Home Performance Coalition

Weatherization and Home Performance: Recommendations for Mutual Success and Collaboration

By: *Kara Saul Rinaldi, Brad Penney, and Brian Castelli*

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I. Executive Summary

The purpose of this report is to identify the opportunities and barriers in creating a more unified set of cost-effective national residential energy efficiency programs for all income levels and to discuss the untapped potential for residential energy efficiency. A unified plan for residential energy efficiency programs would build upon the lessons and strengths of the Low Income Weatherization Assistance Program and the lessons learned from home performance programs that are currently designed for all income levels. The report recommends steps to achieve greater collaboration between Weatherization and home performance programs that will, in addition to saving energy, create jobs, spur new efficiency technologies, and reduce the carbon footprint.

The potential for residential energy efficiency in the United States is huge. About half of the energy used in a typical American home is spent on heating and cooling.[1] As such, increasing the energy efficiency of a home's heating and cooling systems and insulating the envelope are effective means of reducing energy consumption. The largest residential energy program in the United States is the Low Income Weatherization Assistance Program (WAP), which was created by Congress forty years ago, in 1976. A home performance industry (HPI) that serves all homeowners emerged from WAP, spurred largely by incentives to non-low-income families and increased education about residential energy efficiency. However, both programs have not even begun to reach the potential market for home energy retrofits.[2]

It is important to first acknowledge the tremendous influence and on-going support the national Weatherization program has on the home performance industry's policies and programs. From the work to develop standardized work specifications, to contractor training, to educating the public about the benefits of energy efficiency, the Weatherization program has served a critical role in home performance. This report aims not to minimize this contribution but to magnify and target these efforts in a collaborative fashion.

This report recommends a pathway for future collaboration between private contractors and the weatherization program, with the goal of establishing a level of collaboration that could lead to an eventual residential energy efficiency program to assist all income levels. There is much work that needs to be done before there can be a foundation for such type of unified program. Private contractors that are a part of HPI need a better understanding of how the Weatherization program operates – what the parameters are for use of funding, where there is flexibility, and where there are limitations. The state agencies that run WAP benefit from encouraging participation by more private contractors and may help reach more low-income

[1] U.S. DOE http://www.energy.gov/public-services/homes/heating-cooling

[2] While both the Weatherization Assistance Programs and the home performance programs that provide home energy upgrades to non-low-income families are "home performance" programs and a part of the same industry, for the purposes of this paper we refer to them as WAP and HPI to better distinguish the unique characteristics of each.

families due to streamlining and cost-saving measures, consistent with current trends at the subcontractor level.

This report will begin with a brief history of energy legislation, the role of energy efficiency, the experience to date with the WAP and HPI, and the opportunities and challenges to synergies between the two program types and the underlying policies that created them. We will discuss recommended strategies for building a foundation for future collaboration. In the report, we will discuss the following issues:

1. The differences and similarities between WAP and HPI;
2. The lessons that the two programs can share with each other; and
3. How WAP and HPI can work together to maximize the cost-effectiveness of both programs.

The report will present the following recommendations for how to build upon the successes already achieved by Weatherization and HPI programs:

1. The U.S. Department of Energy (DOE) Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs, should support the adoption and use of the Building Performance Institute's (BPI) - 2101 *Standard Requirements for a Certificate of Completion for Residential Energy Efficiency Upgrades* ("Home Performance Certificate") as a strategy for documenting upgrades (and resulting energy savings) funded by WAP. A BPI-2101-compliant certificate that is issued to homeowners that receive weatherization assistance can be used as reference document by real estate agents, appraisers, and other professionals during the home sale process.

2. The DOE Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs should promote the use of smart home technologies in weatherization as a way of reducing program costs, streamlining EM&V, and providing real-time feedback on performance to weatherization contractors and program participants. Data from smart home devices can be used to support traditional EM&V, reducing the costs of evaluation and providing real-time or near real-time feedback to contractors, programs, and program participants on performance. Programs can then use this information to target resources to high energy users. Contractors can use this information to better understand the results of their work and communicate to customers the value of weatherization.

   The DOE Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs and the Office of Electricity Delivery and Energy Reliability, should consider establishing a pilot program in FY 2018 and FY 2019 in multiple states to test new models for streamlining and maximizing resources.

The pilot would aim to test auto-M&V[3] and utilize home energy management devices, such as smart thermostats and smart meters that are enabled to provide near real-time data to programs to demonstrate if a project was successfully completed. By utilizing an auto-M&V system, the pilot would test the current 100% quality control currently used by WAP in an effort to reduce both costs to the program and burden on the contractors and homeowners.

3. The DOE Office of Weatherization and Intergovernmental programs should work to ensure that training and technical assistance is offered to all contractors that make a commitment to work in the WAP program. The training should be consistent with industry best practices. In addition, the WAP provider should consider a stipend for private sector contractors to equalize the time-cost of participation in training.

4. The DOE Residential Building Integration Program, working with Department of Commerce's Small Business Administration, should work to advance small business loans to states that are focused on energy efficiency contracting and training to complement the WAP programs.

5. In FY2017 and FY2018, there should be a series of national dialogues among private contractors and members of the Weatherization network for the purpose of developing a better understanding of WAP programs by contractors, and identifying best practices and shared interests between the two groups that can become the foundation to improve the alignment of residential energy efficiency programs. This dialogue should take place in connection with existing national or regional conferences where contractors and members of the WAP network will be in attendance (to avoid unnecessary costs).

6. The DOE Office of Weatherization and Intergovernmental programs should be authorized to streamline the process for approving energy efficiency measures for inclusion in the Weatherization Assistance Program to advance innovative pilot programs and quickly approve adoption of new technologies for the benefit of low income clients.

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[3] "Automated M&V" or "auto-M&V" is a process that utilizes analytic tools and services that provide automated, ongoing analysis of energy consumption data in order to monitor and measure the energy savings in a home. By understanding how the home used energy before and after a retrofit on a near-real-time basis, a program can better understand if energy savings are being realized and if the project was installed properly. With the investments in the smart grid, interval meters, home energy monitoring systems, and equipment with embedded communications technology, there is growing discussion about using these data analytic tools to complement and/or replace expensive and intrusive EM&V. It is also referred to as, or as a part of, "EM&V 2.0".

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II. Development of Energy Policy and Residential Energy Efficiency

The notion of residential energy efficiency retrofits is relatively new in the United States. Up until the 1960s, the supply of energy continued to grow well ahead of demand and there was a general view that diminishing energy prices would continue indefinitely. Nuclear power advocates claimed that electricity would one day be "too cheap to meter."[4] Efficiency was of relatively little concern to both engineers and policymakers in the 1940s and 1950s.

Global vulnerability first affected the United States in the early 1970s, with the 1973 oil embargo and the belated realization that the United States was dependent on foreign sources of fuel. For the first time, the concept of resource scarcity was recognized. The oil embargo coincided with a slowly emerging national awareness that the extraction and use of energy in the United States was a major source of pollution. This nascent environmental awareness, partially triggered by books such as Aldo Leopold's *Sand County Almanac* and Rachel Carson's *The Silent Spring*[5] and fueled by citizen activism, ultimately led to the passage of environmental laws and the creation of the Environmental Protection Agency in 1970.

Following the enactment of the Energy Policy and Conservation Act of 1975 (EPCA),[6] which established the first vehicle fuel economy standards and authorized efficiency standards for household appliances, public support for a national energy policy began to grow. President Carter signed legislation in 1977 creating the Department of Energy, and he devoted much of his domestic agenda to energy policy, the urgency of which was underscored by the Second Energy Crisis, or Oil Shock, triggered by the Iranian Revolution in 1979.

For the first time, the idea of building a business around "energy efficiency" products and supplies began to emerge. A national energy efficiency movement quickly followed, highlighted by the establishment of new organizations like the Alliance to Save Energy, founded in 1977 by Senators Charles Percy (R-IL) and Hubert Humphrey (D-MN). The Alliance provided leadership in public service announcements and public education campaigns on how to save energy, just as leadership on research and data tracking and analysis was provided by the American Council for an Energy Efficiency Economy (established in 1980). Around the same time, utilities began offering efficiency programs as part of their portfolios, as well as early demand side management initiatives - steps that would help to facilitate the emergence of the home performance industry.

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[4] "It is not too much to expect that our children will enjoy in their homes electrical energy too cheap to meter, will know of great periodic regional famines in the world only as matters of history, will travel effortlessly over the seas and under them and through the air with a minimum of danger and at great speeds, and will experience a lifespan far longer than ours as disease yields and man comes to understand what causes him to age." Lewis L. Strauss, Head of the Atomic Energy Commission (AEC) Speech to the National Association of Science Writers, New York City September 16, 1954.

[5] The Silent Spring. Rachel Carson, 1962. Houghton, Mifflin Company. Sand County Almanac. Aldo Leopold, 1949. Oxford University Press.

[6] Energy Policy and Conservation Act of 1975 (EPCA), P.L. 94-163

Federal policy moved slowly during the 1980s as energy prices dropped and the Administration de-emphasized energy policy. In fact, there was a near absence of federal energy legislation in the 1980s, with only the National Appliance Energy Conservation Act (NAECA)[7] of 1987 enacted during the decade. The act established the first national home appliance efficiency standards by amending NECPA. Another federal energy bill that began to take shape in the 1980s, but was not enacted until the early 1990s.[8] While federal policy stalled, strong state policies began to emerge, starting with California in the mid-1970s. States began to take the initiative to establish appliance standards and create incentives for making residential and commercial buildings more energy efficient. Companies offering energy efficiency services to homeowners also began to spring up in the 1980s.

Tax incentives were gradually enacted, beginning with the tax credits enacted in 1978 for the construction of energy efficient new homes and residential efficiency improvements.[9] These tax incentives stimulated the growth of HPI, as did state sales tax holidays for energy efficient appliances and products.

Another important catalyst was the finding by the DOE that residences are the source of 22% of total energy consumption in the United States, amounting to $230 billion annually in energy bills.[10] This demonstrated that residential efficiency was a potential source of substantial energy savings otherwise "left on the table." In 2015, some 40% of total U.S. energy consumption was in residential and commercial buildings[11] with the residential sector consuming 38% of the electricity (more than commercial or industrial sectors)[12]. ACEEE has observed that most homes in America could see a 20-30% reduction in energy use by undertaking cost-effective energy efficiency measures. The opportunity and the market definitely exist; the only question is how do we get there?

III. The Weatherization Assistance Program

The concept of the Weatherization Assistance Program emerged out of the greater energy scarcity consciousness described above, especially after the first Arab oil embargo in 1974. At the time of the embargo, Richard "Dick" Saul was working at the Community Services

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[7] National Appliance Energy Conservation Act, P.L. 100-12; 101 Stat. 103; enacted March 17, 1987.
[8] The Energy Policy Act of 1992 (EPAct), P.L. 102-486, was a major energy law containing many significant energy efficiency provisions, including building energy codes, equipment energy efficiency standards, appliance energy-efficiency labels, grants for regional lighting and building centers to be established in each of the ten regions served by the DOE, federal energy management, electric and gas utility regulatory reform, least-cost planning for federal electric utilities, and energy-efficiency R&D. See also http://economics.mit.edu/files/1144, an excellent and readable summary of energy policy in the 1990s.
[9] http://aceee.org/files/pdf/white-paper/energy-efficiency-tax-incentives.pdf
[10] https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf
[11] http://www.eia.gov/tools/faqs/faq.cfm?id=86&t=1
[12] http://www.eia.gov/todayinenergy/detail.cfm?id=26672

Administration, where he first envisioned the potential for a Weatherization Assistance Program, three years before the creation of the Department of Energy.

The Energy Conservation and Production Act of 1976 (ECPA)[13] codified the law authorizing WAP as part of the Community Services Administration. The initial appropriation for the program in 1977 was $28 million.[14] The initial WAP workforce came from the Comprehensive Employment and Training Act (CETA) program. WAP was one of a number of scattered energy programs that were consolidated into the Department of Energy when it came into existence in October of 1977.

Joseph P. Flynn Jr., now the Senior Vice President and Manager of Community Development for Wes Banco Bank, Inc., was one of the early WAP Directors, serving from 1980 to 1986. He recalled many of the early challenges faced by the program, such as the potential defunding of the program in 1981.[15]

Flynn had an experience that shed light on the partnership potential between WAP and HPI. While at DOE, he launched an effort to encourage the WAP delivery agencies to explore the possibility of creating for-profit, energy-related subsidiaries to create additional funding sources for the agencies and employment opportunities for their staff. He launched a competitive process to award up to $1 million in business planning grants, none of which could exceed $50K. Approximately thirty grants were made, at least three of which Flynn recalls succeeding in establishing viable and tax paying companies. These business planning grants were not continued and the lessons learned in supporting businesses to complement the low-income community should be explored, per our recommendations.[16]

Over the forty years of its existence, more than 7.4 million households have benefited from WAP, which accomplishes its objectives by utilizing community action agency work crews and private sector home performance contractors. The trend in WAP is to increase utilization of private contractors, which now outnumber agency crews, providing weatherization services to roughly 60% of the homes served by WAP.

The WAP Mission Statement in ECPA states that the program exists "to reduce energy costs for low-income families, particularly for the elderly, people with disabilities, and children, by improving the energy efficiency of their homes while ensuring their health and safety."[17] As the program evolved, health and safety measures were increasingly added to the program.[18] Given this statutory mandate, the benefits of weatherizing low-income homes cannot be fully

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[13] Energy Conservation and Production Act of 1976 (ECPA), P.L. 94-385
[14] "DOE Weatherization Program: A Review of Funding, Performance, and Cost-Effectiveness Studies." Congressional Research Service, Fred Sissine. January 2012, pg.1. http://neada.org/wp-content/uploads/2015/09/Weatherization.pdf
[15] Interview with Joseph Flynn. March 1, 2016.
[16] Ibid.
[17] Energy Conservation and Production Act of 1976 (ECPA), P.L. 94-385. Chapter 81.
[18] Health and safety measures were added in a Final DOE Rule adopted on March 4, 1992; see http://www.waptac.org/Technical-Tools/Health-and-Safety.aspx

captured by looking at energy savings alone. WAP provides many societal and other non-energy benefits. The health and safety benefits are significant and also consistent with policy objectives of state agencies.

Under the American Reinvestment and Recovery Act ("ARRA") enacted in 2009 as a "stimulus" program during the recession, $5 billion in funding was allocated to the Weatherization program and more than 15,000 new jobs were created as a result.[19] Between February 2009 and September 2012, one million homes were weatherized – demonstrating the "surge" impact of the program when funding levels are high. Since the end of the ARRA program, however, federal funding has declined and today remains at a level that is more consistent with keeping the Weatherization program functioning in all states and territories, but without much innovation.[20]

Challenges Facing WAP and Opportunities for HPI Collaboration

As significant as the achievements of WAP have been, there remain areas where the programmatic results could have been better. There was an expectation that the newly created jobs from the ARRA funding would carry over into jobs in the non-low income residential market after the Recovery Act was over. However, this did not happen on a meaningful scale. The recession and the lack of available cash flow for homeowners blocked growth in the residential market, and consequently most workers trained in the ARRA-funded training centers did not go on to jobs in the residential sector. Meanwhile, the need for additional weatherization services remains high: the Department of Energy has estimated that 38 million American households are eligible for weatherization services (contrasted to the figure of 7.4 million units that have been weatherized over the past forty years).[21]

WAP has also faced political and financial challenges. The program was jeopardized when funding fell to $68 million in the FY2012 Continuing Resolution, and restoring the funding to pre-Recovery Act levels has proven difficult. The current funding level for the program is $214 million. The program is increasingly viewed as providing, in addition to energy savings, significant health benefits to the residents of "weatherized" units, where serious mold and moisture problems are often uncovered during the weatherization process, along with even more serious carbon monoxide conditions inside the residence. Evaluations of WAP are increasingly focusing on health and safety benefits as well as increased comfort levels in the residences. As noted, this is a challenge for proving cost-effectiveness when measured against energy savings alone, particularly given currently low heating fuel prices.

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[19] http://thinkprogress.org/climate/2011/09/19/321954/home-weatherization-grows-1000-under-stimulus-funding/

[20] $214 million was appropriated for WAP in FY2016, which includes $3 million for Training and Technical Assistance. This is less than the Administration's FY2017 request of $230 million.

[21] See https://portal.hud.gov/hudportal/documents/huddoc?id=fsweather_proc_mf_building.pdf; http://energy.gov/eere/wipo/weatherization-assistance-program and www.nrel.gov/docs

The voices of contractors who participate exclusively in WAP, partially WAP and HPI, and exclusively HPI are essential to the full WAP narrative. The more the programs are unified, the more the supporting messages are unified.

In contemplating the future of WAP, there is an important opportunity to engage with the changing world of energy efficiency and advance a model that supports an inclusive program. One promising development has been the introduction of bipartisan legislation reauthorizing the WAP statute.[22] The "Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act"[23] was introduced in the Senate by Senators Coons (D-DE), Reed (D-RI), and Collins (R-ME), with a companion measure in the House introduced by Congressman Paul Tonko (D-NY).[24] The legislation contains constructive language that would help support HPI contractors' inclusion in WAP retrofits by encouraging broader training efforts.

[22] WAP authorization expired in 2012. It was last authorized by the Energy Independence and Security Act (EISA) of 2007. P.L. 110-140.
[23] Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act (S.703). 114th Congress. This legislation has been incorporated in the Senate comprehensive energy bill. S.2012.
[24] Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act (H.R. 3420). 114th Congress.

IV. Home Performance Industry

The Home Performance Industry (HPI) emerged out of WAP to improve the energy efficiency of residential buildings, regardless of the homeowner's income level. The key difference between HPI and WAP is that in HPI programs, the homeowner pays all or part of the efficiency upgrade. While there are often publically-funded incentives included in HPI programs, these incentives do not cover the full cost of the upgrades - they cover only a portion, so as to motivate homeowners to purchase more efficient energy upgrades. Emerging on the scene in the 1980s, partly in response to ratepayer utility energy efficiency programs, residential efficiency programs came to be recognized as providing significant energy and economic benefits to the utility system and to ratepayers, and thus public/ratepayer funding could be used to provide incentives for these public goods. Energy efficiency programs have also led to job growth in many fields, including the building sector.[25]

Steve Cowell, President of E4TheFuture and former Chairman of Conservation Services Group (CSG), was a leader in the emergence of both the weatherization and home performance programs in Massachusetts and saw HPI grow from WAP. "We saw that we could take WAP and put it into the energy economy if we could get the incentive system changed," Cowell remembers.[26] Weatherization leaders and contractors worked with a team of allies and stakeholders in Massachusetts to develop programs that could be brought to the utility industry. It started with a project in North Hampton in 1986 that addressed energy savings from non-low-income homes that saw measured energy savings in 1987, which was a satisfactory outcome for the New England Electric System. From the beginning, the WAP and HPI programs were intricately linked. "[We] coordinated on who has what dollars and we coordinated on volume. We knew that the same contractors could do both. The whole idea of having the two initiatives was to maintain a consistent workforce," said Cowell. "This was at the core from day one."

While HPI began to emerge in Massachusetts, New York was working to expand their WAP low income programs. Rick Gerardi ran the New York weatherization program for 14 years before starting New York's home performance program. Gerardi first worked with the weatherization program by ramping-up contractor training and supporting the development of standards-making organizations like the Building Performance Industry (BPI).[27] When Governor George Pataki was elected, there was a move in the New York Public Service Commission to look at utility funding of energy efficiency and use of the system benefit charges to fund a NYSERDA program on residential energy efficiency. The Governor asked NYSERDA to take on residential and consumer programs outside of low-income and to determine an investment protocol that would work.

In the mid-1990s, NYSERDA increased their focus on residential efficiency, including existing homes, new homes, appliances and lighting. The focus was on market transformation and the

[25] http://www.aceee.org/topics/utility-regulation-and-policy
[26] Interview with Steve Cowell, CEO of Conservation Services Group, December 18, 2014
[27] Interview with Rick Gerardi, Principal of New Dawn, LLC, December 10, 2014

need to expand beyond a low-income focus. The idea was to go beyond the rebate-for-measures programs and look to whole-house energy efficiency.

As HPI programs looked at the home as a system, home performance programs were born. It became clear that unlike weatherization, the non-low-income homeowners would need to use primarily their own resources to pay for their residential retrofits. This “skin in the game” requirement of the homeowners was key to the market-based program. NYSERDA also put significant financial resources into advertising and quality assurance and they invested in the contractors, helping in the acquisition of equipment and training.

In 2002, the Environmental Protection Agency introduced the Home Performance with ENERGY STAR (HPwES) Program to connect existing homes with the brand of energy efficiency excellence ENERGY STAR. Today, HPwES resides at the Department of Energy and continues to provide homeowners with the resources needed to identify knowledgeable contractors as well as support the training, recognition and participation of home performance contractors. DOE staff note that the program "standardizes many of the requirements needed for a successful home performance industry across the country.” More than 560,000 homeowners have improved their homes’ efficiency as a result of the program.

Challenges Facing HPI & Potential for Collaboration with WAP

Established standards have been important to the growth of the market-based HPI programs. Unlike WAP, states had to learn to market the retrofit programs and convince homeowners to invest money in their homes. And for the programs to work, homeowners had to be able to trust the home performance contractors and tell the difference from those with energy efficiency training and those without.

NYSERDA undertook a number of public service announcements (PSAs) about home energy efficiency—starting in Buffalo and Syracuse and moving more broadly across the state. As the PSAs spurred homeowners to respond to the advertising, NYSERDA was able to recruit more contractors into the program. Such is the case today. States with robust home performance programs such as New York, California, and Maryland recruit contractors and advertise the programs to homeowners to help drive interest and sales in home upgrades.

Of course, not every contractor or program has been successful. As weatherization contractors began to develop new for-profit home performance businesses, some had difficulty finding the right prices for their retrofits and programs and determining the right level of training and quality assurance requirements that worked with their business models. Many of these issues continue to vex private contractors today.

Programs also struggled to find the right balance, and the initial programs were far more costly per house as “start-up” contractors learned how to size rebates and streamline administrative costs. As state programs matured, they found their pathways and became leaders; Wisconsin, California, Vermont, and dozens of other states began to follow the lead of Massachusetts and New York. Now more than half the states in the country have advanced residential energy efficiency programs.

Residential retrofits are now a measurable and significant part of the U.S. economy. Residential improvements and retrofits are greater in dollar terms than commercial improvements, and the home performance industry has seen significant growth in the decade since 2005. Energy efficiency in buildings has become a significant part of GNP: the value of residential and commercial repairs and retrofits reached nearly $400 billion in 2005.[28] Part of this growth is likely due to the rising number of homes in the U.S. — an increase of nearly 40 percent (80 million to 113 million) from 1980 to 2005.[29] The increase in households, as well as greater understanding in building science and home energy efficiency, has led to more and more potential for Americans to see the benefits of home retrofits in terms of energy savings, health improvements, and enhanced comfort.

[28] http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/bt_stateindustry.pdf
[29] http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/bt_stateindustry.pdf

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V. Recognizing the Differences

As the home performance industry has grown out of the weatherization industry, there have been opportunities for synergies and challenges with competing programs. While the details of providing weather stripping, insulation, HVAC system upgrades, air sealing, and duct sealing are the same, there are different business practices, incentive programs, and homeowner involvement in the various programs.

WAP serves households that qualify under the income requirements stipulated by the federal government. WAP is administered by state agencies, non-governmental organizations, or other local administering agencies and involves a great deal of oversight. The agency that oversees WAP in a given state or locality often handles all administrative details associated with contracting and simply assigns specific jobs to contractors. In most cases, each job undertaken by a contractor or a crew must be verified through a test-out process by an independent, Quality Control Inspector (QCI). Contractors will be paid once projects are complete. This can make it difficult for private contractors to participate financially. In addition, contractor requirements - ranging from insurance to training – vary from state to state.[30]

General Differences in WAP and HPI Contractor Services[31]

Weatherization Contractor Services	Home Performance Contractor Services
Health & safety upgrades	Health & safety upgrades
Air sealing/ duct sealing	Air sealing/ duct sealing
Equipment replacement	Equipment replacement
HVAC upgrades	HVAC Upgrades
Insulation	Insulation
Weather stripping	Weather stripping
Ventilation	Ventilation
	Window replacement
	Home energy checkups
	Test-out checkup
	Solar hot water
	Photovoltaic

Importantly, WAP serves low-income homes that may face challenges aside from energy consumption. These homes often face mold, asbestos, or other health concerns that a WAP contractor may not be able to address without bringing in other resources. That said, even the most basic home energy measures implemented by a WAP contractor can bring health and comfort benefits, not to mention the often significant energy savings.

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[30] http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/home_perf_contr_business.pdf

[31] A Business Case for Home Performance Contracting prepared by Pacific Northwest National Laboratory to EERE, October 2012, Table 4

Home performance contractors, on the other hand, are only tied to a program's requirements if they are working under a program – and there are many state and utility programs that have requirements for contractors (e.g. for those who provide work that qualifies for program rebates or incentives). Program requirements usually include insurance, training, and certifications. Furthermore, while every WAP home must be inspected after completion, that is not always the case with non-income-qualified incentive programs (though there is often some level of quality assurance).

Another difference between WAP and HPI is in the business model itself. WAP determines which contractor will be used in a low-income residence, while the private contractor model is more competitive in nature. In order to obtain a home performance job, home performance contractors must ensure they have a top-notch sales teams visit to communicate with homeowners as they are comparing bids. This marketing requirement means the costs of the jobs are higher to take into account the overhead needed to make a sale.

HPI contractors experience additional challenges. For example, HPI contractors are also responsible for developing, operating, and maintaining all of the business aspects of their contracting company, including marketing and acquiring new customers, handling administrative duties, accounting, scheduling, and often assisting their customers in obtaining financing. According to Home Performance and Weatherization contractor Tony Crane of Efficient Home LLC in Maryland, "[i]n home performance, you're trying to sell to a client and it's a lot more client-based, nurturing, answering questions, so those guys need to be better on customer interaction, sales, follow up, doing a full report, presenting the report, [etc]."[32]

This is a major difference between WAP and HPI contractors. Consequently, there is a perception among some HPI contractors that WAP- trained contractors would compete for limited business opportunities in the non-low-income sector. As Mike Jones of CNY Weatherization in New York noted, "[t]here is a dynamic where [WAP] agencies and [private sector] programs are competing against each other for customers."[33]

The lessons from building science, customer engagement, and opportunities to streamline projects are incredibly valuable in both camps. Furthermore, there may be little need for an "either/or" contracting model. As the training matures for both WAP and HP contractors, the contractors may have opportunities across both programs, such as the opportunity to utilize private contractors for WAP during the construction slow season or for HPI contractors to hire from the WAP workforce.

[32] Tony Crane Interview by Coby Rudolph of Efficiency First, June 2015.
[33] Mike Jones Interview by Coby Rudolph, of Efficiency First, June 2015.

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VI. Opportunities for Change and Growth

Recognizing the need for an evolution in the Weatherization program, Congress urged the Department of Energy in the FY2015 Omnibus Appropriations bill[34] to work with WAP and HPI stakeholders and facilitate discussion about a national residential energy retrofit program for all income levels. Specifically, Congress stated that "[w]ithin the Residential Buildings Integration subprogram, the Department is encouraged to engage stakeholders, including the existing home performance industry and weatherization network, for the purpose of developing policy recommendations that could lead to a new residential energy efficiency retrofit program supporting all residential buildings and income levels."[35]

Technological advances also allow for new opportunities. New technologies and innovations should be considered in both WAP and HPI programs, and both programs would benefit by evolving together. There is an increased desire by policymakers for measured energy savings and clear results from public funding. Technology, software, and data standardization has evolved in the private sector environment and should be used by both WAP and HPI to prove efficiency benefits.

For example, the BPI – 2101 *Standard Requirements for a Certificate of Completion for Residential Energy Efficiency Upgrades* has been adopted by DOE's Home Performance with ENERGY STAR for use by its program sponsors to document energy efficiency upgrades for home resale listings. BPI-2101, or the Home Performance Certificate as it is known, identifies a subset of HPXML[36] data elements for certificates that document the completion of an energy efficiency project, either whole-house or individual measures.

There are two types of certificates that can be issued in compliance with BPI-2101. The first is a Certificate of Efficiency Improvements, which provides information about the energy efficiency improvements installed. The second is a Certificate of Performance, which provides information about energy efficiency improvements installed plus quantitative information about a home's performance (e.g., a Home Energy Score[37] or projected energy consumption).

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[34] Consolidated and Further Continuing Appropriations Act for FY 2015. P.L. 113-235.
[35] Consolidated and Further Continuing Appropriations Act for FY 2015. P.L. 113-235. Energy and Water Appropriations section.
[36] The Home Performance Extensible Markup Language (HPXML) Data Dictionary (BPI-2200) and Transfer Standard (BPI-2100) are BPI data standards that were published in 2013 to reduce program costs, increase interoperability, and promote high-quality research and analytics from standardized datasets. The HPXML Data Dictionary standardizes terms and field formats related to the physical attributes and performance of buildings and measures. The Transfer Standard provides requirements for an extensible mark-up language (XML) data transfer protocol that can be used to transfer data defined in the dictionary between different software systems. HPXML is currently being used in the market by several home performance program administrators and software vendors. BPI-2101 is one of HPXML's standard datasets. For more information on HPXML, visit www.hpxmlonline.com.
[37] The U.S. Department of Energy developed the Home Energy Score to help homeowners better understand their home's energy use and how to save on energy bills. It also allows a comparison of the

Certificates that comply with the standard are designed to be used as a reference document by real estate agents, appraisers, and other professionals during the home resale process. Because the standard is aligned with the Real Estate Standards Organization (RESO) Data Dictionary[38] and the Appraisal Institute's Residential Green and Energy Efficient Addendum,[39] information on energy efficiency upgrades and performance can be quickly and more cost-effectively shared with the real estate and appraisal industries through the auto-population of Multiple Listing Services.

The adoption and use of BPI-2101 as a strategy for documenting upgrades (and resulting energy savings) will support greater understanding of the benefits of energy efficiency in the market. In a future where there may be payments for energy efficiency savings (via a capacity or carbon market), standardized data may drive further funds into the program.

Data standards and evaluations can be used on homes with homeowners at all income levels. Emerging certificates about home energy consumption can be provided to homeowners involved with WAP and HPI programs providing further synergies. BPI-2101 compliance certificates can be provided to homeowners that receive weatherization assistance so that the value of the upgrade may be included in a future sale.

The use of smart home technologies in weatherization and home performance retrofits also can reduce program costs, streamline EM&V, and provide real-time feedback on performance to programs. Data from smart home devices can be used to support traditional EM&V as well as expand the potential of more auto-M&V that would further reduce program costs. By reducing the costs of evaluation and providing real-time or near real-time feedback to contractors, programs, and program participants on performance, there would be more funds for more upgrades.

A house is a house and building science is building science. The more that retrofit evaluations are standardized, the more streamlined they become and the more data can be retrieved on energy savings.

Should additional resources be available, WAP and HPI could collaborate further to utilize private contractors for weatherizing homes during the "off season" or so-called "shoulder season" in the construction industry. For example, HPI contractors often hire seasonal help during the summer and winter to address seasonal needs and then downsize or absorb decreased profits in fall and spring. These new hires could be kept all year to address low-income weatherization during the "off season." This concept was tested by the Empower New

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energy performance of the home to other homes nationwide. Further, it indicates the current score and a possible score if proposed improvement recommendations are implemented.

[38] The RESO Data Dictionary standardizes data fields that are used in hundreds of multiple listing services nationwide.

[39] The Appraisal Institute's Residential Green and Energy Efficient Addendum standardizes how energy efficient and/or green features of a home are documented for appraisers. An updated version of the Addendum will be release in early 2017.

York program, which is administered by NYSERDA. Kelvin Keraga, Senior Project Manager at NYSERDA, explained that while not funded directly by ARRA, Empower New York was successful in hiring 120 private contractors (primarily insulation contractors) to support their WAP program (typically 60% of those working in Empower are private contractors; the rest are WAP contractors). As a result of the initiative, 14,000 units were weatherized and it was successful in addressing the contractors' learning curve about weatherization.

Keraga said that a number of good things emerged from the ARRA experience, starting with the development of a common application for the Empower program and WAP in New York. Contractors were free to approach the weatherization clients about energy measures that are outside the scope of the WAP program. The experience of the Empower program suggests to Keraga a model for the future, if there is tighter working collaboration between private contractors and WAP contractors. Such a collaboration would result in more units being weatherized and additional work opportunities for contractors during the "off-season" in contracting. In fact, with increased funding this would be an additional recommendation to WAP as another pilot and a model for future growth in the Weatherization program. This model has the potential to be a cost-savings tool, as it could incentivize agencies to not hold as many staff contractors and instead utilize the private sector at their least-cost time.

There currently exist home performance programs under which states use energy efficiency revolving funds or system benefit charges to provide the "up-front" funding needed for funding/financing energy efficiency upgrades. Utility DSM programs are expanding, though a number do not include home performance programs. In addition to rebates and tax incentives, there are also innovative financing solutions including on-bill financing and residential Property Assessed Clean Energy (PACE) loans.[40] While many of these solutions would be challenging to scale for different income levels, the types of retrofits/energy efficiency measures implemented, and the training required for the contractors providing the retrofits should arguably not vary between income levels. What is critical is that those in the weatherization/home performance community join forces to work with state and federal policymakers, utilities, environmental organizations, and other parties to ensure robust funding for energy efficiency programs that serve all income levels. The benefits of comprehensive home performance services should be available to all, delivered by an integrated network of trained professionals.

[40] For a detailed analysis of these financing policy solutions see Chapter 2 in DOE SEEAction's "A Policy Maker's Guide to Scaling Home Energy Upgrades" at https://www4.eere.energy.gov/seeaction/publication/policymakers-guide-scaling-home-energy-upgrades

VII. Recommendations

To address the challenges and opportunities detailed in this report, the authors recommend the following actions be undertaken by the U.S. Department of Energy (DOE) with support from the stakeholder community:

1. The U.S. Department of Energy (DOE) Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs, should support the adoption and use of the Building Performance Institute's (BPI) - 2101 *Standard Requirements for a Certificate of Completion for Residential Energy Efficiency Upgrades* ("Home Performance Certificate") as a strategy for documenting upgrades (and resulting energy savings) funded by WAP. A BPI-2101-compliant certificate that is issued to homeowners that receive weatherization assistance can be used as reference document by real estate agents, appraisers, and other professionals during the home sale process.

2. The DOE Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs should promote the use of smart home technologies in weatherization as a way of reducing program costs, streamlining EM&V, and providing real-time feedback on performance to weatherization contractors and program participants. Data from smart home devices can be used to support traditional EM&V, reducing the costs of evaluation and providing real-time or near real-time feedback to contractors, programs, and program participants on performance. Programs can then use this information to target resources to high energy users. Contractors can use this information to better understand the results of their work and communicate to customers the value of weatherization.

   The DOE Residential Building Integration Program, working together with the Office of Weatherization and Intergovernmental Programs and the Office of Electricity Delivery and Energy Reliability, should consider establishing a pilot program in FY 2018 and FY2019 in multiple states to test new models for streamlining and maximizing resources. The pilot would aim to test auto-M&V[41] and utilize home energy

[41] "Automated M&V" or "auto-M&V" is a process that utilizes analytic tools and services that provide automated, ongoing analysis of energy consumption data in order to monitor and measure the energy savings in a home. By understanding how the home used energy before and after a retrofit on a near-real-time basis, a program can better understand if energy savings are being realized and if the project was installed properly. With the investments in the smart grid, interval meters, home energy monitoring systems, and equipment with embedded communications technology, there is growing discussion about using these data analytic tools to complement and/or replace expensive and intrusive EM&V. It is also referred to as, or as a part of, "EM&V 2.0".

management devices, such as smart thermostats and smart meters that are enabled to provide near real-time data to programs to demonstrate if a project was successfully completed. By utilizing an auto-M&V system, the pilot would test the current 100% quality control currently used by WAP in an effort to reduce both costs to the program and burden on the contractors and homeowners.

3. The DOE Office of Weatherization and Intergovernmental Programs should work to ensure that training and technical assistance is offered to all contractors that make a commitment to work in the WAP program. The training should be consistent with industry best practices. In addition, the WAP provider should consider a stipend for private sector contractors to equalize the time-cost of participation in training.

4. The DOE Residential Building Integration Program, working with Department of Commerce's Small Business Administration, should work to advance small business loans to states that are focused on energy efficiency contracting and training to complement the WAP programs.

5. In FY2017 and FY2018, there should be a series of national dialogues among private contractors and members of the Weatherization network for the purpose of developing a better understanding of WAP programs by contractors, and identifying best practices and shared interests between the two groups that can become the foundation to improve the alignment of residential energy efficiency programs. This dialogue should take place in connection with existing national or regional conferences where contractors and members of the WAP network will be in attendance (to avoid unnecessary costs).

6. The DOE Office of Weatherization and Intergovernmental programs should be authorized to streamline the process for approving energy efficiency measures for inclusion in the Weatherization Assistance Program to advance innovative pilot programs and quickly approve adoption of new technologies for the benefit of low income clients.

Home Performance Coalition

Conclusion

As discussed in this report, challenges remain in fully tapping the residential energy efficiency retrofit potential in the United States. There is also immense opportunity in this sector to provide sustainable jobs and new economic opportunities, as well as generating energy savings and reducing the carbon footprint. An energy efficiency market is evolving and our policies need to evolve to take advantage of it. It is time to build a national strategy that works and brings together all of the stakeholders in residential energy efficiency. The job creation, pollution reduction, positive health impacts, and energy security that is tied to home energy upgrades supports the need to find ways to cost-effectively utilize all members of the residential energy efficiency work force. This report identified opportunities to increase collaboration between private contractors and WAP. By building a joint foundation from which to work together, the residential energy efficiency contracting community and the weatherization network have the potential to save all homeowners energy and money regardless of income levels.