0	Hamilton	0	0	Marshall	1	2	Scott	NR	0
Cass	8	0	Hancock	5	0	Mason	1	0	Shelby	32	0
Champaign	335	8	Hardin	0	0	Massac	2	0	Stark	3	2
Christian	29	0	Henderson	6	0	Menard	24	0	Tazewell	637	10
Clark	4	0	Henry	34	2	Mercer	6	4	Union	9	0
Clay	4	0	Iroquois	28	0	Monroe	110	0	Vermilion	6	0
Clinton	85	1	Jackson	9	0	Montgomery	24	0	Wabash	1	0
Coles	16	0	Jasper	0	0	Morgan	2	0	Warren	6	2
Crawford	5	0	Jefferson	7	0	Moultrie	26	0	Washington	20	0
Cumberland	0	0	Jersey	25	0	Peoria	121	24	Wayne	1	0
De Witt	25	0	Johnson	0	0	Perry	50	0	White	1	0
Douglas	23	0	Knox	27	3	Piatt	20	1	Williamson	77	1
Edgar	3	0	La Salle	79	0	Pike	20	0	Woodford	73	49
Edwards	NR	0	Lawrence	42	0	Pope	0	0			
Effingham	24	0	Logan	13	42	Pulaski	3	0			

NR=Not reported

According to program staff, Illinois had the fewest housing starts in the country. Nevertheless, new home sales improved in AIC's territory from 2013 to 2014. The Homebuilder's Association of East Central Illinois reported that the demand for new properties expanded during this period due to strong employment, low borrowing costs, and a lack of available existing homes.[4] This reflects a national upward trend for new construction; in January 2015, Bloomberg reported that the purchases of new homes in 2014 in the United States rose to its highest level in more than six years.[5]

The evaluation team compared new housing starts with program home construction to identify potential geographic areas with high potential for the program. Eliminating all counties with fewer than six homes built in 2014, Figure 3 illustrates the relationship between program homes and total homes built. The x-axis shows the total number of single-family homes built in 2014. The y-axis shows the total number of program homes built in PY7 by county. The program had more homes built in St. Clair County than any other county, representing more than 50% of all building activity in the area. The program's opportunity areas are shown in the lower right quadrant, where building activity is high but program activity is low. These opportunity areas include the counties of McLean, Madison, Sangamon, and Champaign. While considerable building activity occurred in Tazewell County, most of this activity was in response to a 2013 tornado that devastated the

[4] Available online: http://www.hbaeci.com/state-issues-blog/archives/2015-01/

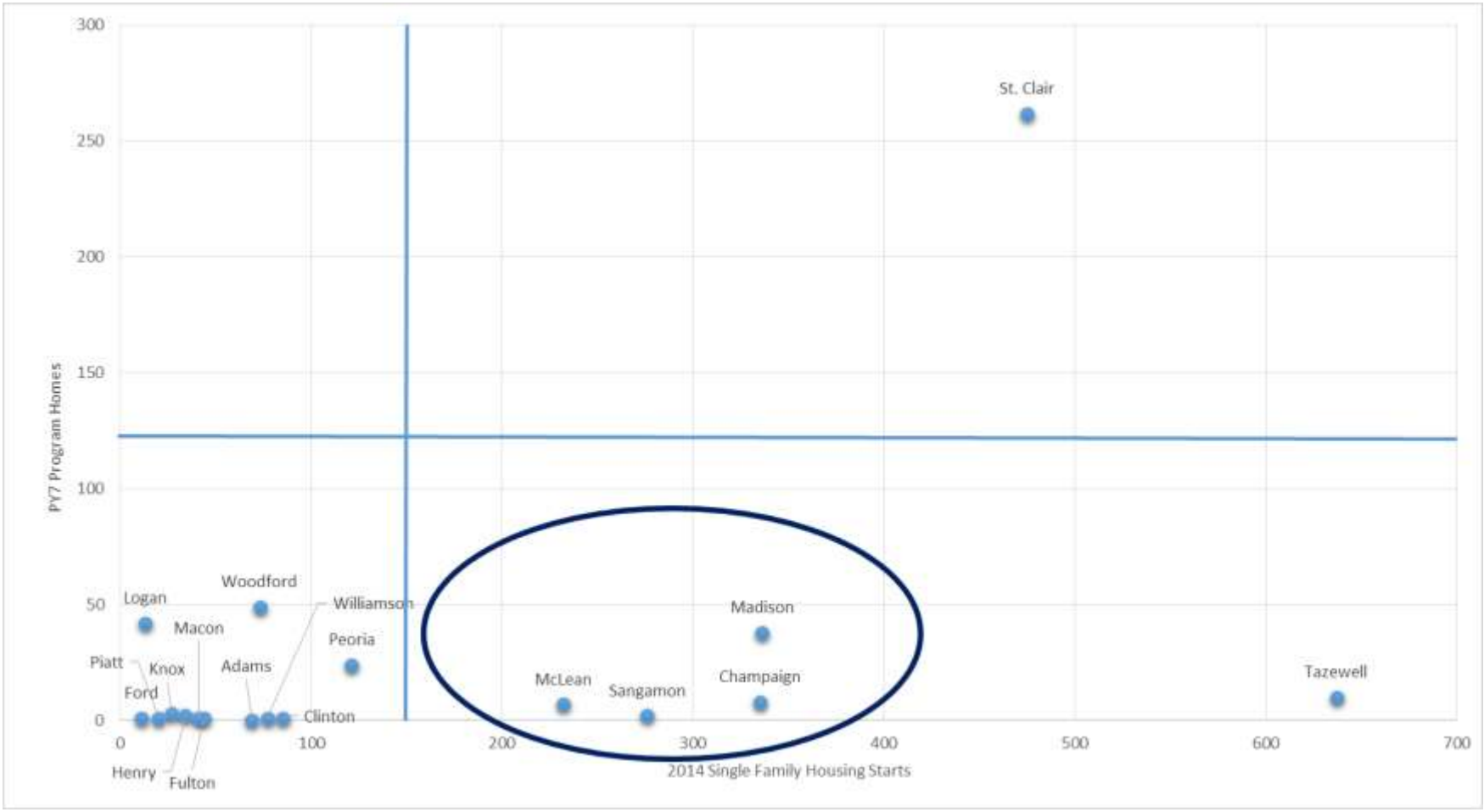
[5] Available online: http://www.bloomberg.com/news/articles/2015-01-27/sales-of-new-u-s-homes-increased-11-6-in-december-to-481-000#sthash.txeR6oFD.dpuf

community; it is likely that current building activity in Tazewell is short-term. Table 9 shows the builders who were active in Champaign, Madison, McLean, and Sangamon Counties in PY7.

Table 9. Program Builders in Opportunity Areas

County/Builders		
Champaign County: 40 Program Homes		
• Habitat for Humanity of Champaign County • J2M2 LLC	• Schieler & Rassi / Homeway Homes	
Madison County: 64 Program Homes		
• C&N Properties • C.A. Jones, Inc. • Carrington Homes • Crawford Croft • Definitive Home & Designs • Gebhardt Homes • J.D. Sheppard • JK Companies • KevCorp Construction • Lantz Homes	• LDC Homes • Lerch Homes • LMV Homes • Piedmont Development Corporation • Premier Homes by Jones • R&R New Home Construction • Remington Properties • Rocca Construction	• Shawn and Lisa McBride • Spencer Homes • Stone Ledge Homes • Sunswept Design Build • Superior Home Builders • TFH Construction • Tottleben Construction Service
McLean County: 6 Program Homes		
• Hoffacker Homes • Keystone Homes	• O'Neal Builders • Trunk Bay Construction	
Sangamon County: 2 Program Homes		
• Schieler & Rassi / Homeway Homes		

Figure 3. Program Opportunity Areas



Program Administration and Processes

Administrative Changes

PY7 included administrative changes for the ENERGY STAR New Homes Program. Leidos, the historical implementer of AIC's commercial programs, became the prime implementer of both the residential and commercial portfolios, with CLEAResult as a subcontractor. Leidos assumed some project management functions, ensuring goal achievement, assessing cost-effectiveness, establishing and monitoring the budget, and handling some quality control processes. AIC program staff reported this shift to Leidos across the entire residential portfolio allowed for better budget control across all residential programs. Additionally, Leidos had the capacity to provide more in-depth reporting than seen in previous years. At the end of PY7, Leidos began to transition program data into its database, consolidating all AIC program data.

CLEAResult continued to manage all the day-to-day aspects of the program including marketing, builder and HERS rater relations, and application processing. AIC continued its role of overseeing goal achievement, budget setting, and pipeline management.

CLEAResult program staff said that educating Leidos about the program and relinquishing some control over the program budget proved challenging at first, but that Leidos introduced processes that helped program staff better track the program pipeline. For example, Leidos helped to implement a reservation system for the program when it appeared that it would become oversubscribed. Through the system, Leidos built in checkpoints at which program staff would follow up with HERS raters to learn about the status of a project and eliminate stalled or dead projects. The reservation system allowed AIC to hold the incentive for builders and assure builders they would receive their incentives if their homes, when finished, met program criteria.

Program Performance

Program staff said PY7 participation sustained momentum from PY6, and the improved housing market added to the program's success. Program staff attributed PY7 success to efforts to build the program pipeline in earlier years, including the recruitment and participation of large-volume builders. Five builders accounted for 50% of the program's homes. Schieler & Rassi, McBride, and Timberlane Terrace, three large-scale builders recruited in recent years, were the most prolific program builders in PY7. Staff observed a higher participation percentage in Tier 1, the lowest incentive level, with 45% of single-family homes falling into this category. The program continued to offer the HERS-only option, with just 62 single-family homes achieving ENERGY STAR certification.

Due to the program's success midyear, the implementer requested additional funding to continue offering incentives, but competing residential priorities did not allow for this. Program staff then reduced outreach and instituted a reservation system whereby staff followed up on projects in the pipeline to verify whether builders would complete them within the program year or not. Staff could then identify delayed or dead projects flagged for incentives and open up opportunities for other builders.

Builder and HERS Rater Communication

While the PY6 evaluation focused on builders and the program's communication with them, the PY7 evaluation focused more on HERS rater's program relationships. HERS raters play a central role in marketing to builders and guiding them through the application process. Program staff do not actively recruit raters, as there is a limited pool of qualified raters and most have been participating in the program for several years. Raters must be RESNET certified to participate in the program, and HERS raters reported that the program covered the cost of this certification. Raters receive additional program training from a CLEAResult account manager or

program manager and are welcome to attend educational training sponsored by the program. For example, the program offered combustion safety training in December 2014. Builders do not receive formal program training unless they want to be heavily involved in the program; instead, the program relies on raters to educate builders about the program. Any builder can participate in the program and must present a certificate of liability insurance before enrolling any homes.

Program staff reported that they communicated more frequently with raters in PY7 than they have in the past. Once a month, a CLEAResult account manager provides a list of active projects to the raters. This gives the rater an opportunity to communicate perceived status with the builder, who can then provide the most current information to the rater. For example, if a home submitted to the program prior to construction is not ultimately built, the builder can report this to the rater who communicates the change to program staff. Program staff remove the home from the project pipeline. Program staff reported that this system, in conjunction with the reservation system implemented partway through PY7, helped the program better manage its pipeline and clear out any homes not completed. Raters reported to program staff that builders appreciated the additional communication.

Marketing and Market Awareness

As in years past, program marketing was limited to CLEAResult attending home shows and advertising with homebuilder associations. Due to the oversubscription with the program early in PY7, program staff greatly limited the marketing efforts during the latter half of the program year. Staff also noted that the real estate sector, particularly realtors in the St. Louis metro area, was showing more interest in energy efficiency. For example, more home postings at a multiple listing service describe a home's energy-efficient features.

Data Tracking

Historically, program staff used a Microsoft Excel spreadsheet to track program data. In PY7, program staff began using a relational database for program information and data entry. Use of this new system allowed account managers to provide raters with monthly status updates.

Verification Process

The ENERGY STAR New Homes Program has not experienced any challenges related to quality control and, as such, it has limited processes for home verification. CLEAResult staff reported placing a greater emphasis on the enrollment stage in PY7 by increasing the correspondence between raters, account managers, and program managers. When program staff receive an incentive application, CLEAResult conducts a high-level check of the application information and REM/Rate files. Then, Leidos enters all the application data into its centralized database to ensure that all data fields are complete and validates savings when construction is completed. Program staff reported that a verification plan is in process for future program years.

Future Considerations

When asked what challenges the program faces in maintaining its success in future years, program staff responded that the program's primary challenge is operating within budget while maintaining a robust pipeline. With the program's increased popularity among builders, program staff reported that the increased interest makes it tempting to expand the program to avoid turning projects away. However, due to budget allocations, they need to limit participation.

HERS Rater Feedback

HERS raters drive the New Homes Program. As the liaison between program staff and builders, raters oversee the entire home building process as it relates to the program. They market the program to builders, encourage them to participate in the program, estimate and confirm energy ratings for homes, and complete all paperwork related to the HERS score. The evaluation team interviewed five HERS raters who participated in the program and rated approximately 126 program homes within the last year. Raters described considerable longevity with the program; four of five said they have worked with the program for at least five years, and one of five had been involved with the program for two years.

Overall, raters expressed satisfaction with the program. Two of five said they were very satisfied with the program overall, and three of five said they were somewhat satisfied. Those who indicated they were somewhat satisfied identified communication as an area in which the program could improve.

Communication

Only one of the five raters expressed satisfaction with the frequency and quality of communication received from CLEAResult. The satisfied rater said, "If I request any kind of update I get it very quickly…always felt like they did a good job of being responsive." By contrast, the other four raters identified communication issues as a source of frustration. Two raters relayed concerns about the lack of communication they experienced with their projects, particularly when information was lost or missing. For example, one rater noted that it was not until the builder inquired about status that he received notification that the information was not included in the database, forcing him to resubmit application paperwork. The program's transition with Leidos and CLEAResult may have contributed to the differing impressions of how well communication was happening. Raters provided the following additional comments:

- "[The communication] is not a very good system. I have to e-mail one of the program managers to find out where my projects are. [There is] no central database to see if a project has been enrolled, making sure all the information is correct. I have to upload a form, send it with a building file to an e-mail address [and] I never get a response saying it has been received."
- "I don't receive information about status. I had a project, and it is partially my fault for not reading the fine print, [that the builder] had been waiting to be paid out on [for a year]. Never knew there was a problem until well beyond [the time in which] we should have. Don't get any communication."
- "I have to reach out [for status updates]."
- "[Communication] is one of the reasons we lost interest in the program. For homes that were enrolled, periodically we would get a list [with] number of homes, a progress chart…we would contact [CSG/CLEAResult for the information]."

Raters suggested having a centralized system where raters load the project data and review status. They also suggested a monthly letter from CLEAResult describing program updates and project status as a way to mitigate some of the communication challenges.

Program Delivery

All five raters agreed that the incentives offered by the program sufficiently motivated builders to participate in the program. One rater said: "It's driving them to build better homes." One rater suggested adjusting the HERS tiers slightly such that a 55 HERS score can qualify for the double bonus. This rater noted that he had several homes that scored a 56 or 57, just missing the next tier of incentives, and that to achieve the next tier

a builder must do exponentially more, such as on-site generation or solar. The evaluation team agrees that improving HERS scores below 55 generally requires major equipment changes such as geothermal heat pumps.

The reservation system implemented in PY7 only affected two of the interviewed raters. One of the raters had no concerns about the change, while the other rater expressed frustration that the system created more uncertainty about whether a builder would receive an incentive, even though the system was designed to provide greater certainty.

Marketing

The program has relied on raters to recruit builders to participate in the program. As one rater noted, "There is no marketing, no communication, no trainings. It's the raters themselves who are selling and marketing this program…for Ameren." Raters reported promoting the following benefits of program participation to builders:

- Using the HERS index like a miles per gallon benchmark, but in this instance lower is better
- Identifying other tax credits available
- Promoting the AIC incentives

Raters commented that this system of relying on them to market to builders worked while the program was building its reputation, but as the program has matured raters want more support from program staff to recruit builders. For example, one rater said the program has done a good job creating awareness in the building community and that the program can help builders learn more about energy-efficient construction; however, more marketing materials and presentations at homebuilders' associations would support the raters work. Raters also noted that the program offers training to them, but not to the builders. One rater suggested inviting builders to trainings and events so the builders hear about the benefits first hand.

ENERGY STAR and 2012 Illinois Energy Code

Raters reported that the primary challenge in achieving more ENERGY STAR certification in the program is recruiting qualified HVAC contractors to the program. ENERGY STAR 3.0 requires an HVAC checklist, which an ENERGY STAR-certified HVAC contractor must complete. Raters reported that there are only three certified contractors in the central Illinois area, limiting their ability to certify homes. One rater noted that the HVAC contractors do not seem to understand the code requirements.

2012 Illinois Energy Code

The evaluation team interviewed 10 building inspectors or code officials at six municipalities and four counties within AIC's service territory: City of Pekin, City of O'Fallon, City of Fairview Heights, Village of Dunlap, City of Lincoln, City of Peoria, Peoria County, Tazewell County, and St. Clair County. These communities represent 338 program homes or 61% of PY7 homes. These interviews were a continuation of the interviews conducted in PY6 with five municipalities. The evaluation team attempted to reach all building department contacts provided by AIC. During the REM/Rate review, we required a baseline energy code for every jurisdiction in the sample of 70 files. For jurisdictions where we were unable to perform an in depth interview, we performed web research to determine their adopted codes. If the jurisdiction had not adopted the 2012 Illinois energy code officially on its website, we contacted a person in the inspection office to inquire about the energy code and verify whether or not (and to what extent) the jurisdiction was enforcing 2012 Illinois energy code.

Nine out of 10 jurisdictions reported that they actively enforce the 2012 Illinois energy code, with some that had enforced the code for years, while others had only enforced it for months.

Code Enforcement and Compliance

Similar to PY6 findings, the evaluation team found that the jurisdictions used and accepted a wide array of reports, documentation, or tests for compliance. However, it appears that the documentation required and level of enforcement is more comprehensive among the jurisdictions interviewed in PY7 than in PY6. Table 10 lists the compliance methods used by the nine jurisdictions. Three jurisdictions use REScheck software to assess compliance. Six jurisdictions do not have specific tools or software and rely on the individual inspectors training and visual inspections to assess compliance. Appendix B contains the findings from PY6 and PY7.

Table 10. Compliance Mechanisms and Requirements (n=9)

Compliance Mechanism	Required	Not Required, but Accepted	Not Required/ Not Accepted	Encouraged	Optional	Unfamiliar/ Don't Know
RES check compliance report	5	3			1	
Manual J, S, and D documentation	5	2		1	1	
Thermal break/ bypass inspections	5	3			1	
Insulation inspections	7	2				
Blower door testing/ compliance report	8	1				
Duct blaster/ duct tightness testing	7	2				
HERS rating as a path to compliance	1	4	2			2
Prescriptive compliance	6	3				
Performance based compliance	2	6	1			

All respondents said they are not familiar enough with the 2015 code to identify future impacts on their review and inspection procedures. All said they would implement the 2015 code when the state requires it (January 2016), although only one respondent had specific plans around how his jurisdiction would implement it in the next four years.

Code Officials' Perspectives on Builders

Building inspectors reported that the builders in their jurisdictions understand very well the 2012 Illinois energy code requirements. This represents a significant improvement over PY6 findings. However, cities and villages or jurisdictions enforce the energy code differently, which creates compliance problems for builders who work across different jurisdictions. Inspectors also reported the following specific aspects of the 2012 Illinois energy code that have challenged the builders:

- Added costs of compliance
- Builders' lack of understanding of the economic savings benefits from higher energy codes

- Downsizing of HVAC equipment
- Blower-door tests (because the homes are so air tight already)
- Scheduling the sequence of inspections to avoid construction delays or covering up work not yet inspected
- Requirement for a six inch wall cavity (2x6 studs vs. 2x4)
- Mechanical home ventilation
- Basement insulation prior to buildout of the basement. (This increases contractor liability for air-leaks caused by homeowners who penetrate the insulation barrier when building out the basement at a later date)

The evaluation team also asked inspectors to estimate the percentage of time their inspections or reviews find different components of a building in compliance with the 2012 energy code. Overall, average compliance is high in all areas. One inspector reported low compliance (≤ 50%) in two areas: windows and skylights and high-efficiency lighting. This inspector noted that some contractors want to cut corners to save money. Table 11 reflects the range and average percentage of compliance for each component. Eight of 10 inspectors also provided several reasons compliance was not 100% for all measures. The reason most frequently mentioned was contractor oversight on "*a lot of little things, but nothing large or undone*". Respondents also provided the following reasons:

- Subcontractors lack education about the code
- Contractor confusion resulting from different enforcement in different counties
- Homeowners who do their own work and are unfamiliar with the code

Contractors must bring all measures into compliance with the code before receiving a certificate of occupancy.

Table 11. Compliance Range and Averages

Building Component	Compliance Range (% of time)	Compliance Average
Use of an air barrier (n=8)	80%-100%	91%
Continuity of the air barrier (through different assemblies, joints, etc.) (n=8)	75%-100%	92%
Air tightness of 5 air changes or less (n=8)	80%-100%	97%
Proper envelope insulation levels (n=8)	80%-100%	95%
Proper envelope sealing around envelope penetrations (plumbing, electrical, windows, and doors) (n=8)	75%-100%	84%
Proper Installation of insulation(n=8)	70%-100%	90%
Windows and skylights (n=8)	50%-100%	88%
Proper duct insulation levels (n=8)	70%-100%	92%
Duct sealing (n=8)	60%-100%	91%
Piping insulation on hot water systems (n=5)[a]	70%-100%	92%
High-efficiency lighting (n=7)[b]	25%-100%	82%

[a] Two jurisdictions do not require piping insulation. One additional inspector did not do plumbing inspections and could not provide a percentage.
[b] One inspector did not do electrical inspections and could not provide a percentage.

The majority of respondents said they thought current training for builders, provided by the state, was sufficient to support code compliance. Multiple code officials suggested that brief, one day or less, refresher courses on the code requirements would be beneficial. In addition, one respondent suggested training in air sealing and insulation.

Additional Feedback from Code Officials

Six respondents offered additional comments on the code. Two respondents said there is too much emphasis on air-tightness of the home, resulting in a risk for poor indoor air quality. Two respondents stressed the importance of continued training for both the builders and the inspectors, and two stressed the need for consumer and builder education on the value of efficient homes. In the words of one inspector, “It all comes down to money. These codes add to [builders’] expenses every two to three years. They need to be able to make money and to sell this [energy efficiency] to homebuyers who would prefer granite counter tops to more insulation.”

3.3 Impact Assessment

3.3.1 Gross Impacts

The evaluation team verified participating homes and ex ante savings estimates by reviewing energy analysis models for a random sample of 70 participating homes in the tracking database. We verified that the model runs used input values consistent with identifying information in the tracking database and that HERS ratings

levels matched the model outputs.[6] We verified the participants in the sample frame were correctly categorized by HERS index, incentive level, and building type. We found only minor inconsistencies in the tracking database where program staff had entered additional line items for homes that received corrected measure categories. This resulted in eight fewer homes in the tracking data, because we removed the extra line items for these adjustment measures. Program staff accurately corrected those homes in the database as category changes with negative savings and negative incentive, effectively zeroing out the adjustment measure impacts. As shown in Table 12, we applied the participation results to the project population, which resulted in 99% verification overall.

Table 12. Summary of Program Participation Verification Results

Home Type	Rating	Tier	Fuel Type	Tracking Participants	Verified Participants	Verification Rate
Single Family	ENERGY STAR	TIER I HERS Rating 56-65	Electric only	1	2	200%
			Gas Heat & Electric	10	10	100%
		TIER II HERS Rating 46-55	Electric Heat	4	3	75%
			Electric only	15	14	93%
			Gas Heat & Electric	52	45	87%
			Gas Heat Other Electric	1	1	100%
		TIER III HERS Rating 0-45	Electric Heat	3	3	100%
			Gas Heat & Electric	7	7	100%
	HERS	TIER I HERS Rating 56-65	Electric Heat	3	3	100%
			Gas Heat & Electric	159	159	100%
			Gas Heat Other Electric	24	24	100%
		TIER II HERS Rating 46-55	Electric Heat	5	5	100%
			Electric only	13	13	100%
			Gas Heat & Electric	96	96	100%
			Gas Heat Other Electric	13	13	100%
		TIER III HERS Rating 0-45	Electric Heat	5	5	100%
			Electric only	1	1	100%
			Gas Heat & Electric	13	13	100%
Multifamily	ENERGY STAR	TIER I HERS Rating 56-65	Electric Heat	1	1	100%
		TIER II HERS Rating 46-55	Electric Heat	41	41	100%
	HERS	TIER I HERS Rating 56-65	Electric Heat	87	87	100%

[6] Neither the program implementer nor AIC used the REM/Rate files to develop savings.

Home Type	Rating	Tier	Fuel Type	Tracking Participants	Verified Participants	Verification Rate
		TIER II HERS Rating 46-55	Electric Heat	1	1	100%
Total				**555**	**547**	**99%**

Calculating Ex-Post Realization Rates

After the evaluation team verified the homes in the tracking database, we defined the baseline for each participant home in the modeling sample.[7] Though Illinois adopted the 2012 Illinois energy code statewide in 2013, the evaluation team's literature review and interviews with code enforcement officials indicated that the enforcement of codes were less stringent than 2012 energy code in some jurisdictions. Because of varied enforcement, we varied the baseline by jurisdiction, using the stated adopted code in each jurisdiction. Some jurisdictions did not enforce an energy code at all. Given this variation, the code used to design the UDRH files drew on the stated code adoption of each jurisdiction; if a jurisdiction did not have an energy code, the evaluation team assumed IECC 2006 as the baseline code. Based on our discussion regarding code enforcement in Section 3.2, we believe this to be a conservative approach that more accurately represents the true baseline.

Table 13 details the UDRH features for each code. Overall, UDRH files used heat transfer coefficients[8] as they represented the average insulation level required by code.

[7] The savings in the database are planning estimates. Participating HERS raters produce a HERS rating which is independent of energy savings for this program. Neither AIC nor the program implementer calculated energy savings based on actual participation, except assigning a deemed savings value to each participant based on the home's HERS score and fuel use.

[8] Overall heat transfer coefficients are also known as equivalent U-values. Smaller U-values represent more insulation.

Table 13. UDRH Features and Jurisdictions

Component	IECC 2006	IECC 2009	IECC 2012
Thermostat	Heating 72F Cooling 75F Programmable Thermostat	Heating 72F Cooling 75F Programmable Thermostat	Heating 72F Cooling 75F Programmable Thermostat
Ceiling[a]	U-0.030	U-0.030	U-0.026
Walls	U-0.060	U-0.057	U-0.057
Floors	U-0.033	U-0.033	U-0.033
Slab	R-10, 2ft	R-10, 2ft	R-10, 2ft
Windows[a]	U-0.35	U-0.35	U-0.32
Infiltration[a]	0.00036 SLA	7ACH50	5ACH50
Duct Leakage[a]	12%–20% Duct Loss (RESNET Default)	8CFM/100CFA	4CFM/100CFA
Duct Insulation	R-8 Attic Supply, R-6 Otherwise	R-8 Attic Supply, R-6 Otherwise	R-8 Attic Supply, R-6 Otherwise
Heat Pump	7.7 HSPF	7.7 HSPF	7.7 HSPF
Furnace	80 AFUE	80 AFUE	80 AFUE
Boiler	82 AFUE	82 AFUE	82 AFUE
AC	13 SEER	13 SEER	13 SEER
Lighting*	0% CFL	50% CFL	75% CFL
Appliances	RESNET Default	RESNET Default	RESNET Default
Gas Water Heat	0.59 EF	0.59 EF	0.59 EF
Electric Water Heat	0.91 EF	0.91 EF	0.91 EF
Number of Homes in Sample	1	13	56
Cities	Varna	Moro, Edwardsville, Bethalto, Quincy	Belleville, O'Fallon, Lincoln, Lebanon, Shiloh, Champaign, Washington, Glen Carbon, Peoria, Edelstein, Mascoutah, Princeville, Bloomington, O Fallon, Fairview Heights, Morton, Dunlap, Kewanee, Metamora, Farmington

Source: IECC codes for 2006, 2009, and 2012 provide these example values for IECC Zone 5; IECC Zone 4 uses slightly different values.

[a] Increased energy efficiency requirements in IECC 2012.

The evaluation team estimated ex post savings by calculating the difference between the baseline energy consumption and the as-built energy consumption. Applying the UDRH to the 70 REM/Rate files determined kWh, kW, and therm impacts for each home. The UDRH file determined the energy consumption of the baseline home using the built-in energy simulation engine in REM/Rate.

The evaluation team calculated the realization rates as the ratio of ex post gross energy savings to ex ante gross energy savings using the following equation:

$$realization\ rate = \frac{\sum modeled\ ex\ post\ gross\ energy\ savings}{\sum ex\ ante\ gross\ energy\ savings}$$

The evaluation team calculated the difference between the ex ante savings and the ex post savings from our REM/Rate analysis for single-family and multifamily homes to determine the realization rates shown in **Error! Reference source not found.**.

Table 14. PY7 ENERGY STAR New Homes Gross Realization Rates

Building Type	MWh*		MW*		Therms[a]	
	Realization Rate	Precision	Realization Rate	Precision	Realization Rate	Precision
Single-Family	65%	±5.1%	95%	±3.5%	123%	±2.1%
Multifamily	114%	±4.6%	64%	±3.5%	N/A	N/A
Total	**78%**	**±3.6%**	**87%**	**±2.9%**	**123%**	**±2.1%**

[a] At 90% Confidence

Heating is one of the most significant end uses of a home. Electric heat proved very common among multifamily participants, partially explaining the high realization rate for MWh; ground source heat pumps also prove relatively common and further increased savings. Single-family homes received relatively low realization rates for electricity. The evaluation team found the following common characteristics among rated homes:

- High-efficiency gas furnaces
  - High-efficiency gas furnaces result in a 5 to 10 HERS point reduction at a relatively low cost.
  - Few other measures provide a large reduction in HERS score
- Modest increases in lighting efficiency
  - IECC 2012 requires 75% high-efficiency lighting; the incremental energy savings of installing 80% to 90% high-efficiency lighting is relatively low.
- High-efficiency gas water heaters
  - Tankless and power vented water heaters result in a 2 to 8 HERS point decrease at a relatively low cost.

For homes with gas heating systems, there are few upgrades that significantly lower the HERS score and produce significant electrical savings. For example, a very efficient 20 SEER air conditioner only receives a 1 to 3 HERS point decrease. High-efficiency lighting can achieve a 1 to 3 point decrease at a relatively low cost; however, we did not find this was a common practice in program homes.

Nearly 90% of single-family program homes receive gas service from AIC. These homes primarily meet the program required HERS scores from gas efficiency measures and achieve higher than expected gas savings at the expense of electric savings. Due to the nature of the HERS Index, both gas and electric savings are equally weighted in the index as units of energy; a one-therm reduction in gas usage is equal to a 29.3kWh[9] reduction in electricity usage. Program planning savings assume that 22% of home energy savings would come from electricity for homes served with both gas and electricity. However, we find that only 14% of energy savings are electric savings while the remaining 86% are gas savings. Ex ante gross energy savings are underestimating gas savings and overestimating electric energy savings.

[9] This is a simple unit conversion one therm = 29.3kWh

Calculating Ex Post Gross Savings

The evaluation team determined ex post savings using realization rates from the 70 homes in the sample and the following equation:

$$ex\ post\ gross\ savings = ex\ ante\ gross\ savings * realization\ rate$$

Error! Reference source not found. Table 15 shows ex post savings.

Table 15. Ex Ante and Ex Post Gross Savings

Building Type	Ex Ante Gross			Ex Post Gross		
	MWh	MW	Therms	MWh	MW	Therms
Single-Family	532	0.138	52,120	342	0.131	64,220
Multifamily	200	0.050	-	229	0.032	-
Total	**732**	**0.188**	**52,120**	**571**	**0.163**	**64,220**

3.3.2 Net Impacts

We applied the NTGR value of 0.8 to gross savings, which resulted in the program net impacts shown in Table 16.

Table 16. PY6 ENERGY STAR New Homes Program Net Impacts

Building Type	Ex Post Gross			NTGR	Ex Post Net		
	MWh	MW	Therms		MWh	MW	Therms
Single-Family	342	0.131	64,220	80.0%	274	0.105	51,376
Multifamily	229	0.032	-		183	0.026	-
Total	**571**	**0.163**	**64,220**		**457**	**0.130**	**51,376**

4. Conclusions and Recommendations

- **Conclusion 1:** While program staff reported that monthly communication with raters helped them better manage the project pipeline, all but one rater expressed dissatisfaction at the level of communication received through the program. In PY6, due to similar feedback from builders, the evaluation team made two recommendations: (1) establish communication milestones with builders to improve satisfaction levels and (2) issue a simple quarterly e-mail update (also provided by regular mail) to builders and raters. Based on rater feedback, the lack of communication persists.
  - **Recommendation:** Establish regular communication with raters who can then communicate project status to builders. If the relational database is not robust enough to generate monthly status reports to raters, send monthly e-mails to raters communicating project status. Furthermore, establish proactive response protocols whereby program staff confirms receipt of applications and notifies raters if the information is incomplete. Explore the option of having an online portal that raters and builders could reference with application status.
- **Conclusion 2:** The program adequately covers St. Clair County, where program homes accounted for more than half of all new homes built. Based upon the results of the market share assessment, the program's opportunity areas include McLean, Madison, Sangamon, and Champaign Counties.
  - **Recommendation:** If budget allows, focus program support and training efforts on builders active in these areas, as well as the HERS raters who work with them to describe the broader building opportunity. Focus special trainings (see recommendation below) in these counties to drive further program awareness.
- **Conclusion 3:** The availability of qualified HVAC contractors has limited the ability of builders to use the ENERGY STAR option.
  - **Recommendation:** Offer special trainings on ENERGY STAR to HVAC contractors to help increase the pool of qualified contractors.
- **Conclusion 4:** Fewer building inspectors indicated that the 2012 presented major enforcement challenges, indicating that communities are more capable of enforcing the code than in prior years.
- **Conclusion 5:** While the program achieved total combined energy reductions, program homes achieved more gas savings and less electric savings than expected.
  - **Recommendation:** Assess the cost-effectiveness of the relative savings. If electricity savings provide higher relative benefits, AIC could require certain mandatory electric energy savings measures on the program homes (note that this may reduce participation in the program). Modify the incentive structure to provide additional incentives for electric energy savings measures. Conduct outreach and education with builders and HERS raters to highlight benefits of energy-efficient cooling, lighting, and appliances. Since the program is currently participation limited, optimizing the cost effectiveness of those participants by adjusting requirements could improve the program's net benefits.
- **Conclusion 6:** Several historically tracked parameters were not included in the PY7 tracking database including: home size, HERS score, space-heating fuel, water-heating fuel, and occupancy date.

- **Recommendation:** Update the new tracking system to include historically tracked data (e.g., home size, HERS score, space-heating fuel, water-heating fuel, occupancy date). These data, while not critical for our analysis, provide insight into trends of participating homes and can guide decisions about future incentive tiers.

Appendix A. Data Collection Instruments

Ameren Illinois_NH Building Inspector.c

AIC PY7 New Homes HERS RATER Intervie

AIC PY7 New Homes Interview Guide_DR

Appendix B. Combined PY6 and PY7 Building Code Official Results

Table 17. Compliance Mechanisms from Jurisdictions Interviewed in PY6 and PY7 (n=15)

Compliance Mechanism	Required	Not Required, but Accepted	Not Required/ Not Accepted	Encouraged	Optional/ Not used	Unfamiliar/ Don't Know
RES check compliance report	6	6			2	
Manual J, S, and D documentation	6	3		1	4	
Thermal break/ bypass inspections	8	3			3	
Insulation inspections	9	4			1	
Blower door testing/ compliance report	11	1			2	
Duct blaster/ duct tightness testing	10	2			2	
HERS rating as a path to compliance	1	7	2		2	2
Prescriptive compliance	6	3				
Performance based compliance	2	6	1			

For more information, please contact:

Hannah Arnold
Managing Director

510 444 5050 tel
510 444 5222 fax
harnold@opiniondynamics.com

1999 Harrison Street, Suite 1420
Oakland, CA 94612