CLEAN ENERGY WORKS

100% Targets Mean Reaching Everyone:

The Imperative for Inclusive Financial Solutions

ECEEE Summer Study Presentation

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CLEANENERGYWORKS

Clean Energy Works accelerates inclusive investments that open the clean energy economy to all.

At the ECEEE Summary Study this year, four papers offer a progression:

7-111-22	100% Targets Mean Reaching Everyone: The Imperative for Inclusive Financial Solutions	What is inclusive utility investment and why is it important to scale?
7-098-22 *Today 11:30am*	**Pay As You Save® System of Inclusive Utility Investment for Building Efficiency Upgrades: Reported and Evaluated Field Experience in the United States**	*What can we learn from the field experience broadly across multiple utilities?*
3-092-22 *Friday 9:30am*	**Utility Value of a Pay As You Save® Inclusive Utility Investment Program for Whole Home Energy Efficiency and Electrification Upgrades**	*What can we learn from a deep dive into the portfolio of a single utility?*
4-100-22	**Toward Residential Upgrade Savings Guarantees: An AMI-Based Diagnostic Interface**	*How can we validate savings, distinguishing behavior change and program performance?*

100% decarbonization targets mean reaching *everyone.*

In a race to capitalize clean energy upgrades in virtually every building…

the IPCC underscores that equity is an accelerant.

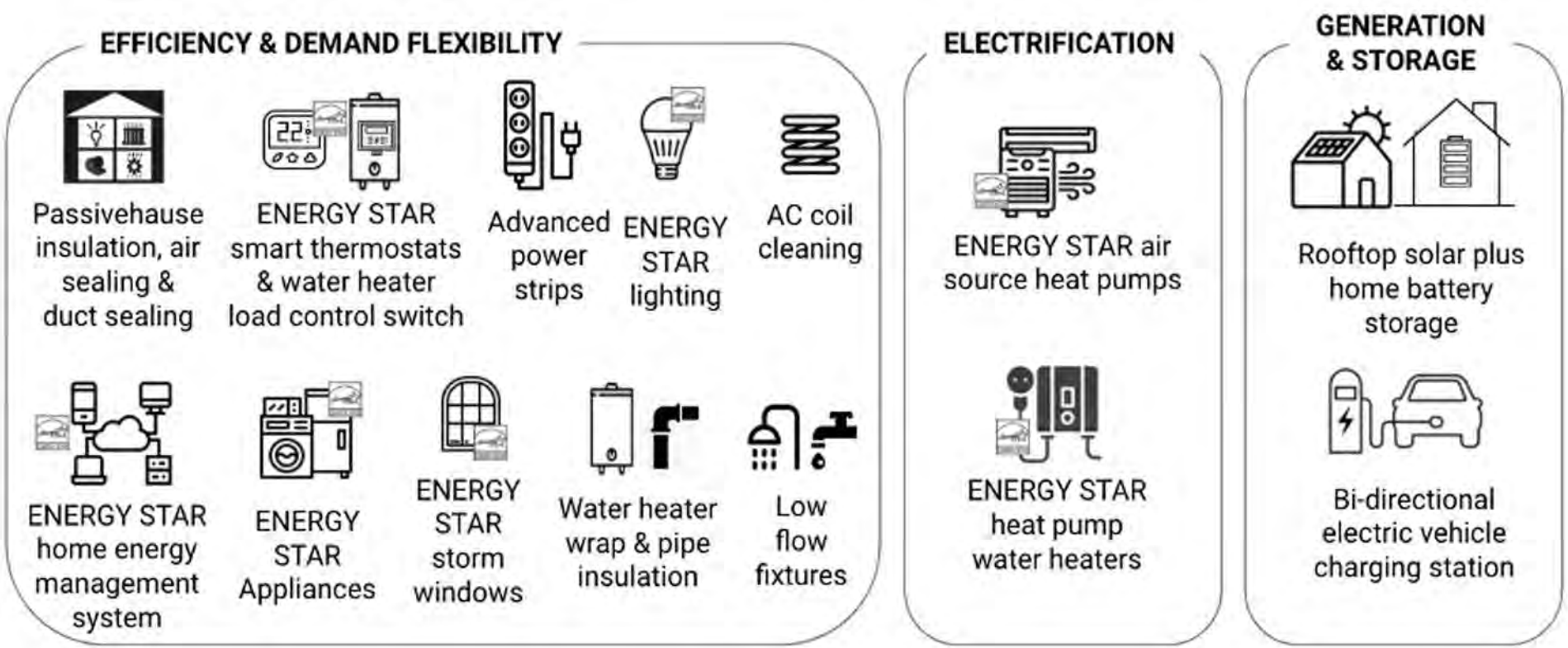
> **Equity can be an important enabler, increasing the level of ambition for accelerated mitigation (*high confidence*) {4.5}.** Equity deals with the distribution of costs and benefits and how these are
>
> **Explicit attention to equity and justice is salient to both social acceptance and fair and effective policymaking for mitigation (*high confidence*).** Distributional implications of alternative climate policy choices can be usefully evaluated at city, local and national scales as an input to policymaking. It is anticipated that institutions and governance frameworks that enable consideration of justice and just transitions can build broader support for climate policymaking. {13.2, 13.6, 13.8, 13.9}

Inclusive financial solutions mobilize investment *at scale.*

Source: IPCC Sixth Assessment Report, Working Group III, Summary

Imperative for Inclusive Financial Solutions

Upfront cost barriers affect the pace of deployment of essential energy upgrades in many economies



Funding and financing policies for efficiency upgrades in the U.S. are not achieving sufficient reach or scale

Three common categories of funding and financing:

1. Taxpayer funded government home upgrade programs for low-income households
2. Ratepayer funded utility rebates and incentives
3. Debt-based consumer financing for credit worthy homeowners

Funding and financing policies for efficiency upgrades in the U.S. are not achieving sufficient reach or scale

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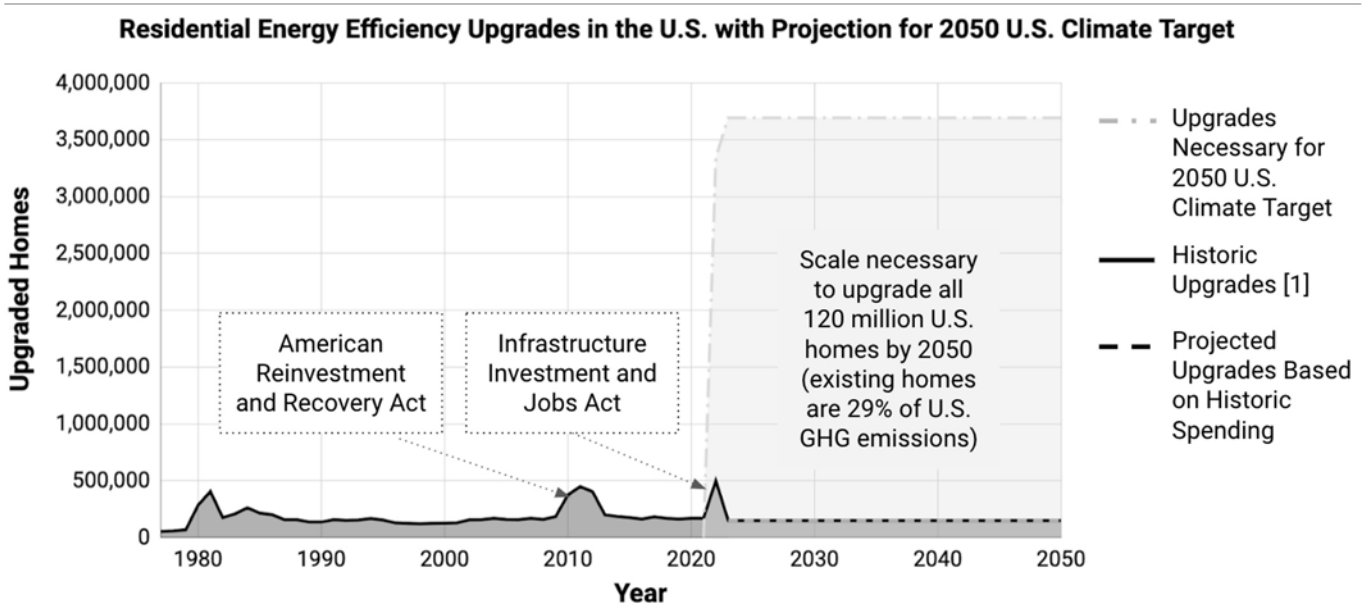
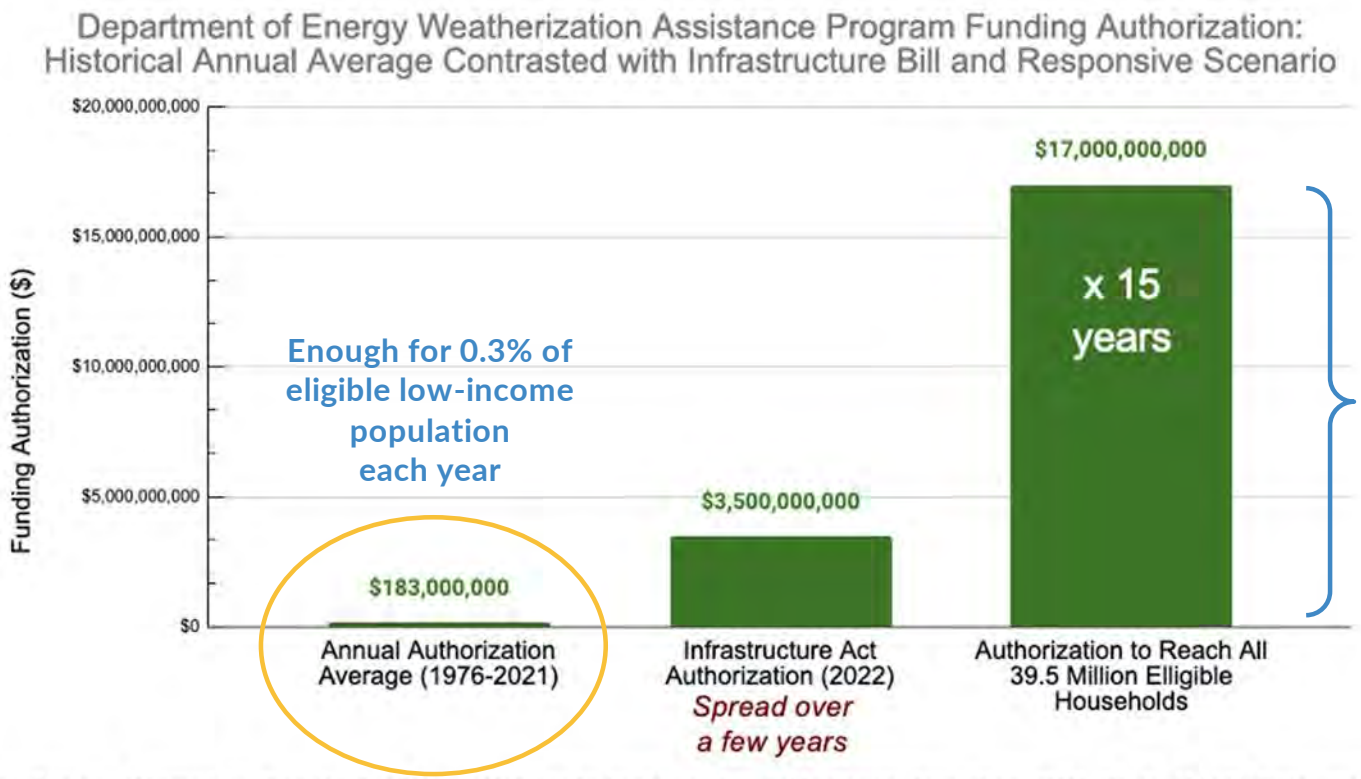
1. Funding levels overall are too small:
In the U.S., funding is ~20X below the scale needed to upgrade existing homes by 2050



[1] The annual number of residential upgrades funded in the past is estimated by dividing the following funding sources, without subtracting overhead costs that do not directly contribute to upgrades, by the average dollars per upgrade reported for each program: U.S. Department of Energy's Weatherization Assistance Program (WAP); U.S. Department of Health and Human Services' Low-income Home Energy Assistance Program (LIHEAP), specifically 15% of state LIHEAP block grants to fund WAP activities; Utility ratepayer funds collected from ratepayers and transferred to a public benefit fund, WAP state agency, or program run by WAP local agencies; State taxpayer funds from fees or taxes; and U.S. Environmental Protection Agency's Home Performance with ENERGY STAR participant spending.

Hummel, H., J.G. Ferguson, S Bickel. 100% Targets Mean Reaching Everyone: The Imperative for Inclusive Financial Solutions. 2022. ECEEE Summer Study Conference Proceedings (Accepted)

For low-income households, the federal funding rate has been ~100X smaller than needed

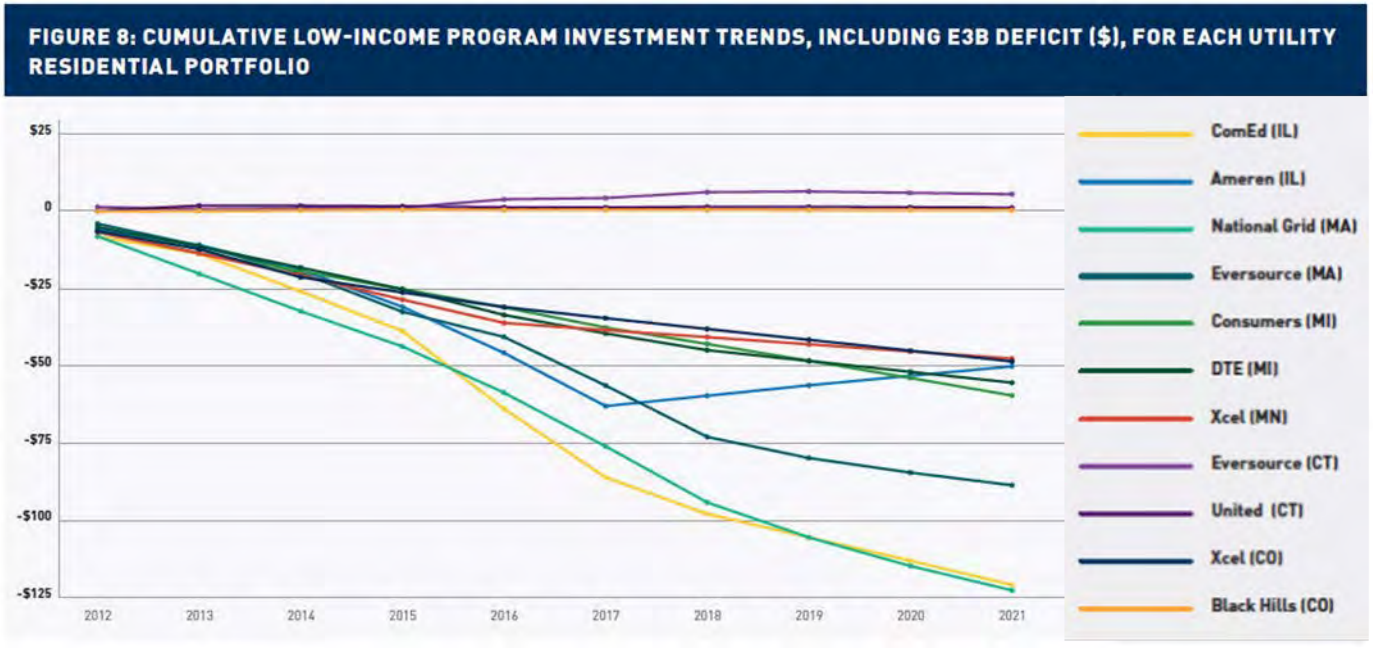


Estimated to be needed by the Senior Advisor for Energy Justice at the U.S. Department of Energy

Carley, Konisky, Reames. Section 2.1.1. of Policy Options to Enable an Equitable Energy Transition. 2021. Raimi, D (ed). Resources For the Future.

2. Utility ratepayer funded rebates and incentives are also not at the scale needed, and are not equitably distributed

Ratepayer funded programs face resistance due to upward pressure on rates, and many have disproportionately benefited higher income households.



A study of energy efficiency spending with ratepayer funds over the past decade by 11 large U.S. utilities shows the distribution is increasingly inequitable.

Urban Energy Justice Lab ; Reames et al. A Multi-State Analysis of Equity in Utility-Sponsored Energy Efficiency Investments for Residential Electric Customers. 2019

3. Financing home upgrades with loans has also had low market penetration

Observation on Loan Volume Data:
Maximum annual market penetration in a sample of 4 state-aided clean energy loan programs since inception is 0.1% of households in each state

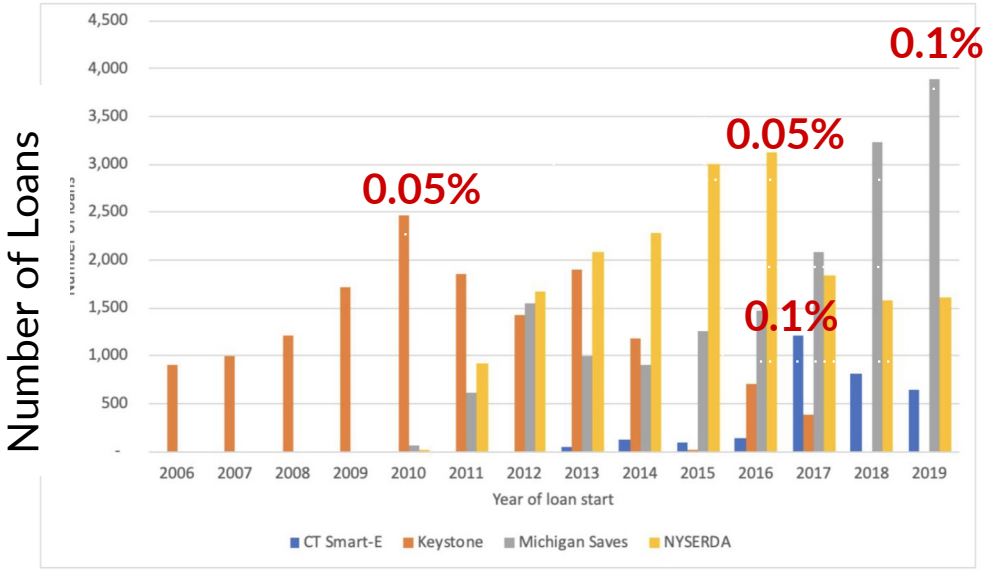
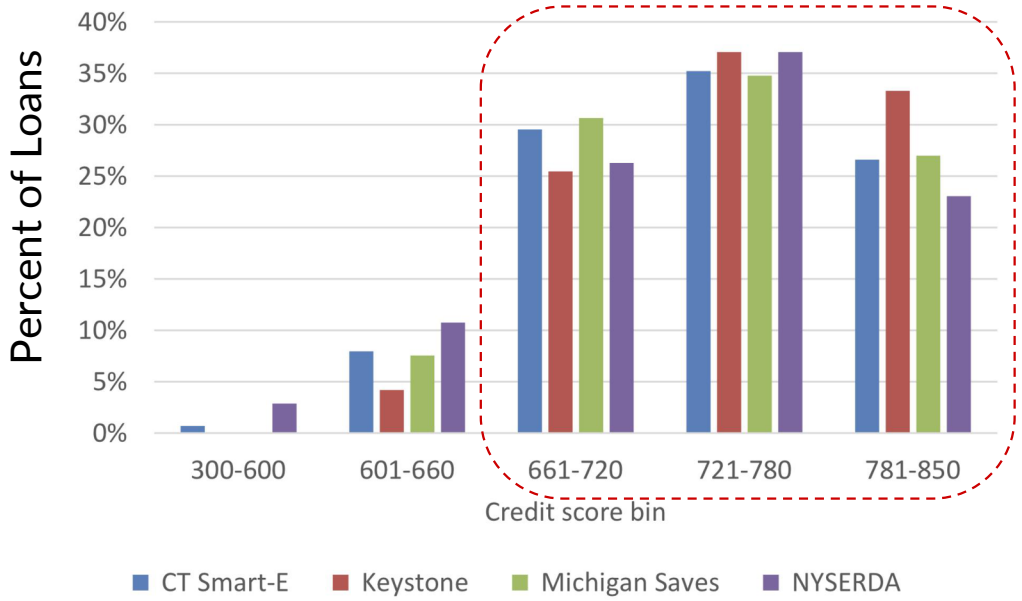


Figure 1. Loan volumes by program and vintage

Observation on Borrower Data:
90% of borrowers in the 4 programs studied had credit scores that were prime, super prime, and beyond super-prime



State and Local Energy Efficiency Action Network (SEE Action). (2021). Long-Term Performance of Energy Efficiency Loan Portfolios. Prepared by: Jeff Deason, Greg Leventis, and Sean Murphy of Lawrence Berkeley National Laboratory.

Barriers to participation have produced a gap that is wide, pervasive, and persistent despite government funding and state-backed financing.

Households reached with available taxpayer or ratepayer funding is limited	Everyone else is left without funding or finance	Households that are *qualified* and *willing* to access loans is limited

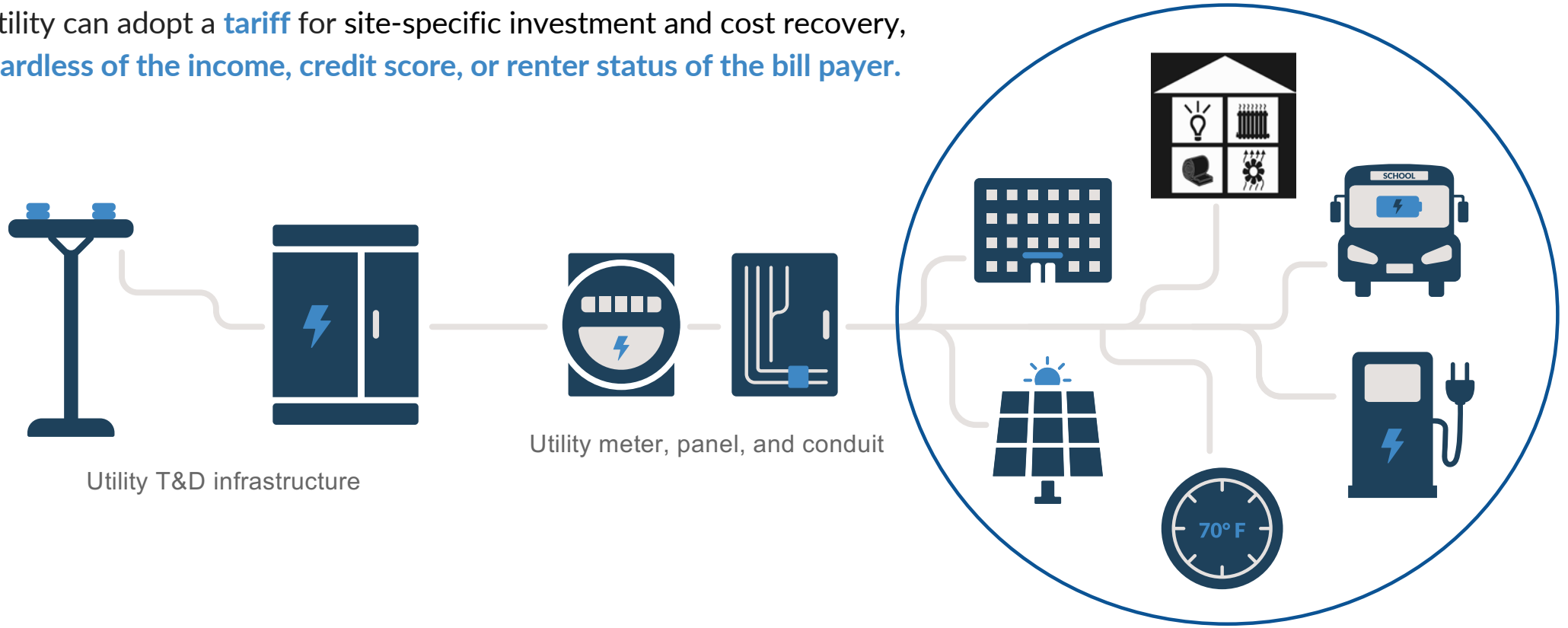
What fiscally sustainable financial solutions can assure that every household has at least one accessible and acceptable option to pay for cost effective energy upgrades?

Forrester, Sydney P., and Tony G. Reames. Understanding the Residential Energy Efficiency Financing Coverage Gap and Market Potential. Applied Energy 260. 2020. 114307. https://doi.org/10.1016/j.apenergy.2019.114307.

Inclusive Utility Investment

What is inclusive utility investment?

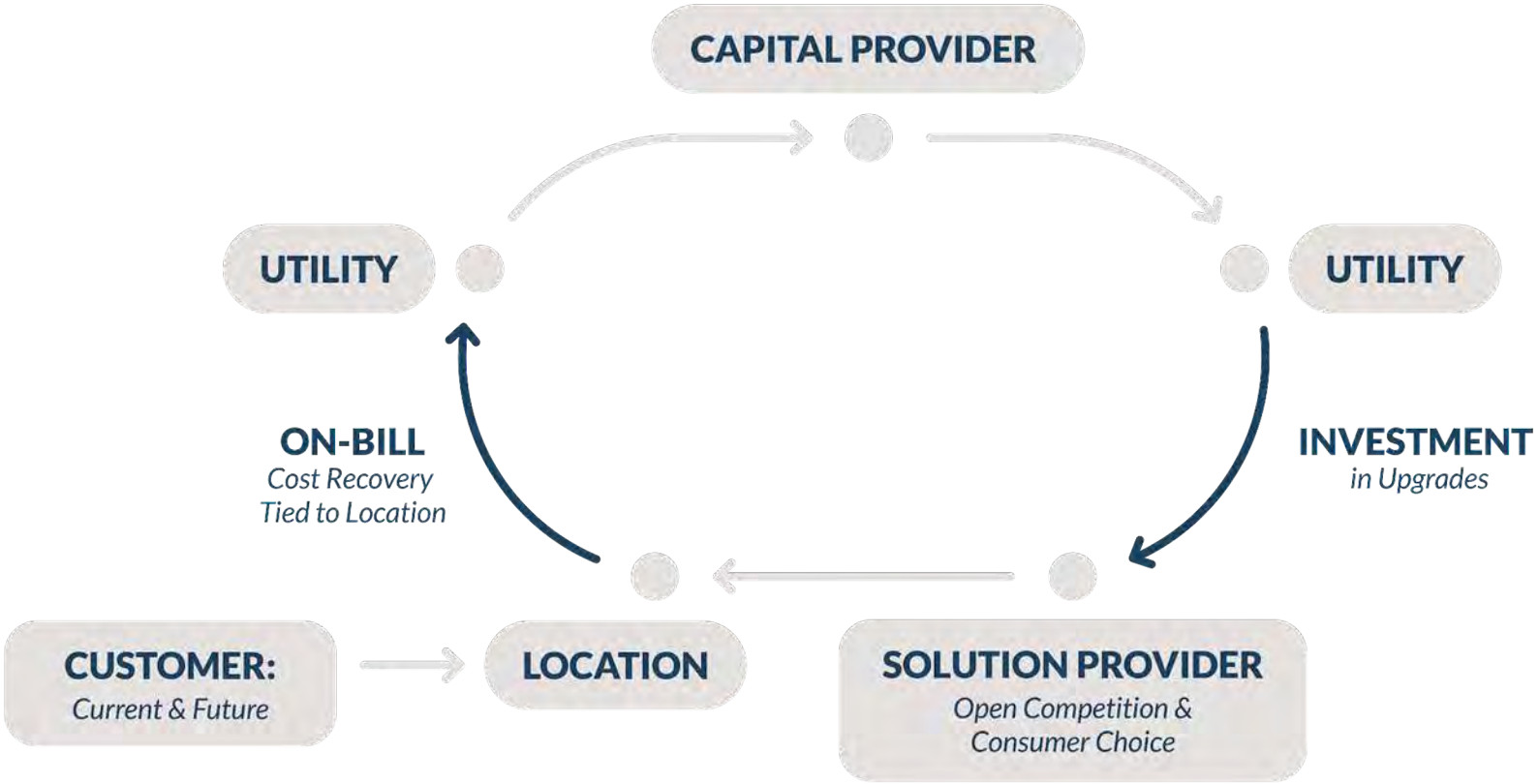
A utility can adopt a **tariff** for site-specific investment and cost recovery, **regardless of the income, credit score, or renter status of the bill payer.**



Utility T&D infrastructure

Utility meter, panel, and conduit

Inclusive Utility Investment: How it works



Experience is accumulating in multiple states and more are exploring a path to adoption. $170 Million already committed for inclusive utility investments over the next three years.

$50M Invested
as of 2021

23 Utilities

10 States

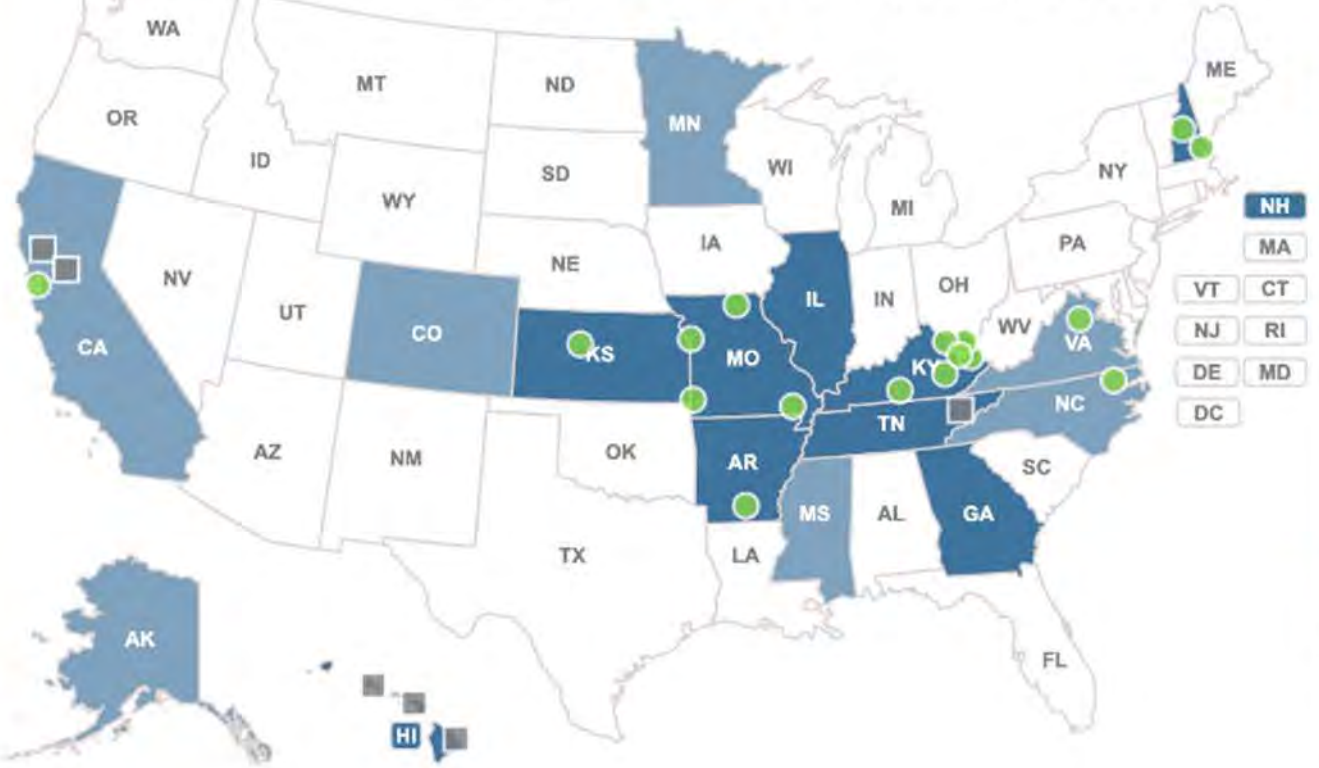
4,500
Single family

590
Multi-family

700 MUSH

$170M Committed
through 2023

Inclusive Utility Investment Using the Pay As You Save System: 2022 U.S. Program and Regulatory Landscape



Source: LibertyHomes

Pay As You Save®

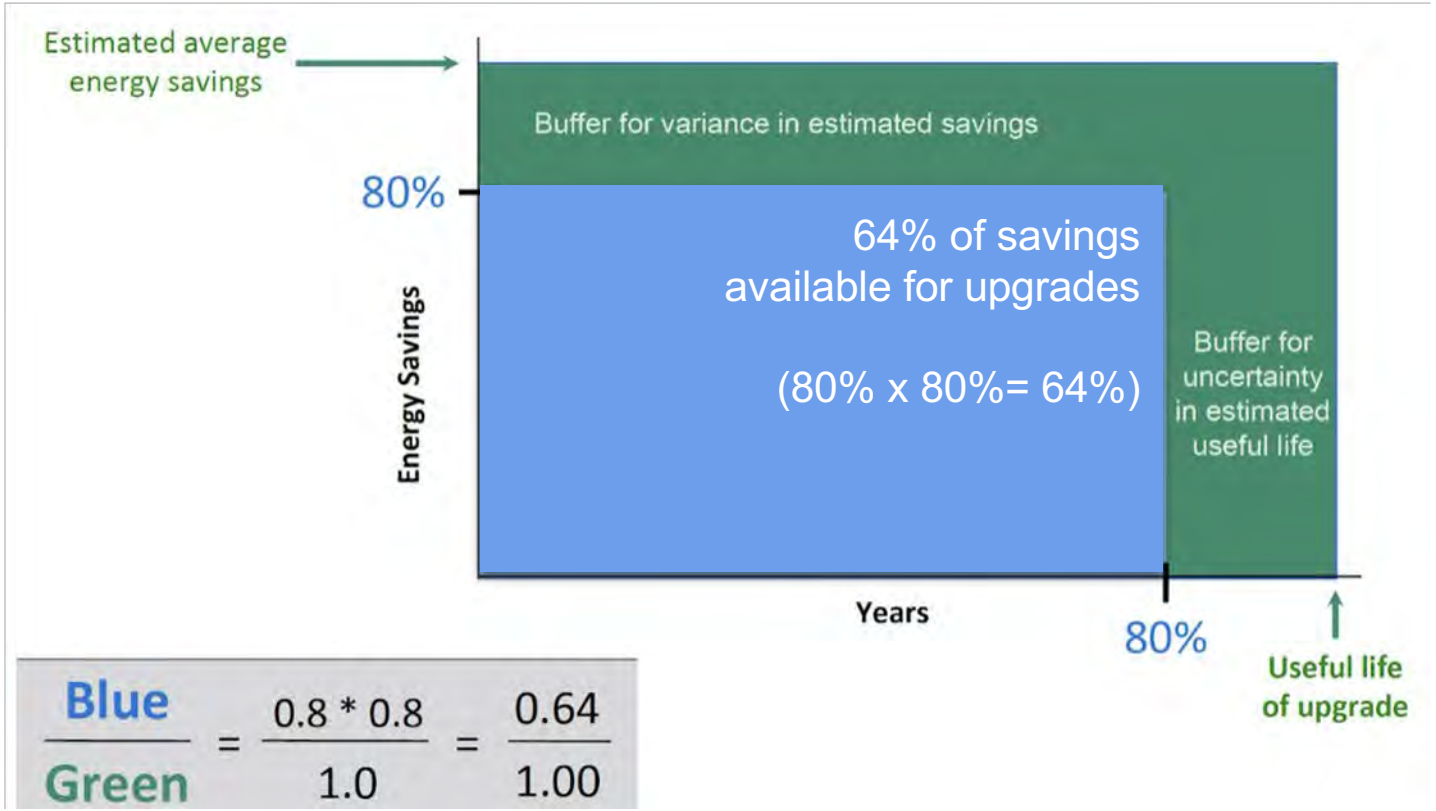
Pay As You Save® is a list of Essential Elements and Minimum Program Requirements designed to ensure strong consumer protections

Consumer Protections	Funding	On-Bill Loan	PAYS® Tariff
• No upfront participant cost	✓	✓	✓
• No credit or income qualification required			✓
• Renters are eligible			✓
• Estimated savings must exceed cost recovery charges			✓
• Cost recovery is through a fixed charge on the utility bill		✓	✓
• Payments end if upgrade fails and is not repaired			✓
• Cost recovery runs with the location and remains in effect for subsequent customers at that site until cost recovery is complete			✓

Pay As You Save program operation best practices

- Utility staff or their program operator conducts the energy audit (not the trade allies making the improvements)
- Utility uses 3rd party validated energy estimation software, calibrated at each site with 12 months of historical billing data, to develop the cost effective scope of work (again, not the trade allies)
- Post upgrade, 100% real-time remote quality assurance via geocoded time-stamped photographs before payment is released to trade allies that install the upgrades
- Volume pricing for equipment and installation that lower the cost of projects
- Monitoring of forward energy usage to help ensure consumption is in line with expectations and to identify anomalies

The Pay As You Save 80% Rule produces a margin to account for expected variation



$$\frac{\text{Blue}}{\text{Green}} = \frac{0.8 * 0.8}{1.0} = \frac{0.64}{1.00}$$

Example single story home upgraded with insulation, air sealing, and heat pump

Investment:	$10,000
Cost Recovery Period:	13 years
Cost of Capital:	3%
Estimated Savings:	$100 / month
Charge:	-$80 / month
Net Savings to Customer:	$20 / month, ~20% of savings
Energy Savings:	4,000 kWh / year

Source: Briefing by Mountain Association, the program operator for the How$martKY program. This sample has conveniently round numbers; home efficiency upgrades are typically ~$7500.

Reported program performance indicates that PAYS can deploy capital at a scale that is 20X more than loans within a comparable market

Result is 2 x 5 x 2 = 20 times that of loans

Replicability in other countries

Countries with utilities or other entities that have the following enabling features can directly replicate this approach

- **Tariff authority** for site-specific investment and cost recovery at each metered location
- Authority to **disconnect for non-payment**
- Can make investment decisions based on **savings potential** of the upgrade **NOT the financial standing of the occupant**
    - (unlike ESCOs and other market based approaches that have exclusive qualifying criteria)
- Access to **large amounts of low cost capital**
- **Existing commercial relationship** with every metered location
- Existing access to historical and future **usage data**

Path to adoption of an approved utility tariff can take multiple routes

Examples from four states:

1. **Missouri:** Utility consumer advocate recommended PAYS → Utility Commission directed utilities to propose a tariff → All regulated utilities launched PAYS programs

1. **California:** State Energy Office study recommended tariff based utility investment → Utility Commission ordered rule-making (now underway) → Utilities are working to propose a tariff.

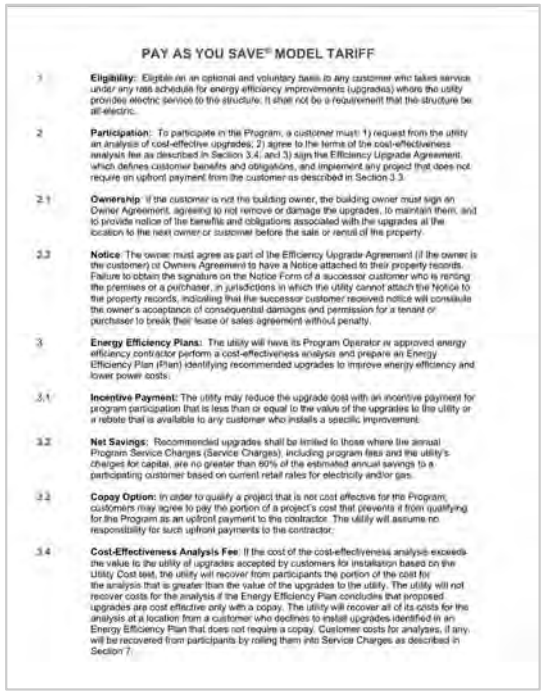
1. **Illinois**: Governor signed a law requiring the Utility Commission to direct its regulated utilities to implement a program in accordance with PAYS

1. **North Carolina:** When a large utility requested a rate hike, public interest stakeholders negotiated for PAYS → they are now co-designing a PAYS program with the utility

What would be the appropriate steps in your jurisdiction?

International Context:
Determining whether utility investment is adaptable to your regulatory structure

The creators of the PAYS system have produced public domain documents, including a model tariff and information on consumer protections, and these can aid adaptation to other jurisdictions.



PAY AS YOU SAVE® MODEL TARIFF

1 **Eligibility:** Eligible on an optional and voluntary basis to any customer who takes service under any rate schedule for energy efficiency improvements (upgrades) where the utility provides electric service to the structure. It shall not be a requirement that the structure be all-electric.

2 **Participation:** To participate in the Program, a customer must: 1) request from the utility an analysis of cost-effective upgrades; 2) agree to the terms of the cost-effectiveness analysis fee as described in Section 3.4; and 3) sign the Efficiency Upgrade Agreement, which defines customer benefits and obligations, and implement any project that does not require an upfront payment from the customer as described in Section 3.3.

2.1 **Ownership:** If the customer is not the building owner, the building owner must sign an Owner Agreement, agreeing to not remove or damage the upgrades, to maintain them, and to provide notice of the benefits and obligations associated with the upgrades at the location to the next owner or customer before the sale or rental of the property.

2.2 **Notice:** The owner must agree as part of the Efficiency Upgrade Agreement (if the owner is the customer) or Owners Agreement to have a Notice attached to their property records. Failure to obtain the signature on the Notice Form of a successor customer who is renting the premises or a purchaser, in jurisdictions in which the utility cannot attach the Notice to the property records, indicating that the successor customer received notice will constitute the owner's acceptance of consequential damages and permission for a tenant or purchaser to break their lease or sales agreement without penalty.

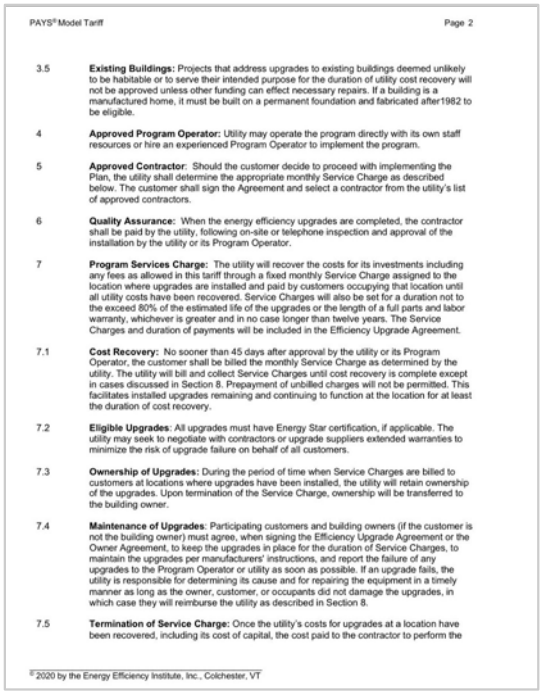
3 **Energy Efficiency Plans:** The utility will have its Program Operator or approved energy efficiency contractor perform a cost-effectiveness analysis and prepare an Energy Efficiency Plan (Plan) identifying recommended upgrades to improve energy efficiency and lower power costs.

3.1 **Incentive Payment:** The utility may reduce the upgrade cost with an incentive payment for program participation that is less than or equal to the value of the upgrades to the utility or a rebate that is available to any customer who installs a specific improvement.

3.2 **Net Savings:** Recommended upgrades shall be limited to those where the annual Program Service Charges (Service Charges), including program fees and the utility's charges for capital, are no greater than 80% of the estimated annual savings to a participating customer based on current retail rates for electricity and/or gas.

3.3 **Copay Option:** In order to qualify a project that is not cost effective for the Program, customers may agree to pay the portion of a project's cost that prevents it from qualifying for the Program as an upfront payment to the contractor. The utility will assume no responsibility for such upfront payments to the contractor.

3.4 **Cost-Effectiveness Analysis Fee:** If the cost of the cost-effectiveness analysis exceeds the value to the utility of upgrades accepted by customers for installation based on the Utility Cost test, the utility will recover from participants the portion of the cost for the analysis that is greater than the value of the upgrades to the utility. The utility will not recover costs for the analysis if the Energy Efficiency Plan concludes that proposed upgrades are cost effective only with a copay. The utility will recover all of its costs for the analysis at a location from a customer who declines to install upgrades identified in an Energy Efficiency Plan that does not require a copay. Customer costs for analyses, if any, will be recovered from participants by rolling them into Service Charges as described in Section 7.



3.5 **Existing Buildings:** Projects that address upgrades to existing buildings deemed unlikely to be habitable or to serve their intended purpose for the duration of utility cost recovery will not be approved unless other funding can effect necessary repairs. If a building is a manufactured home, it must be built on a permanent foundation and fabricated after1982 to be eligible.

4 **Approved Program Operator:** Utility may operate the program directly with its own staff resources or hire an experienced Program Operator to implement the program.

5 **Approved Contractor**: Should the customer decide to proceed with implementing the Plan, the utility shall determine the appropriate monthly Service Charge as described below. The customer shall sign the Agreement and select a contractor from the utility's list of approved contractors.

6 **Quality Assurance:** When the energy efficiency upgrades are completed, the contractor shall be paid by the utility, following on-site or telephone inspection and approval of the installation by the utility or its Program Operator.

7 **Program Services Charge:** The utility will recover the costs for its investments including any fees as allowed in this tariff through a fixed monthly Service Charge assigned to the location where upgrades are installed and paid by customers occupying that location until all utility costs have been recovered. Service Charges will also be set for a duration not to the exceed 80% of the estimated life of the upgrades or the length of a full parts and labor warranty, whichever is greater and in no case longer than twelve years. The Service Charges and duration of payments will be included in the Efficiency Upgrade Agreement.

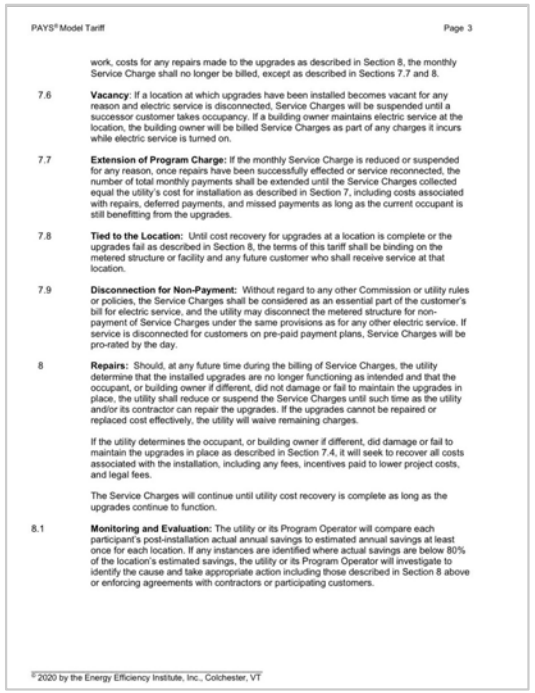
7.1 **Cost Recovery:** No sooner than 45 days after approval by the utility or its Program Operator, the customer shall be billed the monthly Service Charge as determined by the utility. The utility will bill and collect Service Charges until cost recovery is complete except in cases discussed in Section 8. Prepayment of unbilled charges will not be permitted. This facilitates installed upgrades remaining and continuing to function at the location for at least the duration of cost recovery.

7.2 **Eligible Upgrades**: All upgrades must have Energy Star certification, if applicable. The utility may seek to negotiate with contractors or upgrade suppliers extended warranties to minimize the risk of upgrade failure on behalf of all customers.

7.3 **Ownership of Upgrades:** During the period of time when Service Charges are billed to customers at locations where upgrades have been installed, the utility will retain ownership of the upgrades. Upon termination of the Service Charge, ownership will be transferred to the building owner.

7.4 **Maintenance of Upgrades**: Participating customers and building owners (if the customer is not the building owner) must agree, when signing the Efficiency Upgrade Agreement or the Owner Agreement, to keep the upgrades in place for the duration of Service Charges, to maintain the upgrades per manufacturers' instructions, and report the failure of any upgrades to the Program Operator or utility as soon as possible. If an upgrade fails, the utility is responsible for determining its cause and for repairing the equipment in a timely manner as long as the owner, customer, or occupants did not damage the upgrades, in which case they will reimburse the utility as described in Section 8.

7.5 **Termination of Service Charge:** Once the utility's costs for upgrades at a location have been recovered, including its cost of capital, the cost paid to the contractor to perform the



work, costs for any repairs made to the upgrades as described in Section 8, the monthly Service Charge shall no longer be billed, except as described in Sections 7.7 and 8.

7.6 **Vacancy**: If a location at which upgrades have been installed becomes vacant for any reason and electric service is disconnected, Service Charges will be suspended until a successor customer takes occupancy. If a building owner maintains electric service at the location, the building owner will be billed Service Charges as part of any charges it incurs while electric service is turned on.

7.7 **Extension of Program Charge:** If the monthly Service Charge is reduced or suspended for any reason, once repairs have been successfully effected or service reconnected, the number of total monthly payments shall be extended until the Service Charges collected equal the utility's cost for installation as described in Section 7, including costs associated with repairs, deferred payments, and missed payments as long as the current occupant is still benefitting from the upgrades.

7.8 **Tied to the Location:** Until cost recovery for upgrades at a location is complete or the upgrades fail as described in Section 8, the terms of this tariff shall be binding on the metered structure or facility and any future customer who shall receive service at that location.

7.9 **Disconnection for Non-Payment:** Without regard to any other Commission or utility rules or policies, the Service Charges shall be considered as an essential part of the customer's bill for electric service, and the utility may disconnect the metered structure for non-payment of Service Charges under the same provisions as for any other electric service. If service is disconnected for customers on pre-paid payment plans, Service Charges will be pro-rated by the day.

8 **Repairs:** Should, at any future time during the billing of Service Charges, the utility determine that the installed upgrades are no longer functioning as intended and that the occupant, or building owner if different, did not damage or fail to maintain the upgrades in place, the utility shall reduce or suspend the Service Charges until such time as the utility and/or its contractor can repair the upgrades. If the upgrades cannot be repaired or replaced cost effectively, the utility will waive remaining charges.

If the utility determines the occupant, or building owner if different, did damage or fail to maintain the upgrades in place as described in Section 7.4, it will seek to recover all costs associated with the installation, including any fees, incentives paid to lower project costs, and legal fees.

The Service Charges will continue until utility cost recovery is complete as long as the upgrades continue to function.

8.1 **Monitoring and Evaluation:** The utility or its Program Operator will compare each participant's post-installation actual annual savings to estimated annual savings at least once for each location. If any instances are identified where actual savings are below 80% of the location's estimated savings, the utility or its Program Operator will investigate to identify the cause and take appropriate action including those described in Section 8 above or enforcing agreements with contractors or participating customers.

International Context:
Determining whether utility investment is adaptable to your regulatory structure

- **Retail competition is compatible** with inclusive utility investment if the investing utility can be assured a path to cost recovery.
- Utilities with **multi-national service areas**, like Engie and Enel, can accelerate spread of adoption.
- Both **energy and water utilities** have used PAYS
- **International Example:** Energy Efficiency Services Limited (EESL), a public-private joint venture in India, implemented the first large scale Pay As You Save program to install 100 million LEDs, offering to pay the $1.50 and recovering over 18 months

Much Potential for Adaptability!

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Thank You

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