

What is inclusive financing for energy efficiency, and why are some of the largest states in the country calling for it now?

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ABSTRACT

Over the last decade, a dozen utilities in a half dozen states have deployed more than \$30 million for thousands of cost effective energy efficiency upgrades for customers, regardless of their income, credit score, or renter status. In each case, the utilities offered to make their investments on terms of service defined in a tariff, and they recovered their costs through a charge on the bill that is less than the estimated savings. This paper summarizes field data reported by utilities offering inclusive financing through these tariffed on-bill programs. In almost every case, the utilities reported that the majority of customers who received an assessment of energy efficiency upgrade opportunities accepted the offer of utility investment on the terms of the tariff. Furthermore, utilities reported cost recovery rates exceeding 99.9%, and no utility has reported a case of disconnection for nonpayment of PAYS charges. Their program data produces a striking picture of breakthrough financing mechanism that is able to reach underserved markets even in areas of persistent poverty, and it provides examples for other states wanting to expand participation in the clean energy economy and unlock investment opportunities. California and New York are two states with some of the largest numbers of low- and moderate-income households, and each has found that access to financing is a significant barrier. In both states, the top recommendation advanced to address that barrier is to introduce inclusive financing for all cost effective energy efficiency upgrades, using approaches that have attributes of tariffed on-bill programs.

Introduction

Utility customers typically face a range of barriers to installing cost effective energy efficiency upgrades in their homes and businesses. To address barriers to financing, multiple solutions have been introduced in the field, including Pay As You Save[®] (PAYS[®]) and on-bill loan programs like the Home Energy Lending Program (HELP) and Property Assessed Clean Energy (PACE). While these three models have been deployed to varying degrees of success in numerous markets throughout the United States, the differing designs of these programs have led to dramatically different results in the ability of customers to participate as well as differences in the ultimate benefits to all parties involved in these transactions.

Of these three types of program designs, PAYS is unique because it offers all utility customers the option to access cost effective energy upgrades using a proven model for investment and cost recovery that benefits both the utility and its customers. Utilities using the PAYS system have operated more than a dozen programs across seven states, yet few are obligated to routinely disclose program data. This paper presents program design details and results of inclusive financing programs based on the Pay As You Save system.

Inclusive financing

Energy efficiency upgrades can reduce high energy bills in buildings that are wasting energy and improve occupants' quality of life by providing better comfort. In most utility energy efficiency programs, all customers within a sector are technically eligible to participate (e.g. residential, commercial, industrial), but eligibility does not mean that all programs are accessible to all customers, and most customers use none of the programs at all. Even where efficiency is cost effective, an upfront payment presents a persistent barrier to participation. Rebate programs reduce the net cost to customers, yet the rebates are only useful to customers who have the ability to arrange for upfront payment of the balance of costs. Some customers can pay cash, others use a line of credit (e.g. credit card), and a tiny fraction arrange for a loan if they qualify.

This upfront cost barrier can exclude customers in large market segments - such as renters, those with low credit scores, or customers that are debt constrained - from taking part in a program. For example, neither renters nor owners have the motivation to pay upfront costs to make these improvements because their interests are split. The renter may move to a new property before the savings on such a project can be recouped, and the owner does not see savings if they are not paying the utility bill, so few landlords or tenants take advantage of programs that require an upfront investment or incurring new debt. The result is continuing high energy bills that squeeze already tight budgets and exacerbate economic insecurity, especially because the majority of low- and moderate-income households in most markets are renters.

Structural barriers such as these often prevent many customers from being able to access the benefits of energy efficiency programs, even though all ratepayers are paying electricity rates that include charges for energy efficiency programs. These customers are often among low- and moderate-income (LMI) residents that are already facing the highest degrees of energy burden, and the challenges they face to participating in energy efficiency programs are so well known that their market segments are sometimes referred to as "hard to reach" or "difficult to serve." The central problem is not with the customers, however, but rather implicit and explicit program requirements that systematically disqualify them from participation.

Inclusive financing opens doors to participation in utility energy efficiency programs by clearing barriers related to access to capital and eligibility for financing, such as income, credit, and renter status. Inclusive financing programs also do not require customers to prove that they are wealthy enough to qualify for credit or poor enough to qualify for public assistance restricted to low-income households. This is especially important for reaching LMI customers as well as customers who are risk averse, debt constrained, subject to outside approvals (e.g., voter or board approvals), living on fixed incomes, elderly (i.e. have limited life expectancy), and renters. Inclusive financing is a breakthrough in the field because it has two compounding effects: (1) it vastly expands the addressable market and (2) it yields higher participation among customers in market segments that are typically underserved by programs for which they have paid for years.

Pay As You Save[®]

PAYS was developed by the Energy Efficiency Institute, Inc. (EEI) (Cillo and Lachman 1999). The PAYS system enables building owners or tenants to purchase and install money-saving resource-efficient measures with no upfront payments and no debt obligation. Those who benefit from the savings pay for these upgrades through a tariffed charge on their utility bill, but

only for as long as they occupy the location where the upgrades are installed. The annual charges are capped at a level that is significantly lower than the estimated annual savings from the upgrades and remain on the bill for that location until all costs are recovered.

The terms of a PAYS investment described above are set forth in a tariff offered by the utility. Tariffs are approved by a utility regulator according to established criteria (e.g. cost-based, reasonable, nondiscriminatory) and then published in the schedule of rates and charges. Tariffed terms for utility investment and cost recovery are different than bank terms for loaning money and collecting repayment, and those differences account for the striking difference in market response to the same energy efficiency upgrade opportunities. A PAYS program participant does not take on a new debt obligation and, therefore, does not face the liability or the risk of disqualification due to underwriting criteria required in the banking sector. Like a loan, PAYS allows for payment over time, but unlike a loan, the PAYS obligation ends with the customer's occupancy, at which point cost recovery continues with a successor customer. The PAYS obligation also ends if the upgrade fails for no fault of the customer and it is not repaired.

PAYS is structured so that a utility can make investments in efficiency upgrades at a customer's home or business and recover its costs. The utility and the participant both benefit if the investment saves more than the cost recovery charges. Utilities not only have an interest in participants getting savings so that the utility can recover its costs, but as the number of these investments grow, utilities can also integrate these savings into their resource supply portfolio.

How does PAYS® work?

To offer a PAYS program, utilities seek one time regulatory approval for an opt-in tariff to cover all cost effective investments in energy efficiency upgrades or other distributed energy solutions on terms that are reasonable, nondiscriminatory, and cost-based. Once approved, customers interested in the opportunity can request an on-site energy assessment by a qualified energy assessor, who produces a list of cost effective upgrades based on location specific measurements, bill history, and engineering calculations. To benefit from the utility's investment opportunity, a customer opts into a terms-of-service agreement that allows the utility to (1) invest in the energy upgrades and (2) recover its costs with a tariffed charge on the bill that is capped at 80% of the estimated savings based on current rates during 80% of the life of the upgrade (i.e., the 80% rule). Once the utility has recovered all of its costs for the upgrades at a location, including its cost of capital for the investment, the program services charges end and the customer's bill decreases further. The customer at that location then gets all of the savings from the upgrades, which are estimated to last longer than the duration of payments.

With PAYS terms, energy efficiency upgrades that are cost effective must include a net savings stream that is 20% of the estimated annual savings stream and 100% of the estimated savings during the last 20% of the expected life of the project. As a result, participants will experience positive cash flow from the start. Because this "80% rule" is based on current rates, the value of cash flow generated by energy savings increases with each rate increase. With the cost recovery limited to 80% of the estimated annual energy savings over 80% of the estimated useful life of the upgrades, the cost recovery is 64% of the total estimated savings over the full useful life of the upgrades. As a result, the ratio of the total estimated savings compared to the cost of the investment (SIR) will be at least 1.5, which provides better consumer protection than

bill-neutral financing programs. If the investment is not sufficiently cost effective to qualify for the 80% rule, the customer can make a copayment to buy down the cost of the upgrade.

The utility's investment is tied to the location, so it does not follow the customer. The tariffed charge applies to the next customer at that location, who also enjoys lower bills from the upgrade. If the customer is a renter and decides to relocate, the building owner simply has to let successor renters know in writing before they sign their lease that they would be moving into an upgraded unit with lower energy consumption due to investments by the utility, and as a result, the utility bill will include a charge for cost recovery until all the costs are recovered. When the next customer starts utility service, the tariffed charge will appear on their bill – which will be lower than it would have been without the upgrade for the same level of usage. If the customer owns the building and sells it, prior to sale, the customer must disclose the utility's investment in upgrades to the buyer. Because there is no debt obligation, it is not necessary to “pay off” the investment prior to selling the building, though a customer could offer to pay the utility and shorten the cost recovery period.

Essential elements of PAYS®

A program based on PAYS has three essential elements:

1. Estimated savings of energy efficiency upgrades significantly exceed charges on an annual basis as well as over the life of the upgrades;
2. A tariffed charge for cost recovery is assigned to a location, not to an individual customer; and
3. Billing and payment for utility cost recovery is on the utility bill, and protocols for disconnection for nonpayment approved by a utility commission apply.

Programs based on the PAYS system also have three minimum design requirements:

1. Any utility offering rebates and implementing a PAYS program will offer the same rebates to both PAYS participants and nonparticipants;
2. Offers of upgrades to customers will not be burdened with customer risks, such as unproven technologies, or with costs that are more appropriately assigned to all ratepayers, such as program start-up costs or uncollectibles, because they undermine the value proposition, which causes fewer projects to be completed; and
3. Implementing utilities agree to treat uncollectable billed charges for PAYS upgrades the same as all other uncollectables, and they agree to pay their capital providers what they have borrowed, regardless of their collections.

Customer eligibility under a PAYS® model

PAYS has no eligibility requirement other than being a customer. Some utilities define eligibility requirements by referring to bill payment history (e.g., no more than two disconnections for nonpayment in 12 months). Eligibility can be further constrained by placing requirements on the location (e.g., no structural repairs needed). The market will also constrain eligibility because not all locations will have energy efficiency upgrades that provide sufficient savings for a project to be deemed cost effective.

Net savings as a component of cost effectiveness

Energy efficiency financing programs can be designed to be “bill-neutral” or “bill-positive.” Bill-neutral means that cost recovery charges cannot exceed 100% of the estimated savings over 100% of the estimated life of the upgrades. If a customer remains in a premise for the duration of payments and the upgrades function for the entire duration of payments, the customer will come out even. If a program’s bill-neutral calculations include energy inflation when determining the fixed average charges for cost recovery, then the charges will necessarily increase participants’ annual energy expenditures in the first few years. Charges also exceed savings during any years the upgrades temporarily or permanently fail.

By contrast, bill-positive means that the expected annual energy savings from the investments significantly exceed the on-bill charges each year. Bill-positive programs ensure that participants see an immediate decrease in their utility bills and reduction in their overall energy burdens – even with the additional on-bill charges. The net savings provide enough financial benefits to encourage participation and offer a sufficient margin for error in savings estimates.

The calculation of cost effectiveness for an energy efficiency upgrade in a PAYS programs includes those net savings. For example, the tariffed charge for cost recovery is capped at a fraction (e.g. 80%) of the estimated savings and the total period for the cost recovery is capped at a fraction of the useful life of the upgrade (e.g. 80%).¹ Use of this “80% rule” results in tariffed charges for cost recovery that are 64% (i.e. 80% X 80%) of the total estimated savings from the upgrade. The estimated savings figures are calculated based on an on-site assessment, actual upgrade costs, and current rates, without assuming rate increases.

Successor customers in a PAYS[®] program

Because PAYS involves no assignment of a debt obligation, PAYS programs do not involve imposing a legal obligation on one person that then must be transferred to another person. As a result, the tariffed charge survives foreclosure proceedings, changes in tenancy, and can be floated through periods of vacancy. If some billing cycles are missed due to meter inactivity or nonpayment, the implementing utility can extend the duration of payments to assure its cost recovery from customers benefiting from the savings at an upgraded location. The terms of the tariff continue to apply to the location until all costs are recovered, and therefore, successor customers are obligated to pay the charge for cost recovery on their utility bill, which is lower than it would have been without the upgrades.

Programs based on the PAYS system require that the obligation to disclose be assigned to the building owner. The building owner is the only party who knows of intended sale or rental of a premise. Before a utility will invest in upgrades at a site, the building owner must accept the obligation to disclose the utility’s investment in upgrades and terms for cost recovery to future tenants or buyers prior to lease or sale.

The utility can also take steps to ensure that successor customers at sites where it invests understand the tariffed on-bill program benefits and obligations beyond relying on the owner’s

¹ EEI has recommended a 75% rule or even a two-thirds rule for customers who need more assurance that savings will exceed payments (e.g., low-income customers).

obligation for disclosure. For example, when a successor customer opens a new account at a site where the utility has invested in upgrades, a flag in the utility’s records prompts a letter to the new successor customer that describes the benefits and obligations of the PAYS tariff that applies to the upgraded location until the utility’s costs for the upgrades are recovered. The utility may also choose to facilitate disclosure by affixing notice of the program to places that any reasonable person might inspect before agreeing to rent or purchase the premises.

Cash flows in a PAYS program

Figure 1 illustrates the cash flows for a PAYS investment. The utility can source capital in multiple ways, including the public bond market, third party lenders, or its own balance sheet, which is supported with a mix of equity and debt. The earliest PAYS programs used authorized conservation program funding as a source of capital. Strong customer demand led to immediate cash shortages that suspended or delayed program investments until the next budget cycle made more funds available. The most recent programs approach capital sourcing as a business as usual activity for the utility, which is then also business as usual for the capital provider, whose risk exposure is indicated by the creditworthiness of the utility and the strength of its balance sheet.

Consistent with the terms of a PAYS tariff, the utility is responsible for deploying capital for site-specific upgrades and recovering that capital with revenue generated by a charge on the bill for that location. The creditworthiness of the current or future customers at that site has no bearing on the investment, which is secured on terms of disconnection for nonpayment that apply to all essential utility services. The utility tariff applies to both current and future customers until all its costs are recovered, and to date, no utility has reported an instance of disconnection for nonpayment of cost recovery for a PAYS investment. If a site is permanently vacated or abandoned resulting in meter inactivity exceeding 24 months, the utility may charge-off the outstanding cost recovery using the same procedure that applies to nonpayment for other essential utility services. Utilities are aware of the prevailing meter inactivity rate in their service area, and as the data below indicates, the charge-off rates reported by utilities with PAYS programs are as good or better than the utility’s mainline business.

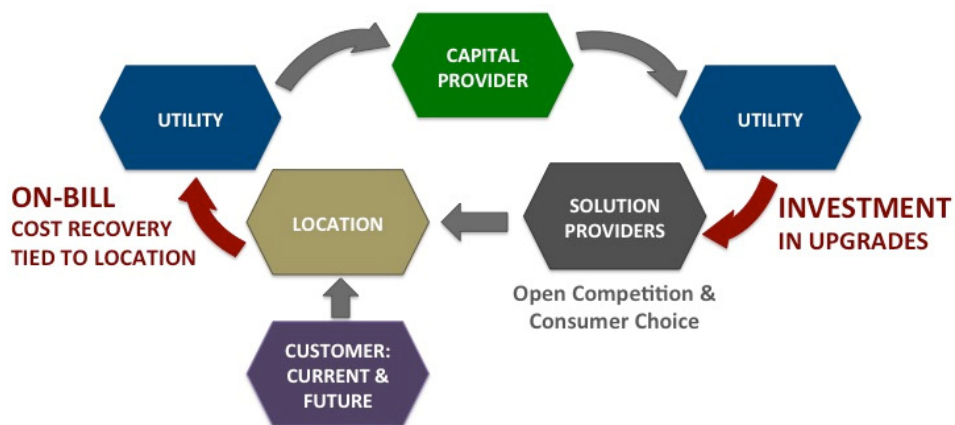


Figure 1. Flow of capital in a typical program based on the PAYS system

Key differences with on-bill loan programs

Because PAYS programs recover costs through a tariffed charge on the utility bill, some authors have included PAYS under the category of on-bill financing (OBF) programs, which primarily consist of on-bill loan programs and on-bill loan repayment programs. On-bill loan programs involve a lender and a borrower. Loan programs typically involve credit checks and security, the very hurdles that PAYS was designed to overcome. Some OBF loan programs do mitigate or eliminate the need for security and credit worthiness by paying for credit enhancements to mitigate the risk to capital providers of loan defaults.

Figure 2 illustrates important differences in the transaction path between an on-bill loan program and a PAYS program (Figure 1). PAYS is a utility investment, not consumer financing. The customer is not a borrower, so consumer financing is not involved, and therefore, consumer finance laws regarding lending do not apply. PAYS programs do not put the utility in the position of making loans, though the utility itself may borrow money to capitalize its portfolio of energy efficiency projects. The utility's capital arrangements are not dependent on the credit profile of the participating customers but rather on the credit standing of the utility itself.

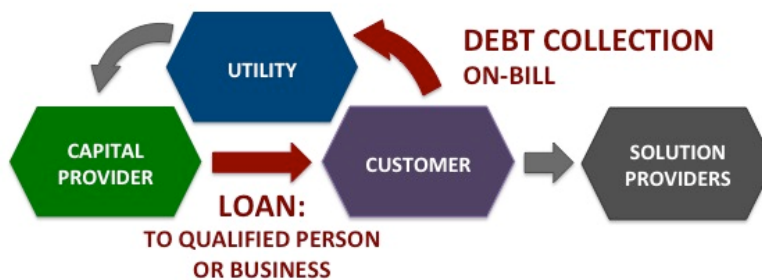


Figure 2. Flow of capital in a typical on-bill loan repayment program

Key differences with other financing approaches for energy upgrades

The differences between PAYS and other financing programs for energy upgrades have key differences that are captured in two categories – customer eligibility and customer experience. Table 1 shows these differences.

Table 1. Attributes of financing approaches for energy upgrades

Attributes	PAYS®	On-bill loan	PACE
Customer eligibility			
• Residential customers are eligible	✓	✓	✓
• Commercial customers are eligible	✓	✓	✓
• Renters are eligible	✓		
• No credit score check	✓	*	
• Eligibility includes all customers in a utility's service territory	✓		
• Utility uses bill payment history to confirm good standing	*	✓	
Customer experience			
• On-site energy assessment identifies cost-effective upgrades	✓		

• Customer chooses contactor for installation	✓	✓	✓
• No upfront customer cost	✓	✓	✓
• Estimated savings must exceed cost recovery charges	✓	✓	
• Immediate net savings to customer	✓		
• Customer signs a promissory note to accept a debt obligation		✓	
• Customer opts into a utility tariff tied to the location	✓		
• Customer agrees to disconnection for not paying utility bills	✓		
• Cost recovery is through a fixed charge on utility bill	✓	✓	
• Customer agrees to a lien on the property			✓
• Cost recovery is through property tax bill			✓
• Payments end if upgrade fails and is not repaired	✓		
• Participant’s charges end when they leave the location if they have fulfilled their responsibilities, e.g., maintaining upgrades	✓		*
• Cost recovery runs with the location and remains in effect for subsequent customers at that site until cost recovery is complete	✓		*

[*] indicates that this attribute applies in some cases.

Results from PAYS[®] programs across the United States

There are 17 programs based on PAYS that are or have been operating in seven states – Arkansas, California, Hawaii, Kansas, Kentucky, New Hampshire, and North Carolina. Investor owned utilities (IOUs), rural electric co-ops, and municipal utilities have implemented PAYS programs in commercial buildings, single-family homes (SF), and multifamily housing (MF), though the majority of programs have been implemented by cooperative and municipal utilities.

Four factors have contributed to accelerated investment through PAYS programs: (1) larger addressable market due to fewer barriers to eligibility, (2) higher adoption rates (i.e., the portion of customers who receive an assessment of cost effective energy upgrades that actually accept the utility’s offer to pay for them on PAYS terms), (3) a willingness of both utilities and customers to undertake larger projects that achieve deeper savings and (4) the involvement of program operators experienced with implementing PAYS programs. These four factors have a compounding effect. For example, a doubling in each factor compared to a debt-based financing program would result in eight times greater capital deployment. The adoption rate in 16 of the 17 programs for which utilities have reported that data is above 50%, which is very high compared to the prevailing rate for programs that market debt products. While the raw numbers of customers installing upgrades and the total dollars invested may appear to be small relative to some nationally recognized programs, the per capita numbers are high. For example, Ouachita Electric Cooperative’s HELP PAYS[®] and Midwest Energy’s How\$mart[®] programs have provided comprehensive weatherization services to 4% of their residential customers.

Utilities that offer tariffed on-bill programs also keep track of how much of their portfolio has been deemed uncollectable, at which point it is charged-off from their accounts receivable. This is the same practice that a utility applies to their mainline business of electricity sales, and the charge-off rate for a utility is calculated annually as the total amount of charges billed to customers that were unpaid divided by the total amount of revenue that was expected from the bills sent to customers. In the tables below, however, the “uncollectable %” data is reported as a *cumulative* figure across the entire portfolio and all years. When converted to metric akin to

average annual charge off rate, the data on uncollectable billed charges shows that the portfolio of PAYS investments have a lower risk profile than the utility's mainline business.

PAYS® programs offered by investor-owned utilities

Table 2 shows the results from the programs implemented by investor owned utilities (IOUs), three of which are subsidiaries of Hawaii Electric Company.

Table 2. Results from PAYS® programs implemented by IOUs

Program	Solar Saver Pilot			Smart Start
	Hawaiian Electric	Hawai'i Electric Light	Maui Electric	Eversource
State	HI			NH
Number of customers	304,261	85,029	70,872	513,304
Inception (yr)	2007			2002
Active (Y/N)	N			Y
Source of capital	Ratepayer funded conservation budget			Ratepayer funded conservation budget & repayments
Program operator	Utility			Utility
Project type	Single Family (SF)			Municipal
Projects completed	484			269
Percent of customers	NA			NA
Investment total (\$)	□ \$2,900,000			□ \$10,800,000
Adoption rate (%)	NR (not reported)			NR
Avg. project size (\$)	□ 5,990			NR
Cost recovery period (yr)	□ 10			□ 8
Uncollectables (%)	<0.1%			0.0%
Data reported through	12/31/08			12/31/17

Source: Katherine Peters, Supervisor, Energy Efficiency, and Thomas Belair, NH Energy Efficiency Manager, Eversource, pers. comm., March 7, 2018. Johnson Consulting Group 2009.

PAYS® programs offered by electric cooperatives

In 2002, New Hampshire Electric Cooperative (NHEC), the first co-op to implement a program based on the PAYS system, provided weatherization services to members who heated their homes with electricity and with energy sources other than electricity (e.g., propane). Many of the implemented PAYS programs allowed the estimated savings of resources other than the one they provide to be included in the assessment of cost effective efficiency opportunities. However, NHEC decided that customers who heated with electricity and wanted to participate in the PAYS pilot would be ineligible for NHEC's rebates funded by all customers through their electric bills. That effectively discouraged investment by customers who heated with electricity with none participating. Several propane-heated homes did weatherize their homes using PAYS.

In 2007, Midwest Energy, the second cooperative to implement a program based on the PAYS system, targeted single-family, rental housing, and ground water heat source HVAC systems, a technology with prohibitive upfront costs. Table 3 shows these two programs.

Table 3. Results from the first two PAYS programs implemented by electric cooperatives

Program	PAYS Pilot	How\$mart®	
Utility	New Hampshire Electric Coop	Midwest Energy	
State	NH	KS	
Number of customers	□ 84,000	□ 50,000	
Inception (yr)	2002	2008	
Active (Y/N)	N	Y	
Source of capital	Conservation Budget & NRECA	Various	
Program operator	Utility	Utility	
Project type	SF, Commercial, Retail	Residential	
Projects completed	21 (does not include retail CFLs)	1,915 (□15% are rental units)	
Percent of customers	NA	4%	
Investment total (\$)	\$157,000	□ \$14,630,176	Recovered from Tariff \$11,081,668
Adoption rate (%)	NR	□ 70%	
Avg. project size (\$)	NR	\$7,640	\$5,786
Cost recovery period	5-10	10-15	24%
Uncollectables (%)	<0.1%	<0.1%	
Data reported through	12/31/04	2/28/18	

Source: GDS Associates, Inc. 2003. Brian Dreiling, Manager of Energy Services, Midwest Energy, pers. comm., March 7, 2018.

Roanoke Electric Cooperative, Ouachita Electric Cooperative Corporation, and electric cooperatives served by the Mountain Association for Community Economic Development (MACED) all serve counties that are recognized for persistent poverty. Ouachita focused on multifamily tenants who pay their own energy bills and served 100% of these customers in the first 18 months of its program. Table 4 shows the results from the Ouachita and Roanoke programs, and Table 5 shows data for the PAYS program operated by MACED.

Table 4. Results from PAYS programs offered by two utilities with same program operator

Program	HELP PAYS®				Upgrade to Save
Utility	Ouachita Electric				Roanoke Electric
State	AR				NC
Number of customers	6,920				14,510
Inception (yr)	2016				2015
Active (Y/N)	Y				Y
Source of capital	CFC				USDA EECLP
Program operator	EEtility				EEtility
Project type	Total	MF	SF	Commercial	Residential
Projects completed	283	81	197	5	290
Percent of customers	4%				2 %
Investment total (\$)	\$2,031,095	\$465,410	\$913,918	\$651,767	□ \$2,300,000
Adoption rate (%)	90%				85%
Avg. project size (\$)		\$5,746	\$4,639	\$130,353	\$7,400
Cost recovery period		12	12	7	Varied (4-12)
Uncollectables (%)	NR				< .1%
Data reported through	1/1/18				3/1/18

Source: Mark Cayce, General Manager, Ouachita Electric, pers. comm., March 2, 2018. Marshall Cherry, Chief Operating Officer, Susan Tann, Manager of Member Services, Greyson Morris, Accountant, Roanoke Electric Cooperative, pers. comm., March 12, 2018.

Table 5. Results from PAYS programs in Kentucky operated by MACED

Program	HowSmart® KY					
	Big Sandy RECC	Grayson Electric Co-op	Fleming-Mason Energy	Jackson Energy Co-op	Farmers RECC	Licking Valley RECC
Utility						
State	KY					
Number of customers	139,230					
Inception (yr)	2011					
Active (Y/N)	Y					
Source of capital	Various					
Program operator	MACED					
Project type	Residential, Commercial					
Projects completed	312					
Percent of customers	0.2%					
Investment total (\$)	\$2,341,312					
Adoption rate (%)	78%					
Avg. project size (\$)	\$7,504					
Cost recovery period	Varied					
Uncollectables (%)	2% during pilot; 0.4% post pilot					
Data reported through	1/31/18					

Source: Chris Woolery, HowSmartKY Program Coordinator, MACED, pers. comm., March 7, 2018.

PAYS® programs offered by municipal water utilities

The Town of Windsor and the City of Hayward, two municipal water utilities in California, targeted water saving and energy improvements in multifamily buildings. Table 6 shows these programs as well as the East Bay Municipal Utility District WaterSmart Pilot.

Table 6. Results from PAYS® programs offered by municipal water utilities in California

Program	Windsor Efficiency PAYS®	Green Hayward PAYS®	EBMUD WaterSmart Pilot
Utility	Town of Windsor Water Utility	City of Hayward	East Bay Municipal Utility District
State	CA	CA	CA
Number of customers	7,846 SF, 615 MF	13,439 MF	
Inception (yr)	2012	2015	
Active (Y/N)	Suspended for Redesign	Y	
Source of capital	Utility Operations	Utility Operations	Utility Operations
Program operator	Sonoma County Energy Independence	Frontier Energy	Utility
Project type	SF, MF	MF	MF
Projects completed	242 SF, 233 MF	162 MF	53 MF
Percent of customers	3% SF, 38% MF	1.2%	<1%
Investment total (\$)	\$561,704	\$173,115	\$22,634
Adoption rate (%)	NR	23%	NR
Avg. project size (\$)	\$460 SF, \$19,220 MF	\$28,852	\$7,545
Cost recovery period	10-15	3-10	3-5
Uncollectables (%)	<0.1%	NR	NR
Data reported through	SF 2014, MF 2016	3/9/18	11/2/17

Source: Chris Bradt, Quashaun Vallery, and Tatiana Geftter, pers. comm., March 9, 2018.

Three case studies of PAYS[®] programs

Ouachita Electric Cooperative's HELP PAYS[®]

In less than two years since inception in 2016, Ouachita Electric has reached 4% of its residential customers, all of whom are member-owners of the electric cooperative. The target market of this program is single and multifamily residential customers, but the utility has also invested in upgrades to public buildings. Upgrades include heat pumps, insulation, air sealing, and duct sealing. EEtility, a registered B corporation, is the program operator.

Prior to this program, Ouachita Electric had been operating a loan program called Home Energy Lending Program (HELP) developed with funding from the Clinton Foundation. HELP upgrades included insulation capping, and air and duct sealing. The average HELP project size was \$2,533. (Performance of Inclusive Financing for Energy Efficiency 2016). Following Roanoke Electric Cooperative's successful implementation of Upgrade to Save, Ouachita's General Manager proposed to the board that the utility change its HELP loan program to a HELP PAYS[®] program, and the Arkansas Public Service Commission approved it unanimously.

Among those customers that received an energy assessment indicating cost effective opportunities for upgrades through the HELP PAYS[®] program, more than 80% accepted the offer, and the acceptance rate for projects that did not require a copayment reached 90%. The average project size for residential customers in the HELP PAYS[®] program was more than double the average HELP project size. The primary reason for the larger investment and deeper savings was the decrease in risk exposure for both the utility and the participants.

Ouachita made it a priority to reach all of its customers who live in multifamily housing where the tenants pay for energy bills and has done so. Ouachita benefited from using a program operator who had already provided services under an on-bill loan program. For that reason, their start up costs were much lower because only training was required to educate the contractor workforce already in the local market.

Eversource's Smart Start

New Hampshire Public Service (now Eversource) started its program in 2002, and the target market remains municipal customers. Renamed Smart Start in 2004, the program can help customers with all cost effective upgrades; almost all the projects have been lighting or street lighting projects. Eversource completed 269 projects in more than half of the 138 municipalities it serves. In 15 years of operation, Eversource reports zero uncollectible charges for its program.

In November 2000, the New Hampshire Public Service Commission directed Eversource to implement a pilot PAYS program (Order No. 23,574) making it the first utility in country to implement a PAYS program (NHPUC 2000). Because voter approval and additional funding can be necessary to secure prior to starting a project, it can be more difficult for towns and cities to take advantage of the program, despite rebates and efficiency technologies readily available. For example, the Town of Strafford signed up for the first PAYS project, a street lighting project, and although the project had just over a two-year simple payback, voters twice voted against incurring costs for the retrofit. In the newspaper article highlighting the program, the Town Manager was quoted, "Without PAYS, we could not get this project done."

The funds to pay for the upfront costs of projects initially came from the utility's Core Programs. Through 2010, annual amounts were used to seed a revolving fund. Capital now comes from customer payments of their energy services charges and a program activities fee.

Eversource staff report that its program works well for municipal customers and addresses how they own buildings and make upgrades. Demand for the PAYS program typically exhausts the allocated supply of ratepayer funds for capital and rebates between April and June of each year. Eversource's commitment to their customers has made this program the longest, continually operating program based on the PAYS system.

Roanoke Electric's Upgrade to \$ave™

Roanoke Electric in North Carolina offers residential customers the opportunity to upgrade their heat pumps, insulation, air sealing and duct sealing through the Upgrade to \$ave program. In the first two years of operation, Upgrade to \$ave reached 2% of Roanoke Electric's residential customers, a faster rate of market penetration than reported by the state of New York's primary energy efficiency and weatherization programs targeting LMI customers. (See "More states calling for inclusive financing" below.)

The federal government recognizes most of the counties served by Roanoke Electric as persistent poverty counties (USDA ERS). Persistent poverty counties are defined as those where 20% or more of county residents were poor, measured by the 1980, 1990, 2000 censuses, and the 2007-11 American Community Survey. Half of Roanoke's residential customers have monthly utility bills above \$200, exceeding 6% of the average median income for the counties in the service area. The energy burden for households below that median figure is substantially higher.

The original program design for Upgrade to \$ave was never completed because there was such a rush to serve customers who had been waiting over a year for the program. Most of the 104 customers who were unable or unwilling to take on loans through the utility's previous financing program have now been served through Upgrade to \$ave. Roanoke initially experienced higher costs during the start up phase of its program due to challenges with its program operator and the work quality of contractors. They switched program operators to EEtility and remain committed to improving the program. Roanoke Electric executives have frequently shared updates on their program, and they report that it is helping address high bill complaints and that overall member customer satisfaction is increasing.

Roanoke's program was the first PAYS program to secure capital from USDA's Energy Efficiency and Conservation Loan Program (EECLP). EECLP provided \$6 million at less than 3% interest, and it imposed no carrying cost to utility until funds were deployed for efficiency upgrades (REC 2014). The EECLP application developed a business case showing the program benefits to participants as well as benefits to the utility and all its ratepayers due to avoided wholesale costs for energy and demand.

More states calling for inclusive financing

In California, one third of all households are recognized as low-income according to federal guidelines, and 70% of those households are renters (CEC 2016). In the state of New York, 2.3 million households qualify as low-income, and another 1.2 million as moderate income (NY DPS 2017). Both states are leaders in the field of clean energy and climate action, yet the vision of attaining their most ambitious targets implies much broader participation in the clean

energy economy, especially among customers in market segments that are underserved by existing policies and programs. For context, the state of New York reported in 2018 that “the primary energy efficiency and weatherization programs targeted at the LMI market segment have reached only 12% of eligible households across building types and ownership status” in the past 12 years, achieving an annual average market penetration of 1%.

To address the challenge, both California and New York initiated extensive stakeholder consultations in 2016 to explore and address barriers to participation in the clean energy economy in low-income communities. Policy panels in both states found that financing and access to capital was a significant barrier. Staff at the leading energy research agencies in each state (CEC and NYSERDA) solicited input from all types of solution providers. While report authors in both proceedings were familiar with inclusive financing, they accepted all challenges to it and considered any alternative raised for attention.

California state law SB350 mandated the California Energy Commission (CEC) to study barriers to low-income customers participating in the clean energy economy. After months of extensive stakeholder consultation and multiple rounds of public comments and draft review, the CEC concluded, as expected, that financing is a barrier to low-income customers. In a report entitled “Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities,” the CEC advanced its top recommendation for addressing barriers to financing:

The CPUC should consider developing a tariffed on-bill pilot for investments in energy efficiency that targets low-income customers regardless of credit score or renter status, and that do not pass on a debt obligation to the customer. Utilities could use the program to make energy upgrade investments and recover the cost through the bill, so long as the recovery charge is less than the estimated savings. The Energy Commission should encourage and provide technical assistance to publicly owned utilities (POUs) and other load-serving entities seeking to implement a tariffed on-bill pilot.

Meanwhile, the New York Public Service Commission chartered a Clean Energy Advisory Council (CEAC), whose “primary objective is to support innovation and collaboration leading to the development of the most impactful clean energy programs and to reduce cost and achieve scale for these resources, including an effective transition from current clean energy program offerings and on-going delivery thereafter.” The Council established a Low- and Moderate Income Clean Energy Initiatives Working Group co-chaired by key staff at NYSERDA and the Department of Public Service, home of the utility commission. The working group was composed of a specified variety of stakeholders, including affordable housing developers such as Enterprise Community Partners, utilities such as National Grid and ConEd, and community-based organizations such as PUSH Buffalo.

In support of the Council’s objectives, the LMI working group was tasked with investigating and evaluating alternatives to the current delivery of ratepayer funded clean energy services to LMI customers to improve the value for the customers served, as well as for the ratepayer funds being invested. The result of their work was delivered in a Report on Alternative Approaches to Providing Low and Moderate Income (LMI) Clean Energy Services (NY DPS 2017). Just six weeks after the CEC had concluded its yearlong Barriers Study, the NY CEAC LMI Working Group advanced its top recommendation on financing to the Council:

Demonstrate an inclusive finance solution in New York that overcomes the credit barriers faced by lower income and low FICO consumers, integrates 3rd party capital to create a finance model that is more sustainable than the current Good Jobs - Green New York (GJGNY) revolving loan fund, and possibly includes a guaranteed cost recovery mechanism.

In the following State of the State address, the Governor of New York promised to deliver a “comprehensive strategy” for achieving higher energy efficiency targets, and in fulfilling his promise, NYSERDA issued a white paper on Earth Day called “New Efficiency” (2018) in which it announced:

NYSERDA and DPS shall explore the development of a pilot Pay-As-You-Save (sic) tariff-based financing model with one or more utilities, as an instrument that expands the reach and effectiveness of the State’s energy efficiency initiatives while remaining consistent with the principles established in this document.

Conclusion

Utilities that have experience offering inclusive financing programs have reported results that indicate consistently high adoption rates for building energy efficiency upgrades and remarkably low charge-off rates for nonpayment, even in areas characterized by conditions of persistent poverty. Compared to typical debt-based financing programs, experience shows that PAYS has a stronger market response for four reasons:

1. The addressable market is double the size because nearly all customers are eligible, including renters and LMI households.
2. When customers are offered upgrades with the PAYS value proposition, nearly all utilities have reported that those customers accept more than half of the time, indicating that more customers who are risk averse and debt constrained are able to participate.
3. Customers with access to inclusive financing tend to undertake projects that are larger in scope because the terms are more attractive.
4. The investment is more secure because utility collections have a charge-off rate that is approximately 10 times lower than unsecured consumer lending.

Many states have large LMI populations currently paying for ratepayer funded energy efficiency programs that are not effective at clearing barriers to their participation. Inclusive financing programs like those already demonstrated in more than half a dozen states can expand participation among households facing the highest degrees of energy burden and open doors of opportunity to underserved populations who have the most to gain in the clean energy revolution.

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