

Comparison of Home Retrofit Programs in Wisconsin

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Comparison of Home Retrofit Program Models in Wisconsin

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Contents

List of Tables	v
Definitions	vi
Executive Summary	1
Acknowledgments	2
1 Introduction and Objectives	3
2 Approach	4
2.3 Research Team.....	6
3 Results	7
3.1 Home Performance with ENERGY STAR.....	10
3.1.1 Program Description	10
3.1.2 Results.....	11
3.2 Wisconsin Public Service Territory-Wide Increased Incentives	12
3.2.1 Program Description	12
3.2.2 Results.....	12
3.3 Targeted Home Performance with ENERGY STAR.....	13
3.3.1 Program Description	13
3.3.2 Results.....	14
3.4 Together We Save—Milwaukee Pilot	14
3.4.1 Program Description	14
3.4.2 Results.....	15
3.5 iCanConserve—WPS.....	15
3.5.1 Program Description	15
3.5.2 Results.....	17
4 Limitations	19
5 Conclusions	20
5.1 Energy Advocate Model/Community-Based Model	20
5.2 Increased Incentives Model	20
5.3 Standard Statewide Program Model	21
5.4 Summary	21

List of Tables

Table 1. Research Team	6
Table 2. Program Characteristics and Variables	8
Table 3. Program Performance	9

Unless otherwise noted, all tables were created by NorthernSTAR.

Definitions

BPI	Building Performance Institute
DOE	U.S. Department of Energy
Btu	British thermal unit
CFL	compact fluorescent light
GWh	Gigawatt-hour
HPwES	Home Performance with ENERGY STAR
kWh	Kilowatt-hour
MMBtu	Million Btu
THPwES	Targeted Home Performance with ENERGY STAR
TWS	Together We Save
WPS	Wisconsin Public Service

Executive Summary

For many homeowners, investments in weatherization and other home energy efficiency measures can yield high returns in reduced energy costs and increased comfort. Despite these benefits, the vast majority of homes have not undertaken the full range of energy efficiency investments due to a number of factors or customer barriers.

To explore ways to reduce customer barriers and increase home retrofit completions, several different existing home retrofit models have been implemented in the state of Wisconsin. This study compared these programs' performance in terms of savings per home and program cost per home to assess the relative cost effectiveness of each program design. Given the variations in these different programs, it is difficult to establish a fair comparison based on only a small number of metrics. Therefore, the overall purpose of the study is to document these programs' performance in a case study approach to look at general patterns of these metrics and other variables within the context of each program. Energy efficiency program administrators and implementers can use this information to inform home retrofit program design.

Six different program designs offered in Wisconsin for single-family energy efficiency improvements were included in the study. For each program, the research team provided information about the programs' approach and goals, characteristics, achievements, and performance. The program models were then compared with performance results—program cost and energy savings—to help understand the overall strengths and weaknesses or challenges of each model.

The following conclusions from the Wisconsin models may help inform future program design:

- Home retrofit models that feature increased incentives, a limited time frame, and an energy advocate—a person dedicated to helping the homeowner through the program—tend to achieve higher home retrofit completion rates and energy savings. These models do, however, have higher program costs. The challenges are to better understand how each program element influences the outcomes and how to measure all of the benefits in a benefit/cost analysis to make these models more cost effective.
- The home retrofit model that features increased incentives with a limited time frame to complete the work and receive the rewards tends to have deeper savings per home than the standard Home Performance with ENERGY STAR (HPwES) statewide program. This program also has a lower program cost than the energy advocate models because it does not require extensive hand-holding for the homeowners. Despite the deeper savings, this type of program does not have as broad of reach or does not touch as many homes as the standard programs.
- The standard HPwES program achieves solid energy savings for the least program cost per home and the least program cost per Btu. The challenge of a statewide program is balancing the goals of offering a program accessible to all residents while still obtaining as much savings as possible. The other programs reviewed here show that it is possible to obtain more savings per home than HPwES currently achieves. Those additional savings,

however, come with a higher program cost, and the possible additional benefits are difficult to measure.

The comparisons presented suggest strategies that could increase the energy savings per home (energy advocates, higher incentives, geographic targeting, and limited time frame) for retrofit programs. To meet challenging savings goals, additional research and program design work is needed to determine the following:

- How each different program element influences program outcomes
- How to obtain additional savings on a widespread basis without large additional program costs
- How to better document and account for the additional benefits and energy savings from these seemingly more expensive models
- How to best combine a widespread or statewide program with lower costs and lower savings like HPwES with a more program cost and savings intensive model on a targeted basis to maximize overall savings and minimize program costs.

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1 Introduction and Objectives

For many homeowners, investments in weatherization and other home energy efficiency measures can yield high returns in reduced energy costs and increased comfort. Despite these benefits, the vast majority of homeowners have not undertaken the full range of energy efficiency investments. Many do not complete projects for the following reasons: they feel that the up-front costs are too high, they are unable to finance recommended improvements, and they have limited understanding of or belief in the needed efficiency upgrades.¹ In addition, another set of reasons called behavioral barriers also exist, including the “hassle factor” associated with home improvement work and the complexity of home improvement decisions. Finally, energy efficiency is not always a priority for homeowners in general.

Program administrators and policymakers are increasingly recognizing that overcoming these barriers is a key success factor in achieving an increase in participation rates, completion rates, and energy savings of home energy efficiency improvements. For energy efficiency programs, increasing these numbers is central to the success and continued existence of the programs. For utilities, doing so can increase profitability. How to overcome these obstacles, however, has been the topic of much debate.

To explore ways to reduce these barriers and increase home retrofit completions, several home retrofit program models have been implemented in Wisconsin. The original intent of this study was to only compare savings per home and program cost per home to assess the relative cost effectiveness of each of these program designs. Given the many variations in these different programs, though, it is difficult to establish a fair comparison based on only a small number of metrics. Instead, this study documents these programs’ performance in a case study approach to look at general patterns of these metrics within the context of each program.

Therefore, the overall purpose of this study is to describe each program’s approach and goals, characteristics, achievements and performance, and overall strengths and challenges. The example program approaches and results can then be used by energy efficiency program administrators and implementers to inform future home retrofit program design. The knowledge and lessons obtained from this study will be shared with the industry to guide program design toward achieving Building America’s increasing energy saving goals for existing homes.

¹ Van de Grift, S.; Schauer, L. (2010). “A Hand to Hold: A Holistic Approach to Addressing Barriers in the Home Retrofit Model.” Presented at the ACEEE [American Council for an Energy-Efficient Economy] 16th Biennial Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, August.

2 Approach

This section describes the overall approach and methodology of the study. The following six existing home retrofit program designs offered in Wisconsin for single-family energy efficiency improvements were included in the study:

- Focus on Energy Home Performance with ENERGY STAR (HPwES)—Statewide
- Focus on Energy HPwES—Wisconsin Public Service (WPS) Territory Wide Increased Incentives
- Targeted Home Performance with ENERGY STAR (THPwES)—Statewide
- Together We Save (TWS)—Milwaukee
- iCanConserve—WPS–Brillion
- ICanConserve—WPS– Allouez.

HPwES was used as the baseline against which other program results were compared. This approach is appropriate because all other programs are variations of the HPwES program delivery design.

2.1 Methodology

The research team collected information about program design, cost, and savings from program plans, staff members, and reports. Data presented are from the most recently completed program year(s) between 2009 and 2011 for which adequate data were available.

For each program, the following variables and characteristics were collected and compared:

- **Homeowner recruitment.** The programs that were analyzed have different methods of recruiting homeowners. The different approaches are as follows:
 - Market providers—auditors and contractors recruit homeowners to participate
 - Utility—the sponsoring utility recruits participants through a variety of outreach methods
 - Program—the energy efficiency program is responsible for homeowner recruitment
 - City—several programs use the participating city’s (or village’s) outreach capabilities to recruit homeowners.
- **Auditors (consultants).** All the programs use a consultant to conduct the energy audits or assessments. Consultants are independent businesses that offer energy efficiency services and home energy ratings. Most consultants are certified by the Building Performance Institute as building analysts. The THPwES, though, primarily uses the auditors trained under the Wisconsin Weatherization Assistance Program. The variation in program design for auditors is if the consultants supply their services in the open

market to all homeowners or if the program restricts the selection by assigning a prequalified consultant to the homeowner.

- **Contractors.** Contractors are businesses that install energy efficiency improvements for the homeowner. For the programs analyzed here, contractors are either providing their services through the normal open market or were selected by the program as the only contractors that the homeowner can use. Contractors either partner with consultants or perform services from a provided scope of work.
- **Energy advocates.** Some programs include energy advocates or case managers who serve as the homeowner liaison and help the homeowner through the steps of the program process. They educate the homeowner on ways to use energy more efficiently and answer questions about the program.
- **Homeowner incentives.** Incentives for these programs are monetary rewards to the homeowners for installing an energy efficient improvement in their home. Incentive structures, required measures, and amounts vary among the different programs.
- **Audit cost.** Each program has a cost associated with the energy assessment (audit). The homeowner either pays the full audit cost charged by the consultant (market rate), a part of the audit cost if the program subsidizes part of the fee, or no fee at all if the program pays for the audit in full.
- **Service provider incentives.** Some programs provide monetary rewards to the consultants, contractors, or other program partners that meet certain performance criteria in an effort to encourage service providers to recruit more homeowners or complete more improvement work.
- **Direct install measures.** Some programs offer direct installation of compact fluorescent lights (CFLs), low-flow showerheads, and faucet aerators as a way to achieve additional energy savings.

2.2 Metrics

In addition to comparing the different program aspects, the following metrics were calculated to help evaluate the different program designs:

- Energy savings (MMBtu) per home
- Program cost per home
- Program cost per home and per unit of energy saved (MMBtu) to assess cost effectiveness.

To calculate these metrics, the following data were collected for each program:

- **Program cost.** Total program cost including incentives, labor, and marketing. Costs vary among programs as a result of differing program structures and incentive levels.
- **Units.** Total homes that completed installation of energy efficiency measures and the conversion rate from initial audits to final audits.

- **Energy savings.** Measured amount of first-year deemed gross energy savings in therms, kilowatt-hours, and million Btu. (Using MMBtu allows for the comparison of natural gas and electric savings together.)
- **Measures.** Type and frequency of energy efficiency improvements (shell measures and equipment/ventilation measures) for the individual programs.

By comparing program energy savings and cost with the variations in program design, conclusions can be drawn about what variations in design might have significant implications on the program cost or savings achieved by that particular program.

2.3 Research Team

Table 1 lists the project team members and their contact information.

Table 1. Research Team

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3 Results

This section gives an overview of each program included in the study,² along with performance results and a discussion of each model's strengths and challenges. Table 2 summarizes each program's attributes. As detailed in the table, each program's delivery approach varies slightly from the others. Table 3 summarizes each program's performance results in terms of number of homes completing audits and energy efficiency improvements, types of measures completed, energy savings, and program cost.

² Note that other Wisconsin programs that use HPwES as their program design base are the Green Madison and Me² programs, which are part of the U.S. Department of Energy Better Buildings initiative. Because these programs were launched recently, no program data were available and they were not included in this study. In addition, the utility, Xcel Energy, partners with Focus on Energy to provide HPwES assessments to residential customers in certain targeted Xcel customer areas at substantially reduced rates. As part of that program, eligible residential customers can receive additional incentives from Xcel Energy in addition to Focus on Energy incentives toward the cost of implementing energy saving projects. Complete program data were not available for analysis in this study.

Table 2. Program Characteristics and Variables

Program Name	Program Locations	Homeowner Recruitment	Consultant Approach	Contractor Approach	Energy Advocates	Homeowner Incentives	Audit Cost for Homeowner	Service Provider Incentives	Direct Install
HPwES	Statewide	Market providers and program	Open market	Open Market	No	Cash-back rewards or subsidized, unsecured loan	Market rate	Yes	No
HPwES—WPS Territory-Wide Increased Incentives	WPS Territory	Market providers and program	Open market	Open Market	No	Increased incentives above HPwES rewards or low-interest financing	Market rate	Yes	No
Targeted HPwES	Statewide	Program, with income eligibility requirements	Restricted	Restricted	No	90% of improvement cost	Free	No	Yes
TWS	Targeted Milwaukee Neighborhoods	Program	Restricted	Restricted	Yes	50%–90% of improvement costs	Free	No	Yes
iCanConserve WPS–Brillion	Brillion, Wisconsin	Program, city, and utility	Restricted	Restricted	Yes	50%–90% of improvement cost	Free	No	Yes
iCanConserve WPS–Allouez	Allouez, Wisconsin	Program, city (village), and utility	Restricted	Restricted	Yes	60% of improvement costs	Subsidized, \$25	No	Yes

Table 3. Program Performance

Performance Metric	Program Name					
	HPwES	HPwES—WPS Territory-Wide Increased Incentives	Targeted HPwES	TWS	iCanConserve WPS—Brillion	iCanConserve WPS—Allouez
Year(s) Reviewed	2010	2010	2010	2009– 2010	2010–2011	2011
Units						
Number of Homes Completing Energy Assessments (Audits)	1,909	424	349	114	131	357
Percentage of Homes Completing Retrofits	63	31	100	79	66	3%
Measures						
Average Number of Shell Measures Per Retrofit	3.4	3.7	3.3	2.9	3.5	3.4
Average Number of Ventilation/Equipment Measures Per Retrofit	0.6	0.6	0.5	2.9	3.5	2.8
Average Number of Measures (Shell/Equipment/Ventilation)	4.0	4.3	3.8	5.7	7.0	6.1
Energy Savings						
Gross Savings						
Average Savings Per Retrofit Home (kW)	0.3	0.3	0.4	0.4	0.3	0.3
Average Savings Per Retrofit Home (kWh)	446	530	1,636	715	1,049	1,053
Average Savings Per Retrofit Home (therm)	331	408	276	385	317	362
Combined Savings (MMBtu)						
Average Savings Per Retrofit Home (MMBtu)	34.6	42.6	33.2	40.9	35.3	39.8
Average Savings Per Energy Assessment (MMBtu)	22.0	13.2	33.2	32.3	23.2	14.4
Cost						
Cost Per Gross MMBtu (\$)	68	91	245	258	304	235
Cost Per Retrofit Home (\$)	2,368	3,861	8,130	10,559	10,737	9,358

3.1 Home Performance with ENERGY STAR

3.1.1 Program Description

Focus on Energy is Wisconsin's statewide program for energy efficiency and renewable energy, which was created in 1999 and expanded in 2005. The program is funded by ratepayers, with investor-owned utilities being required to participate and municipal utilities and electric cooperatives having the option to participate or offer their own programs. The aim of the program is to increase Wisconsin's energy independence by helping residents and businesses implement efficiency and renewable energy projects that would not otherwise occur through the use of incentives/financial assistance and technical assistance. Focus on Energy's single-family home retrofit program is HPwES, which has been offered statewide in Wisconsin for more than 10 years and is still active. HPwES is one of Focus on Energy's many programs.

HPwES is currently designed to work with a network of independent consultants who help customers increase the energy efficiency, comfort, safety, and durability of their homes. Consultants partnering with the HPwES program help to identify problems in the home and offer recommendations and guidance for solving those problems. A consultant will visit the home and complete a comprehensive assessment of the following areas:

- Insulation and building shell
- Air leakage
- Mechanical equipment
- Moisture and ventilation
- Combustion safety and carbon monoxide.

Homeowner recruitment. The HPwES program and market providers (consultants, contractors, and other referring businesses and organizations) are primarily responsible for recruiting homeowners to participate in the program.

Consultant (auditor) approach. The program uses an open market approach in which homeowners can select any qualified Focus on Energy HPwES consultant or performance contractor to conduct the energy assessment (audit). Performance contractors can conduct the energy assessment and also install the improvements.

Contractor approach. The program uses an open market approach in which homeowners can select any contractor or install improvements on their own; however, preference is given to program allies. Program allies are partner contractors that install building shell measures and partner with one or more consultants. These are primarily insulating and air sealing contractors, but other possibilities include remodelers, roofing contractors, and other referring businesses and organizations.

Energy advocates. Energy advocates are not used in this program.

Homeowner incentives. Once the recommended measures are completed and verified, Focus on Energy provides cash-back rewards to the homeowner for implementing certain energy efficient

measures. Rewards range from \$50 to \$250 per measure. Homeowners have the option to forgo measure rewards and instead take advantage of a subsidized, unsecured loan available through Focus on Energy. The homeowner can also receive a bonus reward of up to \$300 for completing three or more measures.

Audit cost. Homeowners pay the market rate set by the consultant or performance contractor, which is typically about \$300 to \$500.

Service provider incentives. Monetary rewards ranging from \$75 to \$150 for performance, cooperative marketing, and referral rewards are given to service providers.

Direct install. No direct install measures were included in this program as of December 31, 2011.

3.1.2 Results

HPwES is a mature program that has produced energy savings for Wisconsin homeowners for more than 10 years. From 2006 through 2010, the program produced over 4.5 GWh of electricity savings and more than 2.5 million therms in natural gas savings. Because of its longevity and success, other programs in Wisconsin have been built on the HPwES model. HPwES serves as a baseline for assessing the performance of these other programs.

Table 3 shows results for HPwES and the other programs. Data for HPwES are drawn from 2010, the most recent year for which full-year results were available. These results include only savings and program costs for the baseline HPwES program. In some cases official HPwES program results also include results from the other programs highlighted in this report. Results from these other programs were removed from HPwES results to enable a comparison between the basic HPwES program and the various enhancements.

During 2010, the basic HPwES program provided energy assessments to 1,909 homes with 63% of homes completing retrofits. Homeowners completed an average of 4 measures, comprising 3.4 shell measures and 0.6 ventilation/equipment measures. On average the program saved 34.6 MMBtu per retrofit home at a program cost of \$2,368 per home, which is equivalent to \$68/MMBtu.

Compared to the other retrofit programs, HPwES delivered savings for the lowest program cost and touched the greatest number of homes. The program has had years to engage a network of consultants and contractors (which has also benefited the other programs) and refine its approach. With its broad range of experience and statewide reach, it has succeeded in recruiting participants and realizing savings across a broad base of homeowners.

Because of the statewide nature of the program, however, it cannot reach specific audiences as effectively. Although participants have been satisfied with their program experience, HPwES does not realize the same intensity of customer interaction as programs that include an energy advocate. In addition, homeowners completing work in HPwES pay for both the cost of the audit and the full cost of energy efficiency improvements out of pocket or with private financing. Less

intensive customer guidance, lower incentives, and fewer program requirements resulted in lower energy savings per home than other models.

3.2 Wisconsin Public Service Territory-Wide Increased Incentives

3.2.1 Program Description

The HPwES—WPS Territory-Wide Increased Incentives program was offered to qualifying WPS utility customers who completed a home performance evaluation and required measures within 6 months of the evaluation. This enhanced program was first introduced to WPS customers in September 2009 and continued through 2012. The program was the same as the Focus on Energy HPwES program, but offered bonus rewards. Customers chose to receive double the cash-back rewards or reduced-interest financing plus \$250 in cash, further encouraging them to complete home energy improvements.

Homeowner recruitment. The program and market providers (consultants, contractors, and other referring businesses and organizations) were primarily responsible for recruiting homeowners to participate in the program.

Consultant (auditor) approach. The program used an open market approach in which homeowners could select any qualified Focus on Energy HPwES consultant or performance contractor.

Contractor approach. The program used an open market approach in which homeowners could select any contractor or install improvements on their own; however, preference was given to program allies.

Energy advocates. Energy advocates were not used in this program.

Homeowner incentives. Homeowners could receive increased incentives (sometimes as much as double or even triple) the standard HPwES cash-back rewards (up to \$3,000) or low-interest financing if at least three of the recommended insulation, air sealing, and/or combustion safety measures were completed within 6 months.

Audit cost. Homeowners paid the market rate set by the consultant or performance contractor, which was typically about \$300 to \$500.

Service provider incentives. Monetary rewards ranging from \$75 to \$150 for performance, cooperative marketing, and referral rewards were given to service providers. These rewards were identical to those offered through HPwES.

Direct install. No direct install measures were included in this program.

3.2.2 Results

Compared to the basic HPwES program, this program had a lower rate of conversion from energy assessment to completed retrofit.³ Homeowners that completed retrofits installed an

³ For this analysis any homes in the WPS territory that had an energy assessment are counted in the energy assessment category, but only homes who met the requirements for the increased incentives are counted in the

average of 4.3 measures for an average of 42.6 MMBtu savings per home at a program cost of \$3,861 per home, which is equivalent to \$91/MMBtu.

This program succeeded in realizing greater savings per home than the basic HPwES program model, and successfully encouraged participants to install a greater number of shell measures. Although on average WPS-HPwES participants installed the same number of equipment/ventilation measures as HPwES participants, and fewer equipment/ventilation measures than participants in other programs, this program achieved the greatest average MMBtu savings per home of all programs reviewed. The per-home and per-MMBtu program costs exceeded HPwES program costs, but they were 40% or less of the costs of the other programs.

3.3 Targeted Home Performance with ENERGY STAR

3.3.1 Program Description

During the last ten years, the THPwES program has offered Wisconsin residents with limited incomes and resources an effective opportunity to increase the energy efficiency, affordability, safety, durability, and comfort of their homes. Home energy assessments were provided to identify energy efficiency opportunities. In addition, the program supplied facilitation services to install the needed materials, equipment, and appliances at minimal cost to participants. This program ended in 2011.

Homeowner recruitment. The program recruited homeowners to participate, and in addition, the program received referrals for residents who exceed the income requirements for the Wisconsin Weatherization Assistance Program. The THPwES program's income guidelines are 60% to 80% of state median income. Households within 60% to 80% of the state median income guidelines must be served by participating natural gas and electric providers.

Consultant (auditor) approach. The program restricted how homeowners selected a consultant. Homeowners were assigned a contracted state weatherization auditor (a Wisconsin Weatherization Assistance Program grantee agency) serving the area where they live. (Please note in some markets or in rare circumstances the program did use Focus on Energy HPwES consultants for program delivery.)

Contractor approach. The program restricted how homeowners selected a contractor to make the recommended improvements. The program primarily used Wisconsin Weatherization Assistance grantee agencies and their network of subcontractors with some exceptions.

Energy advocates. Energy advocates were not used in this program.

Homeowner incentives. The program covered 90% of the total job cost for measures installed and all facilitation and energy education fees. The program required participants to pay 10% of the total job cost for measures installed.

completion category. An additional 100 homes completed work, but did not complete enough measures to qualify for the increased incentives.

Audit cost. Home energy evaluation costs were covered by the program for eligible homeowners. In some cases, participants were required to pay a 50% contribution for nonenergy-saving health and safety measures or repair measures.

Service provider incentives. Incentives for service providers were not included in this program.

Direct install. The program provided direct installation of CFLs, faucet aerators, and low-flow showerheads.

3.3.2 Results

Participants in this program installed slightly fewer measures overall (3.8, on average) and achieved slightly lower savings (33.2 MMBtu) than participants in HPwES. The program is delivered with a much higher cost per retrofit home (\$8,130) and MMBtu (\$245) than HPwES.

Although these may seem like weaknesses in program design, the program successfully met its main objective, which was to improve the efficiency of homes for participants with limited financial means. Without the program it is unlikely that these participants would have installed any of these energy efficiency measures. Although this program is a variation on the basic HPwES design, neither HPwES nor most of the other programs are a viable alternative for the population served by THPwES.

3.4 Together We Save—Milwaukee Pilot

3.4.1 Program Description

The Milwaukee Neighborhood Efficiency Project, TWS, used a community-based approach to increase energy efficiency investments in Milwaukee homes. The program targeted homeowners within two neighborhoods in Milwaukee. It launched in April 2009 and was completed by the end of 2010. These neighborhoods were selected because of their demographics of homeownership and moderate to low-income households. The TWS program model included community-based energy advocates, provided tiered incentive levels based on income, offered several payment options, and featured additional marketing efforts (e.g., door hangers, neighborhood association newsletters, neighborhood events, neighborhood canvassing, and yard signs). In addition, the program facilitated the entire audit and efficiency upgrade process for the homeowners. Homeowners had no responsibility for hiring or managing either consultants or contractors.

Homeowner recruitment. For this pilot, the program was primarily responsible for recruiting homeowners to participate in the program. Neighborhood associations also helped with recruitment.

Consultant (auditor) approach. The program restricted consultant selection. Homeowners were assigned a consultant. Consultants had to meet program requirements and sign a program agreement.

Contractor approach. The program restricted how homeowners selected a contractor to make the recommended improvements. Homeowners were assigned a preapproved contractor. The contractor was under direct contract to the program.

Energy advocates. Energy advocates were a part of this program. Their primary objective was to serve as their name implies, as a “go-to” person for the homeowner. They educated homeowners on ways to use energy more efficiently and trained homeowners on the steps involved with the program. The energy advocates completed walk-through assessments, provided direct install measures, educated homeowners about behavioral change opportunities, and addressed general questions or concerns about the program.

Homeowner incentives. The program paid for 50% to 90% of the improvement costs (based on household income).

Audit cost. The audit was free, but if homeowners did not complete all recommended measures, they were charged \$150 for the audit.

Service provider incentives. Incentives for service providers were not included in this program.

Direct install. The program provided direct installation of CFLs, faucet aerators, and low-flow showerheads.

3.4.2 Results

Through this program, 114 homes completed an energy assessment. The program achieved a high rate of completion: 79% of homes completed a retrofit. Homes averaged 5.7 measures, evenly split between shell and equipment/ventilation measures. This program had a higher incidence of equipment measures including furnaces, hot water heaters, and central air conditioner tune-ups than HPwES.

Homes participating in this program tended to be older and in poorer condition than HPwES homes. They also experienced greater savings on average (40.9 MMBtu) than HPwES (34.6 MMBtu) with substantially higher costs: \$10,559/home and \$258/MMBtu.

TWS succeeded in targeting specific neighborhoods of older homes in greater need of retrofitting. The program converted 79% of energy assessments into retrofits with high savings per home. This program, however, was comparatively expensive with the highest cost per home and second highest cost per MMBtu of the programs examined.

3.5 iCanConserve—WPS

3.5.1 Program Description

In partnership with WPS and Focus on Energy, three WPS communities—Brillion, Allouez, and Plover—offered residential customers the Home Energy Review Program, which targets whole-house energy efficiency, capitalizes on the HPwES program, and uses energy advocates to lead the homeowner through the process. The program began in Brillion in the fall of 2009, in Allouez in the fall of 2010, and in Plover in the summer of 2011. All three programs ran through the end of 2012.

Objectives of the three programs are as follows:

- Obtain whole-house energy savings on as many homes as possible in the pilot communities.
- Conduct walk-through audits and energy assessments, identifying immediate low- and no-cost opportunities for energy savings as well as greater savings opportunities to explore.
- Help move homeowners to the next steps of completing the recommended improvements to their homes.
- Remove the traditional barriers faced by the HPwES program.
- Help homeowners understand the various rate structures offered by WPS during the pilot programs.
- Encourage occupant behavior change within the home and community.

Homeowner recruitment. For these pilots, the programs, utility (WPS), and the city or village (City of Brillion, Village of Allouez, and Village of Plover) were responsible for recruiting homeowners to participate.

Consultant (auditor) approach. These programs restricted consultant selection. Homeowners were assigned a consultant. Consultants needed to meet program requirements and sign a program agreement.

Contractor approach. The programs restricted how homeowners chose a contractor to make the recommended improvements. In Brillion, homeowners were assigned a preapproved contractor, and in Allouez and Plover, homeowners selected from a pool of preapproved contractors.

Energy advocates. Energy advocates were a part of all three programs. Their primary objective was to serve as a go-to person for the homeowner. They educated homeowners on ways to use energy more efficiently and trained homeowners on the steps involved with the program. For the pilot programs, the energy advocates completed walk-through assessments, provided direct install measures, educated homeowners about behavioral change opportunities, and answered general questions or concerns about the program.

Homeowner incentives. In Brillion, the program paid for 50% to 90% of the improvement cost based on household income. In Allouez, the program paid 60% (up to certain maximums) of the improvement costs if the homeowner elected to complete all of the recommendations. In Plover, the program paid 60% (up to certain maximums) of the improvement costs if the homeowner opted to complete at least the top three recommended measures. There was also a completion bonus of \$250 to Plover homeowners that completed the entire scope of work. Homeowners in all three pilots completing less than the required number of measures could still complete work through the basic HPwES program. Completions of measures in HPwES were not tracked as part of the iCanConserve WPS Program.

Audit cost. In Brillion, the audit was free, but if homeowners did not complete all recommended measures, they were charged \$150 for the audit. In Allouez and Plover, homeowners paid \$25 for the audit.

Service provider incentives. Incentives for service providers were not included in these programs.

Direct install. The programs provided direct installation of CFLs, faucet aerators, and low-flow showerheads.

3.5.2 Results

Results for the pilot programs in Brillion and Allouez are presented in the next section. Because the Plover program launched recently, there were not enough program data to include in this analysis. As a result, Tables 2 and 3 do not include information or data about the Plover pilot program.

3.5.2.1 WPS—Brillion

From 2010 through 2011, 131 homes completed an energy assessment through WPS—Brillion. Sixty-six percent of these homes completed energy efficiency retrofit projects, a similar conversion rate to the basic HPwES program. The influence of program requirements (for example, a homeowner was charged \$150 for the audit if they did not complete all recommended measures), meant that each home completed more measures overall. All homes completed at least three measures, with the average home completing seven measures. Like TWS, these measures were split evenly between shell measures and equipment/ventilation measures. This trend differs from HPwES, where 85% of measures were shell measures. Similar to TWS the additional equipment/ventilation measures were furnaces, hot water heaters, and central air-conditioning tune-ups. WPS—Brillion also saw a higher percentage of homes receiving exhaust fan measures because newer housing stock was frequently encountered.

Although the equipment/ventilation measures are important for homeowner comfort and safety, they did not contribute substantial additional savings. Average savings per home for WPS—Brillion were only slightly higher than HPwES: 35.5 MMBtu compared to 34.6 MMBtu.

Program costs, however, were substantially higher for WPS—Brillion. Program costs were \$304 per MMBtu and \$10,737 per retrofit home. These costs are more than four times the costs for HPwES.

3.5.2.2 WPS—Allouez

From January through November 2011, 357 homes in Allouez received an energy assessment and 36% completed retrofits. This conversion rate is similar to that of HPwES, but lower than that of the other programs reviewed. Participating homeowners, on average, installed 6.1 measures—more than the other programs reviewed except WPS—Brillion. WPS—Allouez participants installed a similar number of shell measures as HPwES and WPS—Brillion. For equipment/ventilation measures, WPS—Allouez installation rates were higher than HPwES, but lower than WPS—Brillion. This is caused, in part, by lower homeowner incentives in Allouez compared to Brillion, coupled with the differences in housing stock. Although older homes were prevalent in Brillion, a greater percentage of homes completing retrofits in Allouez were built before increased insulation levels became prevalent in the 1970s.

Despite the lower rate of measure installation, WPS–Allouez achieved greater savings per home (39.8 MMBtu) at a somewhat lower cost (\$235/MMBtu; \$9,358) than WPS–Brillion. WPS–Allouez succeeded at reaching a large number of homeowners for an initial audit that included direct install measures, and in achieving savings that exceeded several of the other programs. This required program expenditures per home and MMBtu that exceeded those costs under HPwES, but were less than the other, most similar programs (TWS and WPS–Brillion).

4 Limitations

Comparing energy efficiency programs is always a delicate task because programs generally differ in more ways than can be enumerated and accounted for in an analysis. This analysis has the advantage of comparing programs that all operated in the same state, in similar climates (social, political, and weather), and during a similar time frame. Because all programs were modifications of the same baseline program, HPwES, it was possible to consider the impact of the various modifications by comparing program outcomes to each other and to HPwES.

Despite these advantages, many limitations remain. For example, for the purposes of this study, first-year deemed gross savings were compared. Longer-term changes in energy use were not included. Some programs might influence participants to change behavior in ways that either use less energy or more energy, but are not accounted for here. Some programs had higher rates of equipment measure installation that might have a shorter life than shell measures. Program design differences will likely affect attribution and free ridership. More targeted programs might have higher attribution rates, but this needs to be confirmed by evaluations.

These programs all operated in Wisconsin, but several programs targeted specific geographic regions. This could mean that differences in the housing stock between programs might not be taken fully into account. It could also mean advantages in marketing reach because the area to cover is smaller and more homogenous. A program that is successful in implementing a large number of measures in one location might be less successful in a location with newer homes, for example. Differences in socioeconomic characteristics or demographics could also play a role.

The programs highlighted here have different levels of program maturity. HPwES and THPwES have been operating for at least 10 years. Data from most of the other programs are from the first or second year of the program. On the other hand, these newer programs took advantage of the well-established consultant and contractor networks developed over the course of a decade through HPwES. A program starting new in an area without an established HPwES program would not have that advantage.

Finally, the costs analyzed are *program* costs. Each program also involves costs to the homeowner. HPwES participants make significant financial investments in the energy efficiency retrofits. They also make significant contributions of time and effort as they collect bids and schedule appointments. Other programs require either less financial contribution from the homeowner or less involvement in arranging for work to be done or both. These homeowner costs, either the easily documented financial costs or the cost of time and effort, are not included in this analysis. A more comprehensive investigation of cost effectiveness should examine incremental costs of measures installed to calculate a total resource cost test for each program.

5 Conclusions

The following conclusions from the evaluation of the Wisconsin models might help inform future program designs.

5.1 Energy Advocate Model/Community-Based Model

TWS and iCanConserve–WPS are examples of these model types.

Differentiating features:

- Energy advocate
- Community (geographic) focus
- Increased incentives.

Strengths: Home retrofit models that feature an energy advocate (or that focus on delivering a high level of customer service coupled with increased incentives) tend to result in higher home retrofit completion rates and energy savings than models without energy advocates. It is important to note that the models in Wisconsin that feature an energy advocate also offer increased incentives above the standard HPwES model or tiered incentives based on income. The energy advocates also provide direct install measures that increase energy savings.

Challenges: These models have higher program costs because the amount of labor needed to carry out this increased level of customer interaction. When delivering this higher-cost model, community selection, home candidate screening, and specifics of the contractor delivery model and incentive structure become increasingly important. In addition, the face-to-face interaction of the energy advocate model has many benefits that are difficult to measure in a benefit/cost analysis. For example, utility clients might see that energy advocates supply a valuable service to its customers, homeowners might have increased satisfaction with the overall program experience, and many behavior change benefits help to achieve indirect energy savings. Assigning a dollar value to all of these “soft” benefits, however, is challenging. More work with the evaluation community will be needed to find better ways to measure these benefits.

5.2 Increased Incentives Model

HPwES—WPS Territory-Wide Increased Incentives falls under this model type.

Differentiating Features:

- Increased incentives
- Utility-wide service territory.

Strengths: This model features increased incentives with a limited time frame in which to complete the work and receive the rewards. It tends to generate more savings or deeper savings per home than the standard HPwES program. This program also has a lower cost than the energy advocate models.

Challenges: Despite the deeper savings, this type of program does not have as broad of reach or does not touch as many homes as the standard programs. Also, because there is not an Energy Advocate there is not as much customer interaction. Homeowners not able to complete the work within the specified timelines outlined in the program may complete work at a later date, but these savings are not easily documented.

5.3 Standard Statewide Program Model

HPwES falls under this model type.

Differentiating Features:

- Statewide, multiutility territory
- Market-driven approach.

Strengths: The standard HPwES program achieves solid energy savings for the least cost per home and the least cost per Btu. Although the amount of savings per home is less than other programs, HPwES succeeds at giving many residents across the state opportunities to improve the efficiency, comfort, and safety of their homes. The solid basis of the program and established contractor and consultant networks also enables modifications to the program design to be offered to targeted groups of residents.

Challenges: The challenge of a statewide program is balancing the goals of offering a program to all residents while still obtaining as much savings as possible from each home. The other programs reviewed here show that it is possible to obtain more savings per home than HPwES currently achieves. Those additional savings, however, come with a higher cost and the possible additional benefits are difficult to measure.

5.4 Summary

The comparisons presented suggest strategies that might potentially result in higher savings per home (energy advocates, higher incentives, geographic targeting, and limited time frame) for retrofit programs. To meet challenging savings goals, additional research and program design work to test in pilot programs is needed to determine the following:

- How each different program element influences program outcomes
- How to obtain additional savings on a widespread basis without large additional program costs
- How to better document and account for the additional benefits and energy savings from these seemingly more expensive models
- How to best combine a widespread or statewide program with lower costs and lower savings like HPwES with a more program cost and savings intensive model on a targeted basis to maximize overall savings and minimize program costs.

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