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Inclusive utility investment

A literature review, summary of regional efforts, and recommendations for Massachusetts

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Acronyms and abbreviations

OBR	On-bill repayment
OBF	On-bill financing
IUI	Inclusive utility investment
TOB	Tariffed on-bill investment
PAYS	Pay As You Save®
IOU	Investor-owned utility
Muni	Publicly-owned utility (city) or municipal utility
MLP	Municipal light plant
Coop	Cooperative utility or electric co-op
R-PACE	Residential Property Assessed Clean Energy
LIHEAP	Low-income Home Energy Assistance Program

Executive summary

Switching to energy-efficient home appliances can introduce a number of benefits to households across the country, including a reduction in energy bills, an improvement in air quality, and a more comfortable heating/cooling supply. With household emissions making up more than 40 percent of the country's energy-related emissions, residential electrification is one of the most effective ways individuals can make a positive impact (Environmental Protection Agency 2023; Rewiring America 2024).[1]

However, the upfront costs of equipment adoption and weatherization can prohibit households that would benefit the most from making the switch to efficient electric machines. Even with the rebates and incentives from the historic Inflation Reduction Act (IRA), energy-burdened and low-to moderate-income households often struggle to afford upgrades. Residents without sufficient tax liability may not be able to claim the tax credits the IRA offers. Additionally, renters who may be interested in electrification face the challenge of getting property owners to pay for upgrades that will benefit the tenant, not themselves, a dynamic that researchers refer to as the "split incentive problem" (Bird and Hernández 2012). The barriers of the split incentive problem and high upfront costs with varyingly available incentives constrain households eager to realize the benefits of electrification, while also slowing down the pace of progress (Rewiring America 2023) needed to achieve climate goals.

Financial solutions have rapidly expanded in the past few years to reduce upfront costs and make electrification accessible to low- to moderate-income and energy-burdened households. While traditional consumer loans dominate the residential financing market for energy efficiency, alternative financial models have grown to include renters and residents with low to no credit in the transition to electric, efficient machines. "On-bill" mechanisms are one such alternative model.

On-bill financing or on-bill repayment (OBR) loan programs allow residents to receive energy efficient upgrades from a lender with the cost repaid as a line item on their utility bill. OBR programs extend a personal debt obligation. Tariffed on-bill investment (TOB) — known more commonly as inclusive utility investment (IUI) programs — are similar to OBR programs in that they allow residents to repay the cost of upgrades on their monthly utility bill. However, inclusive utility investment programs are not loan programs, because utilities

[1] Rewiring America has analyzed data from the Environmental Protection Agency (EPA)'s 2023 Annual Greenhouse Gas Inventory to calculate the percentage of emissions attributable to households, separating non-household related transportation and fossil fuel production emissions from the EPA's initial figures and determining that 42 percent of emissions are related to household energy use for heating and cooling homes, heating water, cooking, drying clothes, and driving.

pay upfront for upgrades and recoup their cost from the household using that utility meter, regardless of who is living in the household at the time.

This literature review explores inclusive utility investments as a viable alternative resource for residents who may not be able to afford the upfront costs of electrification upgrades that generate lifetime savings, may not have access to adequate incentives or personal market-rate loans, and/or may rent rather than own the property they seek to electrify. First, the literature review distinguishes inclusive utility investments and Pay As You Save® (PAYS) (a branded type of inclusive utility investments) from traditional on-bill financing, also known as on-bill loan repayment (OBR). It also outlines the relative benefits of this investment type, including more robust consumer protections, more equitable eligibility requirements, and a stronger commitment to energy savings. Then, it acknowledges some of the consumer and utility risks associated with inclusive utility investments, along with potential strategies to resolve these risks. The following section outlines scaling challenges and solutions for building enduring programs. Finally, the literature review opens up to consider region-specific efforts and present policy recommendations to expand inclusive utility investment in Massachusetts.

Definitions

On-bill repayment/on-bill loans (OBR)

Traditional on-bill financing most commonly refers to on-bill repayment loan programs that resemble a typical personal loan structure, often relying on a high FICO credit score (min. 640) and a debt-to-income ratio (max. 50 percent). Unlike a traditional loan that a borrower might repay directly to the lender, residents repay an on-bill financing debt through their monthly utility bill (Hummel and Lachman 2018). On-bill repayment programs do not provide as strong a commitment to bill neutrality (ensuring payments are equal to or less than estimated savings) as other on-bill financial solutions, and they are primarily funded and administered by third-party lenders with relatively limited involvement from utilities (Le 2010).

Inclusive utility investment (IUI)

Inclusive utility investment may share the “on-bill” title with on-bill repayment loans and traditional on-bill financing programs, but they are entirely separate financial solutions. The only similarity between these programs is that they include a charge on the monthly utility bill: inclusive utility investment participants pay a service charge, while on-bill repayment participants pay a debt repayment charge. Inclusive utility investment programs are unique in that they **do not create a personal debt**

obligation for residents. Instead, a utility uses its own funding and/or third-party funding to pay up front for a qualified resident's energy upgrade(s). Then, the utility recovers these upfront costs (sometimes with an approved rate of return) through a fixed charge (a tariff) that appears on a customer's monthly utility bill. Inclusive utility investment programs do not require credit checks, and may involve little to no upfront costs. They also ensure the fixed monthly service charges and cost recovery periods won't mean residents pay more than they will save annually on energy bills as a result of the upgrade, or pay for longer than the lifespan of the new machine. (Clean Energy Works 2023).

Pay As You Save (PAYS)®

The Pay As You Save (PAYS) model is a program design of inclusive utility investment that has been trademarked by the Energy Efficiency Institute Inc., (EEI); It caps monthly charge amounts at 80 percent of the estimated annual energy savings and caps cost recovery periods at 80 percent of the upgraded equipment lifetime.

Key findings

- Compared to traditional financial products and alternative models such as Residential Property Assessed Clean Energy (R-PACE) and on-bill repayment, which render consumers vulnerable to foreclosure and equipment repossession, **inclusive utility investment and Pay As You Save pose minimal risks to residents — as they eliminate the need for credit checks, prioritize energy savings, and allow the monthly charges to transfer to a new resident.**
- Still, it is important to acknowledge that these programs may carry their own set of **risks and concerns** for customers, utilities, and capital providers, and aspiring program administrators may want to address these in their program design with robust protections. For instance, inclusive utility investment and Pay As You Save participants may lose electrical service if realized savings do not match anticipated savings and, as a result, they are unable to pay their utility bill (including the service charge). Also, programs may not always provide clear long-term paths for **quality control and customer satisfaction.**
  - → To minimize these risks, utilities and program administrators can design inclusive utility investment and Pay As You Save programs to be **compatible with budget billing** to offer customers fixed monthly payments (avoiding seasonal bill spikes), **arrearage management programs** that allow customers to enroll in payment plans or utility debt forgiveness, **income-based discounted electrical rate programs,** and existing **bill assistance programs** such as LIHEAP.

- → While utilities are unable to guarantee savings, they may **refine savings modeling** to generate more accurate predictions and conduct post-installation evaluations to monitor equipment performance. Administrators may also consider **modifying charge amounts or reimbursing residents** (if program funds allow) in cases where energy savings are not as high as initially estimated.
- → Program administrators should also take responsibility for **long-term maintenance, quality control, and customer service** regarding upgrades. That includes offering residents extended **equipment warranties, free or discounted maintenance plans**, and simple and accessible **processes to raise complaints** and **resolve outstanding equipment issues** (Energy Star 2025).

- Inclusive utility investment and Pay As You Save programs often struggle to scale and secure funding beyond their initial pilot phases. Program administrators may find it **difficult to obtain low-cost and long-term funding,** while **smaller utilities** (Munis and co-ops) may **not have enough internal reserves** to sustain programs on their own.
- More generally, **utilities may worry about negative public perception** if program participants are unable to pay their utility bills and face service disconnection (Kramer 2014: 20). What's more, utilities may **find it costly to build billing and payment processing infrastructure** to sustain on-bill efforts. However, the **consistently low rates of nonpayment** for these programs and consumer protections, including pairing inclusive utility investment cost recovery with bill assistance efforts, can minimize the risk of service disconnection (and negative public perception). Also, **utilities may access municipal or state funds to pay for infrastructure costs.** To scale programs beyond their pilot phase, utilities may access varying capital sources, including **reserve funds, state-based LLRs and loan guarantees, USDA loans, and many more.**

Comparing on-bill schemes

On-bill financial solutions have differing positions on eligibility criteria, commitments to energy savings, and cost recovery, making inclusive utility investment, Pay As You Save, and on-bill repayment nominally and programmatically distinct.

On-bill repayment (OBR)

On-bill repayment, or on-bill loan programs, offer more traditional consumer financing by extending a personal debt obligation directly to residents that is repaid as a line item on their utility bill. Third-party lenders primarily fund and administer these programs with relatively limited involvement from utilities. As such, these programs are not available to all customers in a utility service territory, nor do they prioritize enabling renters to adopt energy-efficient upgrades (Hummel and Lachman 2018). Relatedly, on-bill repayment debt may follow a resident to another location. OBR programs may or may not make repayment contingent on savings, and they do not offer immediate net savings to customers. Additionally, these programs do not outline commitments to ending charges based on poor equipment performance or a lack of energy savings. On-bill repayment financing periods are typically shorter than the cost recovery periods of inclusive utility investment — a design characteristic that can lead to front-loading costs and delaying savings realization.

On-bill repayment programs often determine creditworthiness through conventional underwriting criteria such as FICO credit scores and debt-to-income ratio. Instead of disconnecting electricity service for nonpayment, these programs may place liens on energy-efficient equipment as a way of mitigating risk for private lenders and addressing nonpayment by residents.

Through the Green Jobs-Green New York (GJGNY) Act, the New York State Energy Research and Development Authority (NYSERDA) was able to create an on-bill recovery loan program in 2012. The NYSERDA program offers unsecured loans that are repaid on a resident's monthly utility bill and transferable to the new property owner upon the sale of the property. As such, only homeowners are eligible for NYSERDA on-bill repayment loans. The program relies on traditional underwriting to establish creditworthiness. The average FICO score of participating homeowners is 757, while the average debt-to-income is 33 percent (Green Jobs-Green New York Data and Trends 2025). As of 2025, NYSERDA has issued 13,000 loans with

an average loan amount of $15,000, an average interest rate of 3.8 percent, and an average term of 7 years (ibid., 2025). The NYSERDA program does not cap monthly payments or terms relative to savings or equipment lifetime. Currently, 16.27 percent of the total loan value is delinquent with an average annual charge-off rate of 0.33 percent (ibid., 2025).[2]

[2] A charge-off means that a lender no longer considers a debt recoverable. Lenders will write off or "charge off" a debt as a financial loss and sell it to a collection agency to remove it from their balance sheet.

Inclusive utility investment (IUI)

Inclusive utility investment programs involve utilities of all sizes that may leverage their own capital (ratepayer or public funding) to make an upfront investment in purchasing the energy-efficient equipment, allowing the resident to benefit from the upgrade(s) at little to no upfront cost. To participate in an inclusive utility investment program, customers must request an energy audit from their utility to determine if they are eligible for energy efficiency upgrades. If they qualify, either the homeowner or building owner (if the resident is a renter) must agree to maintain the upgrade(s) and accept a property notice of the agreement (Clean Energy Works 2023). It is also worth noting that unlike on-bill repayment programs, program administrators for inclusive utility investment programs — including investor-owned utilities (IOUs), publicly-owned utilities (munis), and cooperative utilities (co-ops) — require regulatory approval from entities such as a state utility commission (in the case of IOUs) or governing boards/councils (in the case of munis and coops). The inclusive utility investment model establishes a resident's ability to pay by referencing their utility bill payment history instead of conventional loan metrics such as debt-to-income ratio or FICO score (Bell et al., 2011). Eligible upgrades include space heating and cooling equipment, air and duct sealing, insulation, solar PV and battery storage, and more. Once the resident has received their upgrade(s), the utility will recover the cost for the project along with any related fees as a tariff (not a debt) that is tied to the meter and appears under monthly service charges with the resident's utility bill.

Inclusive utility investment programs routinely cap monthly service charges and cost recovery periods at a percentage of the estimated annual net savings and equipment lifetime, respectively. If the utility's initial estimations indicate that a resident will have higher service charges than annual net savings, the resident may be required to pay an upfront portion of the project costs to the contractor as a copay or a down payment to reach the savings to payment ratio and qualify for the project (Energy Efficiency Institute, Inc. 2019). This high prioritization of resident bill savings and cash flow also means that if the upgraded equipment is damaged, and the resident has not caused the damage themselves, the utility and/or program administrator will often reduce or suspend the service charges until the equipment is fixed. If repair is impossible or financially impractical, the utility may waive the

remaining service charges (Energy Star 2025). In some cases, the utility may waive the remaining service charges or modify the charges if a resident has not realized savings from their upgrade(s) (Deason et al., 2024).

Nonpayment consequences also distinguish inclusive utility investment programs from on-bill financing models such as on-bill repayment. Unlike conventional loan arrangements, the new equipment may not be repossessed in cases of nonpayment for inclusive utility programs. However, they may carry the same risks of disconnection as nonpayment of other energy services. While a unit or home is vacant, inclusive utility investment typically requires that service charges pause until another resident resumes electricity service. Service charges are also paused during periods of equipment maintenance and repair. Once the equipment has been fixed, the charges are redistributed over the adjusted cost recovery period.

Duke Energy recently launched its Improve and Save inclusive utility investment program, which covers energy-efficient HVAC, water heating, and weatherization measures. Duke Energy applies incentives up front to reduce the project costs, then pays for the remaining costs associated with the upgrades, installation, and ongoing maintenance (Duke Energy 2025). They recover the cost of the project on the resident's monthly electric bill over a 10-year period. If a resident moves, the incoming homeowner or renter will assume responsibility for service charges. They also prioritize bill savings, allowing residents to see immediate cash flow depending on their realized savings.

Pay As You Save (PAYS)®

Pay As You Save is the first distinct program design of inclusive utility investment, and it was initially developed and trademarked in 1999 by the Energy Efficiency Institute, Inc. (EEI) in Vermont (Cillo and Lachman 1999; Kloke 2014). While other inclusive utility investment programs may operate identically to Pay As You Save programs, they are not licensed under the registered trademark through the Energy Efficiency Institute (Cohen and Wein 2024).

Additionally, these programs outline specific caps for service charges and cost recovery periods up to 80 percent of the estimated savings and equipment life, respectively. Broader, inclusive utility investment programs can cap service charges and cost recovery periods at a much wider range relative to estimated net savings and equipment life (Clean Energy Works 2023). Finally, while Pay As You Save programs notably allow for electrical service disconnection as a consequence of resident nonpayment, inclusive utility investment programs may include protections against shut-offs, instead allowing residents to update their ability to pay and

potentially modify or end the service charges from the upgrades altogether (Le 2010). Additional consumer protections are reviewed in the section below.

In April 2024, Berkeley Lab published a comprehensive report analyzing the performance data of five Pay As You Save programs, including the U-Save Advantage program at the Appalachian Electric Cooperative; the How$mart KY program; the Ouachita Electric HELP PAYS program at the Ouachita Electric Cooperative; and the Upgrade to $ave program at the Roanoke Electric Cooperative. To evaluate these programs, they utilize American Community Survey (ACS) demographic data and program participant data to discern the income and education levels of Pay As You Save participants compared to the national averages for education level and unemployment.

They find that each of these programs aims for a cap on the monthly service charge and cost recovery period between 80 and 90 percent (Deason et al., 2024). Additionally, four of the five programs reached participants with incomes and post-secondary education levels "well below the national average and whose unemployment rates are well above the national average" (ibid., 2024: 21). Although most participants across the five programs are white, Ouachita program participants live in mixed white and Black neighborhoods and Roanoke program participants live in majority Black areas (ibid., 2024). Each program completed more electric HVAC upgrades than weatherization or lighting improvements, with HVAC (including heat pump upgrades) comprising between 80 and 97 percent of residential projects. Program terms include:

- Cost of capital (interest rates) ranging from 2 to 3.6 percent
- Average cost recovery periods between 9 and 15 years
- Monthly service charges around $50 for each program, with estimated monthly savings between $52 and $78
- Total tariff amounts range from $7,000 to $8,000 (without a copay) and $9,000 and $10,000 (with a copay)
- On average, each program yielded electric usage reductions for households between 3,000 and 5,000 kWh and between 17 and 22 percent
- Actual savings data is only available for the Midwest Energy program which has produced 83 percent of its anticipated energy savings, on average, per household

Unlike on-bill repayment programs, Pay As You Save and inclusive utility investment programs minimize consumer risk (e.g., prioritizing energy savings) and extend electrification access to renters and underbanked residents. By adhering to the estimated cost savings requirement, inclusive utility investments typically include much longer cost recovery periods (based on the piece of equipment with the shortest useful life) than any on-bill repayment programs offer.

Consumer risks and protections

Inclusive utility investment programs are distinct in their accessibility, affordability, and commitment to consumer protections. Overall, they pose minimal risk to residents compared to other energy-efficiency financial solutions, such as Residential Property Assessed Clean Energy (R-PACE), which places residents at risk of foreclosure, and traditional personal loans, which may carry high interest rates while also placing a lien on a residential property. Additionally, inclusive utility investment facilitates substantial market transformation for electrification, enabling low- or no-credit residents, renters, and many other people who may not be able to electrify otherwise, to receive energy efficiency upgrades at little to no upfront cost.

Still, it is important to acknowledge that these on-bill programs may carry their own set of consumer risks that utilities and other aspiring program administrators may want to address in their program design to strengthen the success of and residential engagement with their program(s). Namely, inclusive utility investment programs often carry the same service disconnection and late fee consequences of nonpayment as other energy services (to incentivize timely cost recovery), projected savings may not always translate into realized savings, and programs may not always offer clear long-term paths for quality control and customer satisfaction.

Many legal consumer financial protection organizations and energy efficiency researchers have offered recommendations to resolve the unlikely but possible consumer risks involved with on-bill financial solutions including the National Consumer Law Center, the Consumer Financial Protection Bureau, the Center for Responsible Lending, the Lawrence Berkeley National Laboratory, the American Council for an Energy-Efficient Economy, and the Department of Energy's State and Local Energy Efficiency Action Network.

Service disconnection

In lieu of requiring residential property as collateral or underwriting loans with the possibility of equipment repossession, inclusive utility investment programs rely on a utility's standard process of disconnecting a resident's electrical service if they are unable to pay their utility bill (inclusive of the program's service charge).

While it is programmatically challenging and unlikely that utilities will be able to eliminate shutoffs entirely for these participants, or allocate partial payments to

volumetric (based on usage) charges before service charges, utilities should design programs to align with mechanisms that ensure energy security.[3] For instance, program administrators may make these programs compatible with budget billing to offer customers even monthly payments (avoiding seasonal bill spikes), arrearage management programs that allow customers to enroll in payment plans or utility debt forgiveness, income-based discounted electrical rate programs, and existing bill assistance programs, including LIHEAP. To minimize the risk of nonpayment for utilities, assurance funds can allow program administrators to tap into a pool of resources to cover any outstanding service charges.

Additionally, prospective inclusive utility investment program administrators may leverage existing program performance data including cost recovery and nonpayment rates (which are well below market rate loans) from a majority of on-bill programs to demonstrate the low likelihood of nonpayment and, ultimately, reassure funding entities of the success of this type of investment (Durkay 2016; Johnson et al., 2010: 2016). Berkeley Lab reports a range of default rates between 0 and 3 percent across 20 residential on-bill programs with a median rate of just 0.08 percent (Leventis et al., 2016). They particularly highlight the performance of the Tennessee Valley Authority and Wisconsin's Alliant Energy programs, which have existed for decades, generating "over half a billion dollars in volume each," with nonpayment rates just below 3 percent (Leventis et al., 2016: 30). The latest Pay As You Save status report shares uncollectible rates below 1 percent across 16 programs (LibertyHomes & Energy Efficiency Institute, Inc. 2022). Given that cases of nonpayment are especially rare, few participating households are likely to experience shutoffs. However, if program administrators are able, pairing program design with robust bill payment assistance resources can minimize the risk of disconnection entirely and ensure that monthly service charges on the utility bill (and any potential gap between these and savings) do not make the difference between any resident maintaining or losing power.

Energy bill savings

The difference between anticipated savings and realized savings is often termed the "realization rate," which captures actual savings as a percentage of estimated savings. A rate of 100 percent indicates that a program has generated 100 percent of the energy savings it expected for its participants (Kramer 2014). One investigation of the electric and heating realization rates from seven on-bill retrofit programs[4] (including inclusive utility investment, Pay As You Save, and on-bill repayment) found that anticipated and realized savings vary widely, with on-bill repayment programs producing electric realization rates as low as 35 percent (NYSERDA) and inclusive utility investment programs yielding realization rates as

[3] While residents may already be at risk of service disconnection if unable to pay their utility bill, a monthly service charge that exceeds actual savings could potentially make the difference between a resident affording their utility bills and not (ACEEE 2017). Losing access to electrical service can negatively affect residents in a number of ways. Residents may lose access to electric heating and cooling, leaving them vulnerable during periods of extreme weather. Without power, they may light candles which introduces a fire hazard to their home. Medically vulnerable residents who rely on refrigeration to store medicine or use electricity to power medical equipment may be without those resources during a shutoff period.

[4] Kramer examines performance data from the following on-bill financing programs: New Hampshire, Massachusetts, Delaware Department of Natural Resources, Wisconsin Focus, Long Island Power Authority, NYSERDA, and Energy Trust of Oregon. The data separates electric realization rate from heating realization rate with the latter being much higher across each program.

high as 92 and 99 percent (New Hampshire and Wisconsin Focus respectively). While consumer changes in energy consumption may account for some of the variation between anticipated and actual savings, there are other factors that may inhibit savings beyond a resident's control. Some of these non-residential factors include home energy auditing inaccuracies, insufficient tracking system savings modeling, installation issues, electric rate increases (if they outpace fossil fuel rate increases), equipment age and/or performance issues, and weather conditions (Kramer 2014; Rosenberg 2013).

FIGURE 1

Gross savings realization rates of seven on-bill programs (Kramer 2014; Rosenberg 2013)[5]

	Electric realization rate	Heating realization rate
New Hampshire	53%	92%
Massachusetts	n/a	57-86% (varied by fuel type)
Delaware Dept. of Nat Res.	34%	47-101% (varied by fuel type)
Wisconsin Focus	98%	99%
Long Island Power Authority	62%	67%
NYSERDA	35%	65%
Energy Trust of Oregon	n/a	47%

To narrow the gap between anticipated and realized savings as much as possible, program administrators should aim to conduct comprehensive home energy assessments and integrate projected energy escalation rates and weather-normalized data into estimated savings calculations (Deason et al., 2024; Hayes 2023). It is important to note that some residents may prefer to adopt energy-efficient technology for comfort or health improvements even if the project increases their energy bills. In these instances, program administrators should transparently communicate any necessary copays or down payments residents may incur to reach the bill neutrality goals of the program.

Then, once installation takes place, program administrators may conduct additional evaluations, monitoring energy use to compare monthly bills before and after the upgrade(s). If possible, program administrators may consider establishing a reserve or assurance fund to reimburse participants when estimated savings do not match actual savings (Ibid., 2023). If reimbursement is not feasible with program funds, program administrators might offer residents an opportunity to modify or lower their service charges based on the realized savings. While the National Consumer Law Center does not expressly offer guidance about making reimbursement or modification contingent

[5] Kramer 2014 and Rosenberg 2013 provide the most recent publicly available data on realization rates across all seven on-bill programs (IUI and OBR) except the NYSERDA on-bill recovery loan program for which Parlin 2019 shares an electric savings realization rate of 26% in 2016.

upon particular factors that affect energy savings, it may be helpful for program administrators to reference household energy usage data to discern if residential bill increases are due to energy consumption changes or factors external to the resident — including equipment performance issues, increasing rates, or weather conditions.

Quality control

Once contractors perform upgrades, there may be little to no organized process for program administrators to stay in touch with residents to monitor equipment performance, address changes in energy consumption and service charges in cases of bill transfers, or attend to residents' concerns post-installation. Additionally, it may be difficult to discern which involved party should lead customer service efforts within on-bill programs. Unlike energy efficiency financing programs in which the builder has a "duty of care" with respect to the customer, utilities leading inclusive utility investment programs may not have adequate communications infrastructure or maintenance resources to field and resolve residents' complaints over the years (Fredette 2015).

The National Consumer Law Center encourages program administrators to design simple and accessible processes of raising complaints and monitoring attempts to resolve residents' issues with their equipment. They suggest that utilities "establish oversight mechanisms to increase transparency and accountability, including the creation of a complaint and dispute resolution process with a centralized, accessible platform for reporting" (Haynes 2023).

Though unlikely, property owners may struggle at times to attract new renters or homeowners — as with R-PACE programs — given that incoming residents have to agree to service charges regardless of the realized rates or the condition and age of the energy-efficient equipment. In these cases, implementing the long-term quality control and customer service suggestions, along with the strategies to increase realization rates, outlined above, may assuage the concerns of potential residents by keeping service charges consistently below actual savings and addressing any equipment performance issues.

One way that inclusive utility investment programs typically already implement long-term commitments to quality control is by providing extended equipment warranties that allow residents to receive equipment maintenance for free or at a discounted price on a much longer timeline than if they purchased the equipment on their own (Energy Star 2025). This practice helpfully addresses customer concerns beyond the installation phase while also increasing the likelihood of residents realizing estimated savings.

Barriers and solutions for scaling IUI programs

Though inclusive utility investments address a number of barriers to electrification for renters, low- to moderate-income, low-or no-credit, and energy-burdened residents, programs may run out of funding and encounter challenges to scaling beyond their initial pilot phases.

Namely, utilities may be wary of assuming cost recovery responsibilities and leveraging ratepayer funds for inclusive utility investment that may shut off electrical service for nonpaying residents, which may impact public perception among their customer base. Additionally, it is difficult for program administrators to obtain low-cost and long-term capital, and smaller utilities, including munis and co-ops, may not have enough internal reserves to sustain programs on their own.

Utility concerns about public perception and cost recovery infrastructure

Utilities are not lenders. Unlike in more traditional on-bill financing programs, including on-bill repayment, utilities are primarily responsible for administering inclusive utility investment programs. As such, they may have to build out the infrastructure for implementing, billing, and servicing processes to recover costs from service charges.

In particular, utilities will have to allocate funds toward informational technology services to process cost recovery through residents' utility bills. They will have to discern how cost recovery is processed vis-a-vis electrical service and on-bill charges in cases of partial cost recovery, and cover the costs of adjusting their billing structure to accommodate this decision (Zetterberg et al., 2014: 36). Utility consumers may also require consumer education to learn how to properly read their utility bills if the billing structure changes. The costs for building billing infrastructure may be unpredictable, depending on existing administrative networks and resources. For instance, California prepared an $8M budget to cover infrastructure expenses, "including administration, implementation, and upgrades for information technology systems and to work with the Master Servicer for $75M of energy efficiency financing pilots." Connecticut was able to stand up an on-bill

program for much less, as the Clean Energy Finance and Investment Authority was able to administer the program across multiple utility jurisdictions (Zetterberg et al, 2014; Zimring et al., 2013). The Connecticut program also relies on line item billing, so on-bill service charges integrate well with their existing billing system.

Utilities may seek municipal or state funds to cover the costs of setting up an on-bill program (infrastructural expenses). For instance, NYSERDA created a $500,000 reserve, covered by the U.S. Department of Energy Better Buildings Fund, for billing infrastructure costs associated with their OBR program (Bell et al., 2011; Pitkin 2011). In addition to securing upfront funding, utilities may worry about public perception. Utility companies may hesitate to initiate inclusive utility investment programs if it requires them to leverage ratepayer funds, and they rely on service disconnection to secure cost recovery. Ratepayers may have an unfavorable view of utilities that disconnect power for residents who are unable to afford their monthly service charges for energy-efficient upgrades (Kramer 2014; Le 2010). Additionally, utilities will need regulatory approval to use ratepayer funds for inclusive utility investment programs, which may prove to be a laborious process. However, as mentioned above, utilities should strive to develop programs that align tightly with existing bill assistance resources (minimizing the risk of shutoffs), and if operators want to avoid securing regulatory approval for ratepayer-funded inclusive utility investment, they may secure funding outside of their customer base to sustain their program.

Securing long-term funding

Inclusive utility investment programs may also struggle to survive beyond their initial pilot phases due, in part, to a lack of long-term funding. Getting out of the pilot phase requires program administrators to secure a mix of robust public funding and enduring private sector resources, if ratepayer funds are not sufficient.

A number of public funding sources may be available to program administrators as these programs age out of the initial stage of smaller-scale operation. While the new federal administration may pose challenges to accessing historically available funding, utilities have typically relied on USDA loans from the Energy Efficiency and Conservation Loan Program and the Rural Energy Savings Program, loan guarantees from the U.S. Department of Energy's Renewable Energy & Efficiency Energy Projects Loan Guarantee, and federal Community Development Block Grants (Energy Star 2025; see Figure 2 below). Admittedly, utilities would benefit from more widely available and robust funding, and leveraging pre-packaged on-bill programs that utilities can opt into is one way of creating a much simpler path for long-term and enduring inclusive utility investment programs (Gilleo 2019), but varying public pools of funding are another vital way for administrators to build enduring programs.

FIGURE 2

Sources of capital for on-bill programs (Bell et al., 2011)[6]

Capital source	Strengths	Limitations
Utility		
Ratepayer funds	• Low-cost source of capital. • Accessible to utilities.	• Non-payment risk lives with the utility and its ratepayers. • Finite available funds impose limits to program growth and expansion.
Public		
Grants (Federal, State, Local) *Example: ARRA*	• Low-cost source of capital. • May be sizable.	• Likely to be limited in the future. • Not always available year after year. • May impose limitations on program design.
Public Loan Funds *Example: USDA Rural Utility Service Loans*	• May be more sustainable compared to one-time grants. • Can assist in building creditworthiness.	• May be perceived as risky to taxpayers.
Bond Issues	• Potentially low interest rates and favorable terms. • Could be tax-exempt.	• Contingent upon voter approval in many cases. • OBF investments may have a long repayment period and are likely modest, which makes it difficult to correlate with bond maturity.
Revenue from Cap and Trade Programs *Example: Regional Greenhouse Gas Initiative*	• Innovative and possibly unbudgeted source of capital.	• Programs need to be available and be lucrative.
Private		
Community Development Financial Institutions (CFDIs)	• OBF objectives synergistic with CDFI mission. • Can assist programs in building creditworthiness. • Can act as partners in program administration.	• Sometimes limited resources when compared to other private sources of capital, which may make it difficult to bring programs to scale.
Local Banks and Credit Unions	• Experience in providing financial services to the community can improve program access and facilitate effective risk management. • Can act as partners in program administration. • Can expand access to private capital.	• May have limitations with regards to lending terms (constrained by industry underwriting standards)
Large Commercial Banks and Capital Markets	• Potential resources for bringing programs to scale. • Opportunities for exploring the full potential of energy efficiency investments.	• Current scale and diversity of on-bill programs make it difficult to determine its characteristics and value as an asset class. • May be restricted by traditional measures of creditworthiness, and could limit opportunities for underserved participation.

[6] Though some funding sources are less available presently (including ARRA funds), this comprehensive outline of potential capital streams for on-bill programs is largely representative of the many funding pools contemporary programs access for their short and long-term operations.

In addition to public funds, utilities may seek private sector resources to keep program operations going, including leveraging their own credit rating to secure private capital investors and/or seeking capital from tax-equity investors if eligible (Energy Star 2025). Additionally, green banks and community development financial institutions (CDFIs) can support the expansion of inclusive utility investment programs.

Most on-bill programs rely on service disconnection (as with other energy services) to minimize the risk of nonpayment, but as mentioned above, the consequences of service disconnection pose great risks to residential participants. Instead of placing nonpayment vulnerabilities on customers, program administrators might consider establishing assurance funds that can cover missed service charges and potentially attract long-term private investments (in addition to aligning programs with bill assistance resources). The North Carolina Sustainable Energy Association (NCSEA) created the Energy Solutions Reserve Fund (ESRF) in 2018, and states across the country have established loan loss reserves (similar to assurance funds) for state-based on-bill programs to attract private lenders and secure sustained funding for utilities (Gilleo 2019).

It is important to note that inclusive utility investments are not meant to replace existing federal, state, or local incentives for electrification upgrades. Instead, an optimal strategy for expanding low-cost electrification should blend financial solutions such as inclusive utility investment with incentives (rebates and tax credits) and other zero-cost or discounted upgrade programs. Additionally, to effectively scale, programs should target households with the highest potential for energy savings.

Regional policy efforts & recommendations

Massachusetts is well-positioned for inclusive utility investment programs based on several factors, including but not limited to its existing rebates from the Mass Save program, high potential for energy efficiency savings, and in-state financers. Inclusive utility investment can multiply the impact of the public dollars we already invest by expanding the reach, tailoring the approach, and closing the gaps for the customers who are still falling through the cracks.

Additionally, it makes sense to advocate for the integration of inclusive utility investments across both investor-owned utilities and municipal light plants. Under Mass Save's current Three-Year Energy Efficiency Plan, the investor-owned utilities offer rebates covering 100 percent of the upgrade costs to low-income customers. Rather than replacing or redirecting funds from these current direct-install efforts, inclusive utility investments should be seen as a complementary tool — one that can stretch existing resources further and fill critical gaps. Pairing rebates with inclusive utility investment could also dramatically amplify their reach, enabling deeper retrofits or broader household participation without increasing costs. Adopting inclusive utility investment in municipal light plant service territories would unlock access for customers who may not qualify for traditional loans, don't have access to existing financing programs like the HEAT Loan,[7] *and* allow municipal utilities to stretch their limited incentive budgets further. This would be a flexible, scalable way to help local utilities serve more customers without requiring large new outlays. This is especially valuable for smaller municipal light plants operating with tighter incentive budgets.

Regional challenges

Despite the strong potential benefits of inclusive utility investments in Massachusetts, there are regional considerations that create challenges, including heating/cooling loads and/or solar availability.

Massachusetts experiences cold winters with high heating demands, and the state's older building stock often has inadequate insulation and inefficient heating systems, creating significant opportunities for energy efficiency

[7] The HEAT Loan is a zero-interest financing program offered through Mass Save, designed to help Massachusetts residents pay for energy efficiency upgrades in their homes. While the Mass Save program is generally unavailable to customers of municipal light plants (MLPs), there's a notable exception: if an MLP customer receives their gas service from an IOU, they can qualify for the HEAT Loan—even though their electricity is provided by the MLP. This is because MLPs only supply electricity, not gas; thus, any gas service is necessarily coming from an IOU, creating a narrow access point into Mass Save offerings for those customers.

improvements and bill savings. However, this also means higher upfront costs for comprehensive retrofits compared to homes in more moderate climates. This presents an opportunity for substantial savings, but also potentially higher upfront investment requirements that shape inclusive utility investment viability.

In addition to the significant operational savings that energy efficiency can deliver, rate reforms in Massachusetts have moved intentionally toward lowering electricity costs, especially for low- to moderate-income households and heat pump owners. That's happened through seasonal heat pump rates, improving the economics for inclusive utility investment by enhancing the operational savings that underpin the business model.

While Massachusetts has decent solar resources, especially in the eastern portions of the state, it experiences fewer annual sunlight hours than southern states, which affects the economics of solar installations. Despite this challenge, Massachusetts has developed a robust solar market through supportive policies like the SMART program, which could potentially work alongside inclusive utility investment programs. The significant seasonal changes in energy consumption patterns (high winter heating, moderate summer cooling) create complexities for estimating energy savings, which are crucial for the financial structure of inclusive utility investment programs.

Relevant case studies

Additionally, when combined with electrification-friendly rates, demand response programs, and distributed energy resources (DERs) like smart water heaters and batteries, inclusive utility investment can reduce peak demand, improve grid flexibility, and defer costly infrastructure upgrades. **Massachusetts's Connected Solutions** program has a strong track record of enabling residential and commercial customers to reduce peak demand through smart thermostats and behind-the-meter battery storage, earning incentives while enhancing grid reliability and lowering emissions. Over the 2025–2027 Mass Save Three-Year Plan, the program is set to expand device eligibility, enhance income-tiered incentives, scale residential battery dispatch, and tailor offerings for renters and community housing — aligning with state goals on equity and clean peak compliance.[8] **Roanoke Cooperative's "Upgrade To $ave"** program in North Carolina integrates inclusive utility investment and demand response — eliminating upfront costs, tying repayment to actual energy savings, and ensuring equitable

[8] Mass Save. *2025–2027 Energy Efficiency and Decarbonization Plan.* Mass Save, filed 31 Oct. 2024, masssave.com/about-us/three-year-plan. Accessed 10 June 2025.

access while improving grid reliability.[9] Following Roanoke's example — which achieved over 50 percent bill savings, enrolled 10 percent of residential members, and realized utility net present values of ~$3,000 per home — integrating ConnectedSolutions with an inclusive utility investment framework could enable Mass Save to offer smart thermostat and battery upgrades financed via utility tariffs, ensuring broader uptake, embedded resilience, and sustained peak reduction while shielding customers from upfront costs.[10]

ReInvest Ipswich, an inclusive utility investment program, is a collaboration between Ipswich Electric Light Department, CET, and MassCEC.[11] It focuses on whole-home energy efficiency improvements and electrification. This initiative functions as a valuable testing ground for elements of inclusive utility investment approaches in Massachusetts, providing practical experience that could inform broader implementation. By eliminating or minimizing upfront costs and using the utility bill as a recovery mechanism, ReInvest Ipswich has attracted homeowners who might otherwise be unable to afford comprehensive energy improvements or who would have replaced end-of-life furnaces with another fossil fuel system. The program's structure allows participants to see immediate cash flow benefits, with energy savings designed to exceed monthly service charges.[12]

[9] Community-Based Energy Program, Yale University. Case Study: Roanoke "Upgrade To $ave" Program. Yale CBEY, Aug. 2018. cbey.yale.edu/sites/default/files/2019-08/Roanoke%20Upgrade%20to%20Save.pdf. Accessed 10 June 2025.

[10] Roanoke Electric Cooperative. Upgrade To $ave Program. Roanoke Electric Cooperative, 2019, roanokecooperative.com/clean-energy-solutions/upgrade-to-ave-program. Accessed 10 June 2025.

[11] www.cetonline.org/programs/iui/

[12] Ibid.

High-level statistics from the Ipswich pilot

- Has maintained **20% savings** over historic energy costs
- Eliminated **84% of upfront costs** for customers
- Mitigated **400 tons of lifetime CO2** so far
- Enabled HVAC electrification in all participating homes

Lessons learned from the CET 2024 report

- Securing capital is the most time-consuming step
- Customers and contractor communication is critical
- Upfront costs for consumers are likely going to continue
- Measure installation timelines greatly vary
- Single-family oil heat households were the easiest to serve, renter and gas customers were more difficult

The program's approach of attaching the cost recovery to the meter rather than the individual has proven particularly attractive to residents who were unsure about their long-term plans in their homes. This feature removes a significant psychological barrier to making long-term investments. ReInvest Ipswich enables whole-home retrofits that address multiple energy systems simultaneously. Participants have expressed appreciation for this holistic approach, which can include insulation, air sealing, heat pump installation, and other measures in a single project. The involvement of IELD, a trusted municipal utility, has lent credibility to the program. Residents appear more comfortable entering into long-term financial arrangements with their local utility than with private financial institutions (Muspratt et al., 2024).

TABLE 10

Challenge	Munis	IOUs
Regulatory complexity	Low	High
Capital access	Limited	Strong
Political visibility	Low	High
Customer protections	Informal/local	Formal/legal
Implementation agility	High	Low
Gas business conflict	Not applicable	High (for dual-fuel)
Stakeholder scrutiny	Minimal	Intensive

While municipal utilities like Ipswich have piloted inclusive utility investment with promising results, investor-owned utilities will operate under distinct constraints and advantages. As simplified in Table 10, municipal utilities often have an advantage over investor-owned utilities in terms of the relative speed and agility with which they are able to work. Investor-owned utilities may take longer to design their programs, having to adhere to strict procurement rules and coordinate across large internal departments and with the Department of Public Utilities. While municipal utilities have more limited capital access, they benefit from lower cost of capital due to tax-exempt status. In contrast, investor-owned utilities have greater access to diverse capital sources and can recover investments through regulated rate mechanisms.

The political and stakeholder dynamics differ significantly between the two utility types. Municipal utilities face high local political visibility and

direct accountability to elected officials, making them more vulnerable to local political pressure but subject to lower external stakeholder scrutiny. Investor-owned utilities operate with more regulatory buffering from direct political pressure, but can be more easily brought to accountability by multiple stakeholder groups through formal intervention processes. Regarding consumer protections, investor-owned utilities provide more extensive regulatory protections and formal complaint processes. While municipal utilities benefit from the absence of gas business conflicts through their typically electric-only operations, investor-owned utilities' dual gas-electric operations can position them to drive comprehensive fuel-switching strategies across larger customer bases. These fundamental differences suggest that while municipal utilities may excel at nimble pilot programs, investor-owned utilities' superior capital access, regulatory frameworks, and market reach make them better positioned to deliver the scale of emissions reductions and energy efficiency improvements that climate goals demand.

Each investor-owned utility in Massachusetts (National Grid, Unitil, and Eversource) has the financial tools and climate policy directives necessary to implement investment. Regulatory clarity, especially around service charge design, consumer protections, and allowed returns, will be crucial to scaling these programs with investor-owned utilities.

The policy environment in Massachusetts is conducive to inclusive-utility investment viability. There are further opportunities to realize the benefits of these programs with the integration of heat pump-specific electricity rates, which have taken effect in 2025 and will continue to be refined through docket #25-08. These preferential electric rates are designed to reduce the operating costs of high-efficiency electric heating systems, particularly during winter months when usage spikes. These rates differ from standard residential electric rates by offering seasonal or time-of-use (TOU) pricing that aligns with grid and policy objectives, making electrification affordable and sustainable.[13] Pairing inclusive utility investment with heat pump rates not only enhances customer economics but also supports utility goals of electrification and load management. As affordable operating costs increase uptake, utilities should be able to recover their investments at a greater scale.

[13] MA D.P.U. 25-08, Petition of Massachusetts Department of Energy Resources for Requesting the Department of Public Utilities Open an Investigation into a Seasonal Heat Pump Rate.

Recommendations

In May 2025, Governor Healey released an energy affordability bill, titled "An act relative to energy affordability, independence and innovation," (H.4144) — with section 52 explicitly focused on inclusive utility investment. **During the 2025-2026 legislative session, we recommend that the Massachusetts Legislature pass section 52 of Governor Healey's energy affordability bill, calling on the Department of Public Utilities to develop a regulatory framework for inclusive utility investment and require investor-owned utilities to implement such programs statewide.** This provision will give Massachusetts a unique opportunity to lead nationally in equitable electrification finance that removes upfront costs as a barrier and expands access to critical home upgrades for underserved residents. If section 52 is enacted, the Department of Public Utilities' regulatory framework should consider the program design recommendations outlined below.

1 Tightly align the inclusive utility investment program design with existing bill payment assistance resources to mitigate the risk of electrical service disconnection

- Establish assurance funds (via third party if ratepayer funds are unavailable).
- Connect participants facing nonpayment risks with LIHEAP, budget billing (if available), and/or arrearage management plans.

2 Ensure bill savings are notable and immediate by:

- Establishing a cap on monthly tariff charges at less than or equal to 80 percent of projected net energy savings.
- Establishing maximum recovery terms of less than or equal to 80 percent of the equipment lifetime or the duration of an extended warranty.[14]
- Standardizing bill savings modeling protocols developed with the Department of Energy Resources and Mass Save.

[14] See PAYS model tariff https://www.eeivt.com/wp-content/uploads/2020/04/PAYS%C2%AE-Model-Tariff-muni_iou_2020.pdf

3 Incorporate all resource savings into the project cost-effectiveness analysis

- Include projected electrical savings as part of the analysis.
- Include realized bill savings as part of the analysis.

4 Reinforce customer confidence in inclusive utility investment programs by requiring utilities to:

- Require performance monitoring, including post-installation measurement and verification.
- Reassess service charges or issue reimbursements if realized savings from upgrades don't generate a positive cash flow.
- Establish a centralized complaint and quality assurance system with oversight from the Department of Public Utilities and Attorney General.
- Leverage the existing trusted Home Performance Contractor and Independent Installation Contractor network used for Mass Save.

5 Improve affordability and program uptake by instructing utilities to demonstrate how inclusive utility investment service charges will braid with:

- Mass Save rebates and IRA funds.
- Time-of-use heat pump electricity rates (docket #25-08).
- Screening tools that direct eligible customers first to zero-cost options.

6 Integrate inclusive utility investment support into the Massachusetts Building Decarbonization Clearinghouse. Key integration priorities include:

- Standardized program design tools for tariff structures, eligibility, measurement, and verification.
- Facilitated access to capital sources (i.e. green bonds, USDA loans, assurance reserves).
- Data reporting protocols for performance tracking and transparency.
- Stakeholder engagement infrastructure to reach environmental justice and low-income communities.

Conclusion

Overall, inclusive utility investment provides a vital pathway for reducing upfront costs for many households that may otherwise be unable to pay out of pocket or finance upgrades more traditionally with consumer loans. Inclusive utility investment also offers renters, energy-burdened residents, low- to moderate-income households, and those with little to no credit a chance to save on energy, enjoy better indoor air quality, and heat and cool their homes more comfortably. It also helps them avoid risks such as equipment or property liens, and exorbitant interest rates and fees. Inclusive utility investment and PAYS models are especially valuable for protecting residents against the conventional risks of lending.

While inclusive utility investment programs can disconnect service as a nonpayment penalty, it's possible to minimize the risk of shutoff for residents by offering clear opportunities for bill assistance, leveraging successful performance data (low loss rates), tapping into assurance funds, producing accurate energy savings modeling, and potentially offering payment adjustments. These consumer protections, coupled with scaling strategies including securing upfront, infrastructural, and long-term capital investments from private and public funds, can address many of the issues that may make utilities and capital providers hesitant to adopt these programs.

In Massachusetts, the lessons and achievements of the ReInvest Ipswich pilot program can serve as a foundation for scaling on-bill efforts for other utilities across the state. With the existing resources from Mass Save, along with other income-eligible federal programs, Massachusetts residents of disadvantaged backgrounds can gain access to energy-efficient technologies at a pace that matches the state's 2030 and 2050 emissions goals.

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