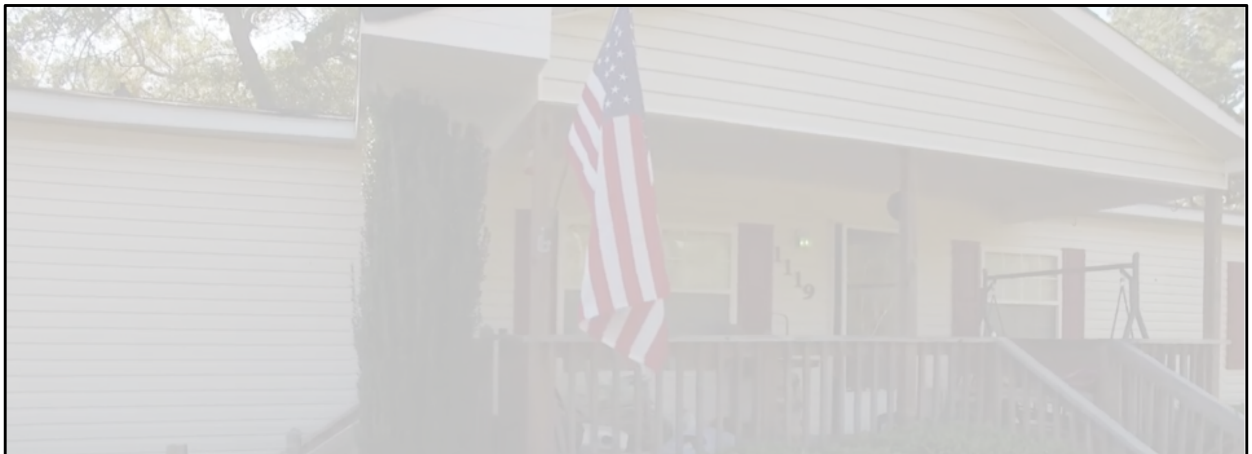


Can you generate 90% take rates for deep residential upgrades?

Stephen Bickel, Jill Ferguson, LibertyHomes | BECC 2020 | 12.9.20

Abstract: Avoiding catastrophic climate change will require a massive rapid upgrade of residential housing infrastructure. Public Utility Commissions and utilities are increasingly seeing the tariffed based Pay As You Save (PAYS) system as the critical ingredient for delivering energy efficiency upgrades to hard to reach populations that comprise more than half of their customers. Compared to debt-based programs, deep energy efficiency home upgrade programs utilizing the PAYS system have proven to be far superior in “getting (customers) to yes”. By increasing accessibility and eliminating customer risk, the PAYS system makes for a compelling offer that, on average, achieves approximately 70% take rates, but there are also carefully honed choice architecture strategies and behavioral best practices throughout implementation that allow utilities to leap to 90% take rates. This study evaluates the entire customer acquisition process at each touchpoint for an ongoing rural electric cooperative PAYS programs and identifies what elements of their processes improve both retention of prospects and produce unprecedented final offer acceptance rates.

Yes You Can...with Pay As You Save®!

The PAYS system, on average, generates 70% take rates

	Midwest Energy (KS)	MACED (KY)	Ouachita Electric Cooperative Corporation (AR)	Roanoke Electric Cooperative (NC)	Appalachian Electric Cooperative (TN)
Start Date	2008	2011	2016	2017	2019
Upgrade Package	Wx, HVAC	Wx, HVAC	Wx, HVAC	DI, Wx, HVAC, DR	Wx, HVAC
Share of Customers Served	**4.8%**	**NA**	**6.2%**	**8.5%**	**0.2%**
Take Rate	**70%**	**78%**	**90%**	**90%**	**90%, no-copay (77% overall)**
Average Job Size ($)	$7,650	$7,500	$6,300	$7,650	$8,550
Charge-offs	**<0.1%**	**<0.4%**	**Zero**	**Zero**	**Zero**

PAYS + program operation best practices generates 90% take rates

Liberty Homes

This presentation explores an alternative approach to personal financing of comprehensive energy upgrades – utility investment with tariffed on-bill (TOB) cost recovery such as Pay As You Save (PAYS). In this model, the utility invests in cost-effective home energy upgrades and recovers that investment through a tariffed charge on the utility bill that is less than the estimated savings.[1] This enables the customer to benefit from lower energy bills without the risk of debt-obligation while allowing the utility to earn the standard rate of return for grid investments.The investment decision is not based on the creditworthiness or liquidity of the customer, rather on the value of energy savings and grid services of the investment at that location.[2] Interest in TOB is growing among utility regulatory commissions and policymakers as a more equitable, scalable approach; commissions in 6 states have committed to investigating or implementing TOB programs in the last 12 months.[3] These are in addition to the 17 utilities across 8 states that have already applied TOB for residential energy upgrades over the last 20 years.[1]

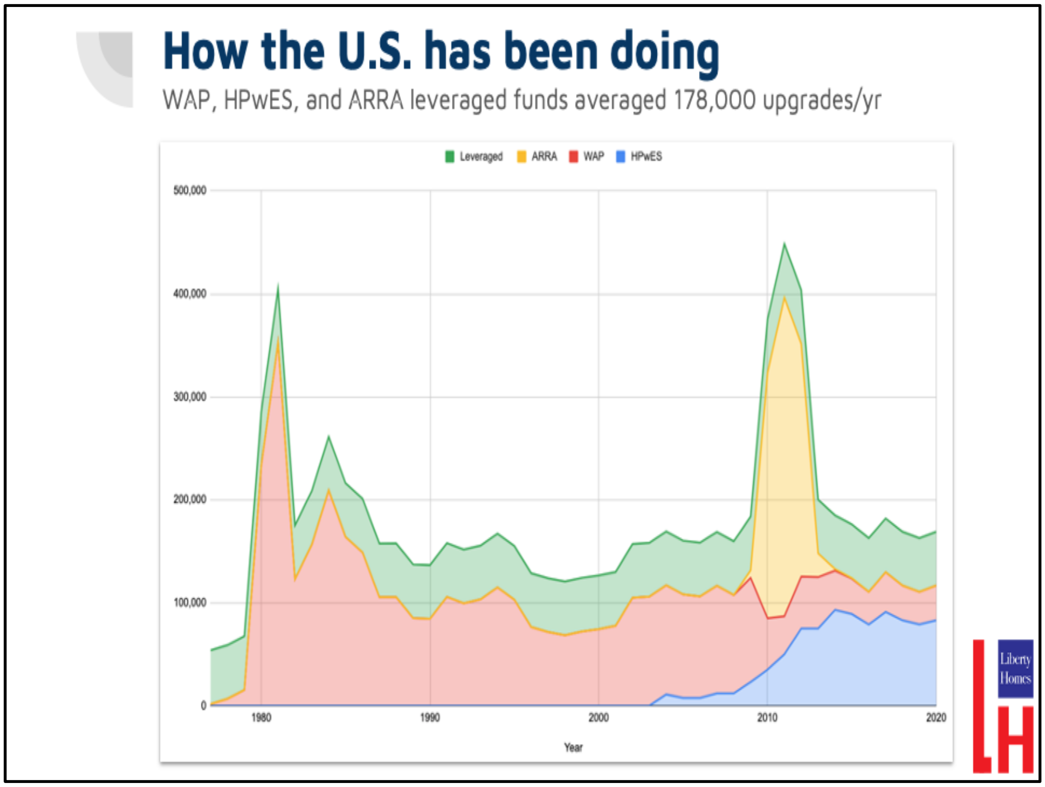
Data for five Pay As You Save home energy efficiency upgrade programs.[1,2] Midwest Energy How$mart® program is operated by the utility. MACED is the non-profit operating a program for a group of several KY rural electric cooperatives. The remaining three programs are operated by EEtility, a B-corporation.

Start date: Date of program inception
Upgrade Package: Wx = Weatherization (air seal, attic insulation, lighting), HVAC (new heating and/or cooling systems, usually electric heat pump, duct seal), DR (WiFi thermostats and water heater control switches)
Share of Customers Served: program participants/residential meters

Take Rate: Accepted offers/Upgrade offers extended; more inefficient homes with higher savings often generate offers requiring no co-pay.
Average Job size: Total cost of upgrade
Charge-offs: Uncollectable invested capital and cost of capital cost-recovery bills charged-off by the utility as bad debt divided by the total invested capital and cost of capital.

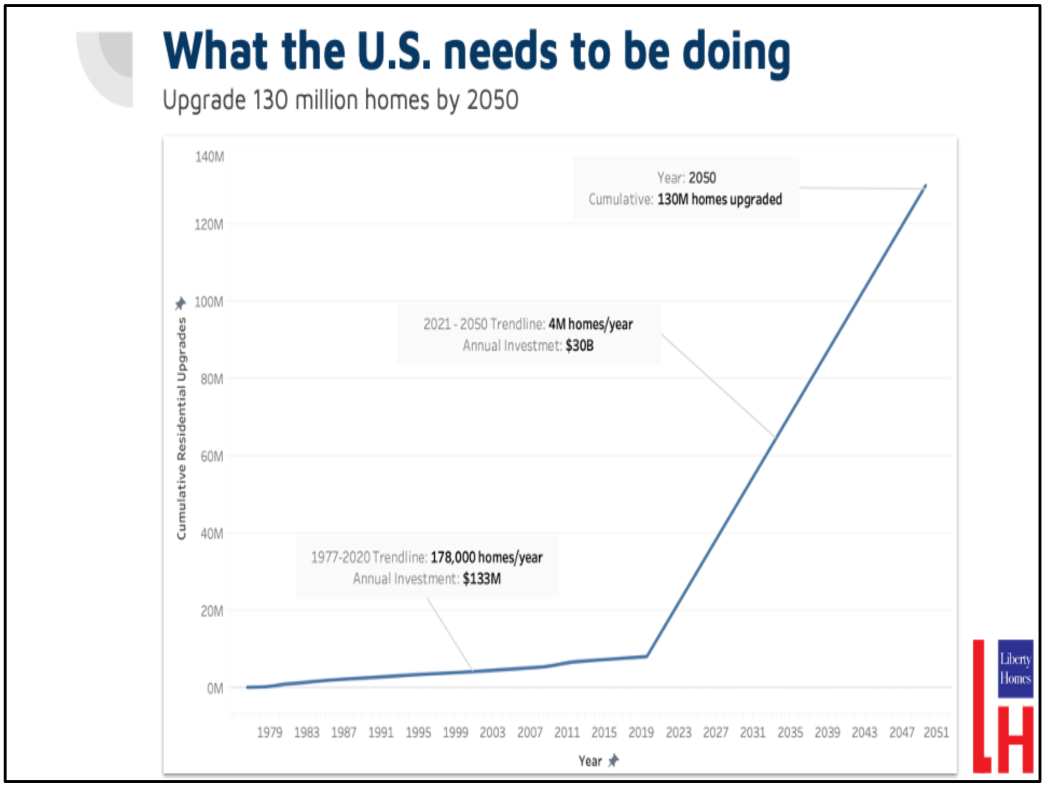
[1] Energy Efficiency Institute. Status Report. (2019). [2] Hummel, H., H. Lachman. Inclusive Financing. ACEEE. (2018). [3] Bickel, S, J. Ferguson. Utility Impact of PAYS. ACEEE. (2020). [4] EEtility Inc. Program data.

And to track with IPCC 1.5℃ scenario we NEED 90%

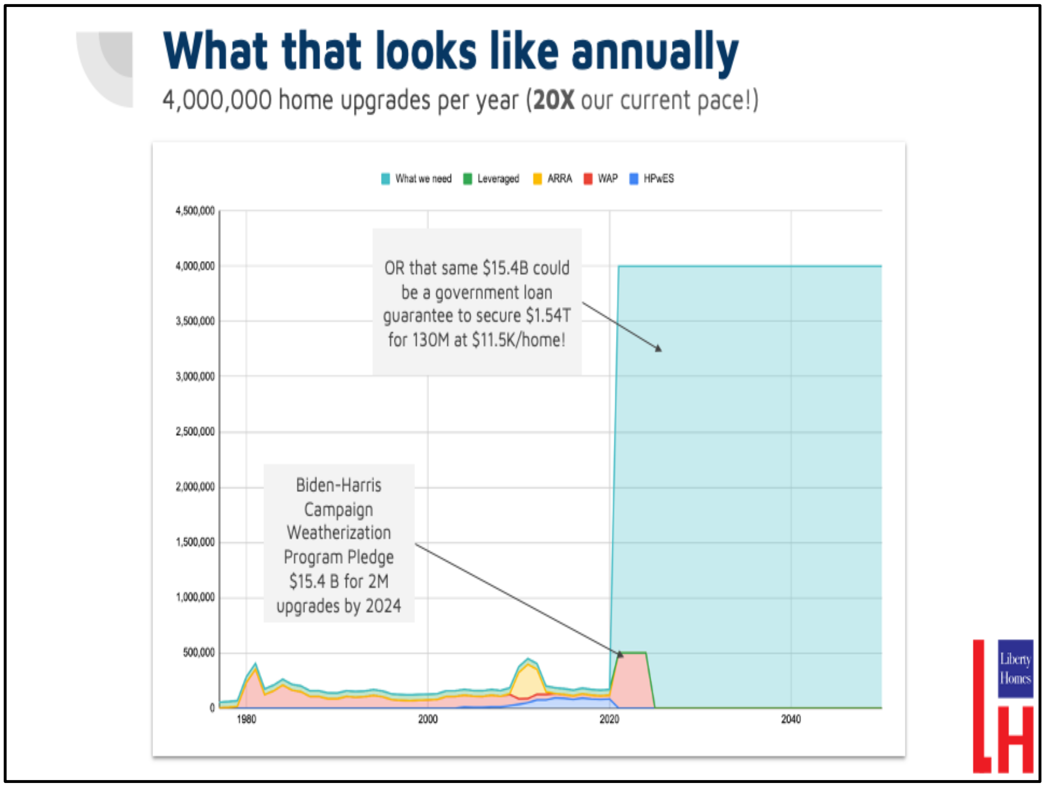


In order to keep global temperature rise below 1.5ºC, all existing residential buildings in the U.S. will need to achieve 80-90% household emission reduction by 2050.[1] To realize such deep decarbonization of all homes, each will require some combination of energy upgrades including: (a) building envelope and HVAC system efficiency improvements, (b) conversion of fossil-fuel-powered equipment to electric, (c) demand response devices that provide flexible electric loads and thermal storage, and (d) on-site renewable generation and battery storage.[1] Between 1937 and 2020, the U.S. government and electric and gas utilities have only cumulatively upgraded 7 million homes, or just 5% of the addressable market, and with only a fraction of the upgrade package above.[2] A major limiting factor in delivering comprehensive energy upgrades at scale has been utilities' reliance on personal financing of energy upgrades, as encouraged through rebate, incentive, and loan programs.[3] This approach excludes most low and middle-income households as well as the 36% of U.S. residents that rent, the 51% of residents with subprime credit scores, and anyone unable or unwilling to take on the risk of debt-obligation.[4] In short, the current approach is inequitable and undermines our ability to achieve the necessary emissions reduction for the residential sector.[5] Utility regulatory commissioners and policymakers are therefore seeking more equitable financing approaches that can overcome these longstanding accessibility barriers while also delivering home energy upgrades that generate the necessary energy savings and grid services quickly and at scale within the existing utility service model.[6,7]

1) IPCC. (2018). *Global Warming of 1.5°C.* 2) DOE. *WAP Briefing Book.* (2020). 3) DOE. Issue Brief: Low-income Financing. (2019). 4) Census Bureau. *American Community Survey.* (2017). 5) LBL. *Market & Behavioral Barriers to Efficiency.* (2011). 6) California Energy Commission. *Docket 16-0IR-02.* (2016). 7) NYSERDA. *New Efficiency*. (2018).



In order to achieve 130M homes upgrades by 2030, we need to dramatically increase the pace of upgrades on the order seen in the graph above . Between 2021 and 2050, we will need utilities to invest $30B a year to upgrade 4,000,000 homes per year (assuming each upgrade is roughly EEtility's average project size ~$7,500).



An annual volume of 4M upgrades per year is 20X our current pace. Are any weatherization plans this aggressive?

The Biden-Harris Plan pledges to upgrade a total of 2 million homes by 2024. That's 500,000 upgrades/yr. Using WAP's 2020 average upgrade amount of ~$7,700, the Biden plan would require $3.85 Billion a year.

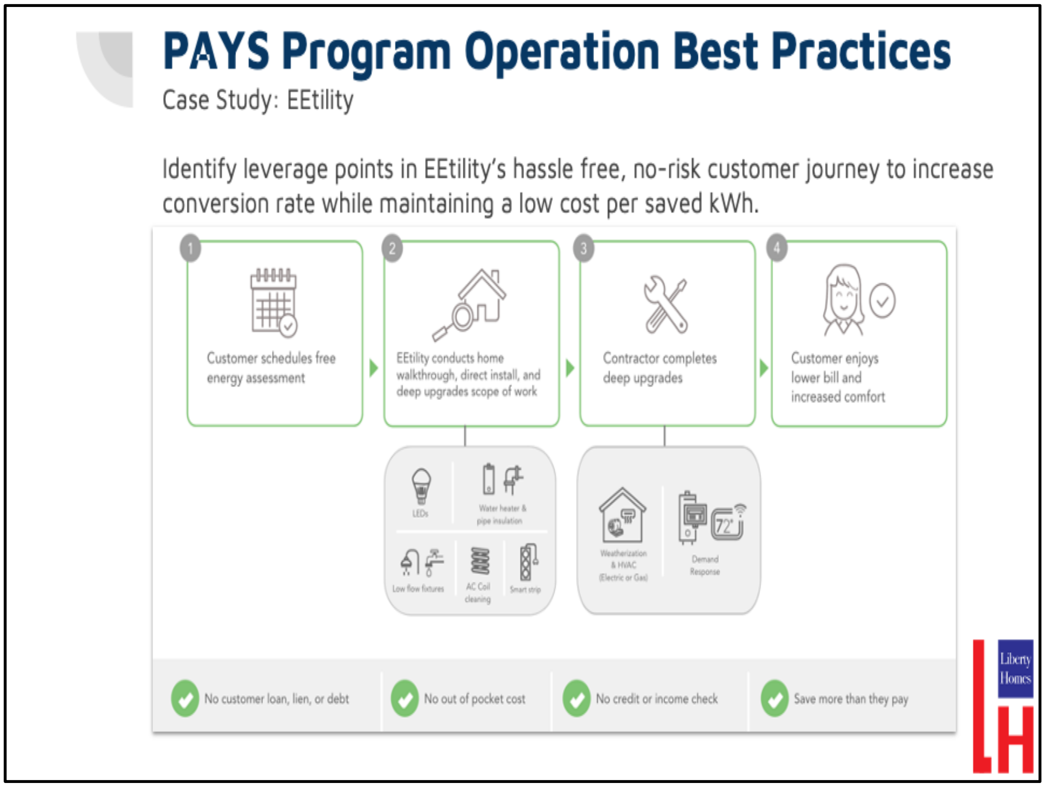
Instead of using $15.4 billion over 4 years to produce 2 million residential upgrades (1.5% of the U.S. housing stock), a future Biden-Harris administration allocated $15.4 billion for PAYS loan guarantees, it would support $1.54 Trillion dollars in PAYS investment! Why $1.54 Trillion dollars? To be conservative, assume the PAYS charge-off rate over time at scale is 1% (10x higher than the current program average of 0.1%), 1% losses on $1.54 Trillion would be $15.4 billion ($15.4B/0.01 = $1.54T).

With $1.54T at $11,500/home, we could upgrade 130 million homes! This means we could easily provide energy efficiency upgrades to all 130 million home and have $3,800 more additional funds per home to provide a more comprehensive upgrades such as renewable energy and storage.

Sources: The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future https://joebiden.com/clean-energy/#,

Money makes it possible, but it will take program operators across the nation to make it real!

An appropriately aggressive national plan is certainly part of the solution. Another crucial element is operationalizing these upgrades. For that, we need all program operators to implement the PAYS model with all its best practices that have been honed in the field thus far. This presentation now digs into a study on these best practices.



Yet, even with PAYS that generates record take rates (70% for past programs EEI), we still need program implementation and program design to maximize takerates while still keeping cost per kWh saved at a low, sustainable cost. Therefore, we need PAYS program operators to iterate and perfect program operation best practices. The next slides will showcase data from a real, boots-on-the-ground PAYS program operated who tested such program design practices aimed at maximizing take rates at reasonable cost and effort.

Field Implementation

EEtility Operation of Roanoke Electric Cooperative (REC) Upgrade to $ave in NC in 2019

Goal	Problem	Intervention	Result
Goal: Identify homes most likely to generate compelling offers	**Problem:** • Many homes have structural integrity issues (roof leak, mold, etc) & must be deferred • Self-selected participants don't necessarily have strong savings opportunities	**Intervention 1:** • Prescreen for structural integrity and provide alternative pathway for households w/ structural issues to re-enter PAYS pipeline • Focus outreach to households w/ high energy intensity (kWh/sqft)	**Result:** Increase number of no-copay offers
Goal: Decrease volume of "open" offers (increase take rate)	**Problem:** • Proliferation of scam calls depressed pick-up rate • Supposition offer is scam, "too good to be true"	**Intervention 2:** • Arrange for EEtility calls to come-up with REC's name and number in caller ID • Use REC branding and letterhead on 4 piece mailers	**Result:** 90% conversion rate

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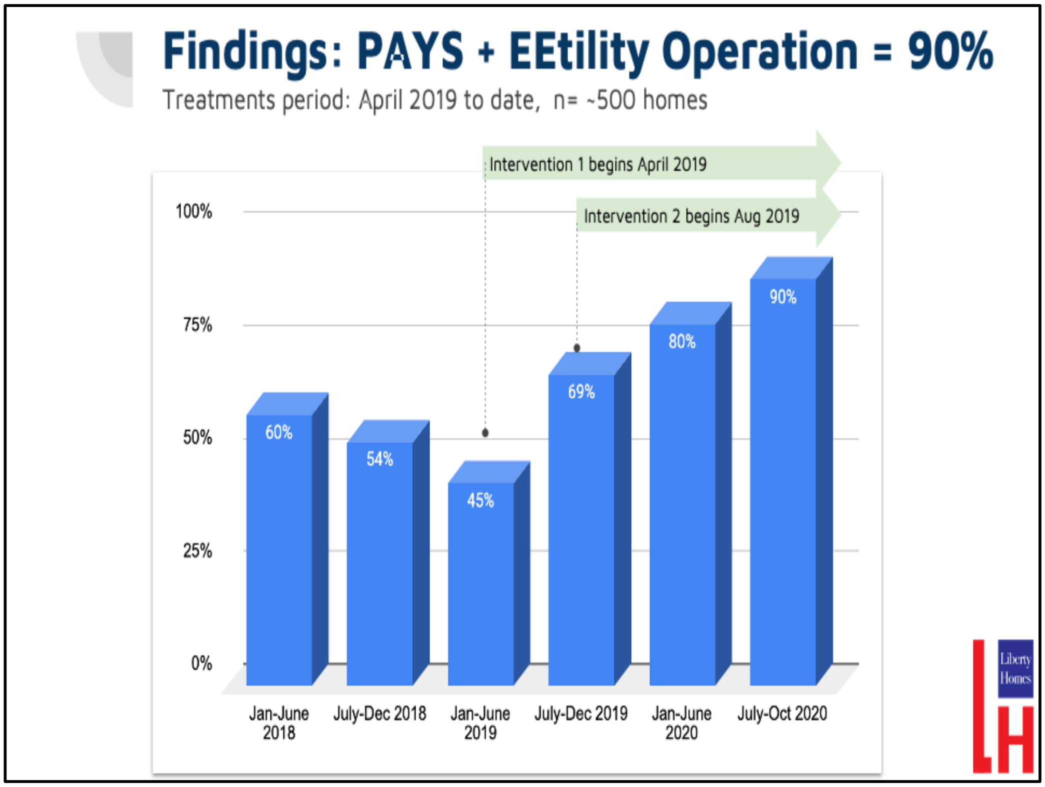

The tangible increase in take rates upon implementing the two treatments is an important find for energy efficiency program operators. By emulating such best practices or partnering with program operators that do, program implementers have less truck rolls, walk-throughs, and assessments per converted lead. There are also larger societal impacts from scaling programs with the ability to reach more homes at a faster pace. For instance, forty million homes currently experience energy poverty, so more immediate access to affordable energy upgrades would drastically reduce the energy burden on our nation's most vulnerable while also benefiting the planet.[18]

18) EIA. *Residential Energy Consumption Survey*. (2018).

Are these best practices scalable?

Evidence points to YES!

EEtility Program Administration Cost of Saved Electricity

$0.021/kWh

on par with the national average.

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TECHNICAL BRIEF

Table 1. Savings-weighted average total cost of saved electricity at the national level by market sector

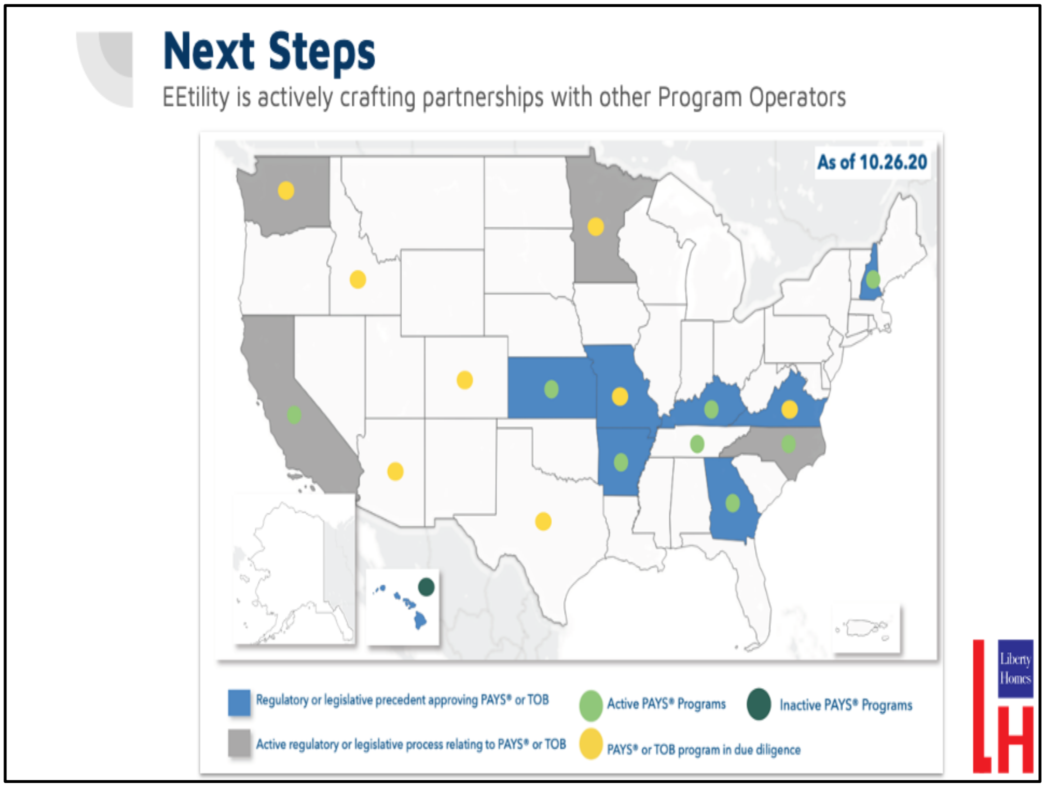
Sector	Program Administrator Cost of Saved Electricity (2012$/kWh)
All Sectors	$0.023
Residential	$0.019
Commercial, Industrial, and Agricultural	$0.025
Low Income	$0.134

Participant Satisfaction Survey (1=poor, 10=excellent)

- Participants rated their overall Program experience **9.4 out of 10**
- Participants rated the Program's HVAC Contractors service **9.2 out of 10**
- Participants rated the Program's WX Contractors service **9.7 out of 10**

Liberty Homes

Before we could truly conclude that these PAYS + EEtility Operational Best Practices were worth emulating, we needed to determine the cost of incorporating these treatments into EEtility's permanent operations. EEtility's Program Administrator Cost of Saved Electricity (all operation and overhead costs to the program operator such as direct installs and audits as well as the utility) averaged $0.021/kWh during the intervention implementation period. To put this into context, the low-income program average for the U.S. is $0.134 according to the LBNL graphs below from this report. EEtility's cost is 30% lower than the average for efficiency programs in general and 85% lower than the average cost for low-income programs. From this, we conclude that EEtility's program operation best practices and treatments described in this presentation are financially sustainable and competitive with all customer sectors: residential, commercial, low-income. Additionally, the high satisfaction ratings from contractors and participants provide evidence in support of the durability of this solution.



2020: The PAYS model + EEtility best practices are now being field tested in the following utility PAYS programs:

- Ouachita Electric Cooperative Corporation, AR
- Roanoke Electric Cooperative, NC
- Appalachian Electric Cooperative, TN
- City of LaGrange, GA
- Georgia Power, GA

2021: These best practices will be continued in EEtility's upcoming utility programs:

- BAYREN, CA (water efficiency)
- Ameren, MO

Additional opportunities to combine PAYS + these behavioral best practices are burgeoning in:

- City of Minneapolis, MN
- Colorado
- All Coops in Virginia (SB 754)
- CPUC

Resources

- PAYS Pals Newsletter to stay up to date on the field of inclusive tariffed based investment and cost recovery
- DOE Issue Brief on On-Bill Tariff Programs
- EPA Clean Energy Finance Tool
- SEEA Utility Guide to Tariffed On-Bill Programs
- For questions about this presentation, contact LibertyHomes Co-Founders Stephen (Stephen.bickel@libertyhomes.org) and Jill (Jill.ferguson@libertyhomes.org)
- If you're a utility (IOUs, munis, or coop) or program operator interested in partnering with EEtility, contact Tammy Agard, the Co-Founder and CEO of EEtility (Tammy.Agard@eetility.com).