The New Retro – Leveraging IRA Incentives in Designing Home Retrofit Programs for Low-Income and Beyond

Joe Schambach, ICF
Charlie Haack, North American Insulation Manufacturers Association (NAIMA)

ABSTRACT

Utility demand-side management (DSM) programs are facing a wide array of changes to policy landscapes in different jurisdictions across the country, from maintaining cost-effectiveness in the face of lost lighting savings to reacting to the complexities of the Inflation Reduction Act (IRA) funding to transitioning traditional energy efficiency programs to decarbonization-centric programs. After years of chasing high-impact and relatively shorter lifetime efficiency measures in utility DSM programs, the incentives included in the IRA have drastically changed the program design equation, with numerous incentives for insulating and air sealing measures unlocking new program approaches. In this paper we will explore how braided IRA funding along with evolving regulatory perspectives and evaluation frameworks is creating an opportunity for insulation and air sealing in the face of utility program challenges.

The paper will include considerations for how to best structure residential programs to leverage IRA incentives – particularly for low-income customers that can benefit from upgrades that are substantially covered by IRA incentives, how leveraging IRA and utility incentives to better pair equipment replacements with insulation upgrades can lead to greater energy cost savings and GHG reductions, as well as how changing cost-effectiveness test trends can realize all of the value streams appropriately. The impacts of more inclusive benefit cost analysis (BCA) approaches that have historically not been drivers in DSM program development but are coming into greater focus- the Societal Cost Test (SCT) and Jurisdictional Specific Test (JST). These tests include value streams that begin to quantify the value of insulation such as health and comfort benefits and GHG reduction benefits.

Introduction

Program planners and administrators are increasingly challenged to integrate additional cost-effective savings into their demand side management (DSM) programs, especially when faced with increasing federal efficiency standards such as lighting standards, state-mandated savings targets, and new policy focus areas. With these challenges, there are also opportunities presenting themselves to re-visit longstanding energy efficiency measures, especially insulation and air sealing, bringing these back to the forefront of DSM programs by overcoming existing market barriers.

This paper explores opportunities to promote insulation and air-sealing measures within utility programs given IRA funding in the market as well as trends in regulatory policy and inclusion of a broader range of benefits within cost-effectiveness screening. With IRA funding either available or imminent across the country, utilities can begin to market IRA funding, coordinate with State Energy Offices (SEOs) on state-implemented IRA programs, and consider program design aspects that could align or complement IRA funding to increase the impact of all funding in the market. Beyond how the IRA is implemented, utilities can also engage with

regulators and stakeholders on how utility programs are evaluated for cost-effectiveness. Existing cost-effectiveness frameworks should be analyzed to ensure that the benefits captured are consistent with a jurisdiction's policy goals. For example, IRA funding could have a direct impact on testing if federal dollars are considered a reduction in costs in certain tests or non-energy impacts such as emissions reductions should be considered for jurisdictions where DSM programs support broader climate policy goals.

The passing of the Inflation Reduction Act in 2022 represents a massive investment of federal dollars to catalyze clean energy across the country with funds dedicated to energy efficiency tax credits and rebate programs. IRA funding related to home retrofits are also very focused on low- and moderate-income households which is an opportunity to boost participation in DSM programs targeting this customer group as well. While home retrofit projects can range in costs to customers depending on the scale of projects, IRA tax credits and rebates in the market can bring the upfront costs down even further which can drive customer interest, bring more contractors into the market, and potentially help utility program metrics like cost-effectiveness simultaneously.

Many states are also beginning to see value in DSM programs beyond their energy and capacity savings potential in the form of greenhouse gas (GHG) emissions reduction potential. Subsequently, the industry is seeing trends in evaluation of DSM programs which expand upon the Total Resource Cost Test (TRC) and Utility Cost Test (UCT) to include more societal and non-energy benefits (NEBs). While insulation and air sealing are not new to the DSM world, these regulatory trends begin to shine a new light on these measures to pair with decarbonization efforts like space heating electrification and show renewed value on the additional benefits brought to customers beyond energy savings like health and comfort benefits.

While states and jurisdictions across North America operate within different regulatory requirements and directives, there are a range of industry trends and challenges that utilities are facing, such as the loss of lighting savings, increasing appetite from regulators for longer-lifetime savings, and high inflation rates increasing technology costs. While the lighting market has been transforming towards LEDs for years, the U.S. Department of Energy rule change in 2022 still caught many utilities off guard. Lighting was still a significant portion of many utility DSM portfolios leaving a gap of cost-effective and affordable savings needed to be made up through other efficiency measures. Some are applicable to all utilities while others may be only applicable to some jurisdictions in immediate planning and implementation timelines. Regardless of the current regulatory policies in a jurisdiction, it's important to grasp the industry as a whole and be prepared for changes that can be enacted swiftly and unexpectedly. Altogether, these sometimes stand-alone or sometimes cascading changes in the industry provide reason for DSM programs to consider not only new technologies but also re-visit old standbys to maximize their portfolio performance across a range of key metrics.

IRA Funding Shaking Up DSM Programs – New Opportunities for Insulation

The IRA contained unprecedented federal funding to drive adoption of clean energy and clean energy technologies – including funding for energy efficiency and electrification in buildings. This funding largely overlaps technologies incentivized through DSM programs which offers utilities the opportunity to stack incentives with federal funds to further drive adoption of energy efficiency measures in their jurisdictions, but this can be complicated when all of the details aren't yet finalized.

IRA funding for efficiency measures is available through either tax credits or rebates. Federal tax credits are active as of 2023 and are managed by the Internal Revenue Service (IRS) and can be claimed alongside federal income taxes. IRA rebate program funding will be distributed to state energy offices (SEOs) for individual state implementation through a DOE application process. While IRA tax credits became active in 2023, IRA rebate programs are still in the development phase with many states developing applications to be awarded funding to launch programs.

While IRA funding applies to a myriad of tax credits, rebates, technology types, and sectors, the authors will focus on credits and programs defined in Sections 13301, 50121, and 50122 of the IRA representing homeowner energy efficiency tax credits, whole-home energy efficiency retrofit rebates, and residential building electrification rebates respectively (Senate 2022, 331-344, 573-595).

IRA Tax Credits.

Tax credits for energy efficiency measures in the IRA were an extension of the tax credits specified in 26 U.S. Code § 25C, otherwise known as the energy efficient home improvement credit, with some modifications (IRS 2022). The general tax credit is 30% of total costs including installation costs up to a specified cap. The following measures cannot exceed $1,200 in combined credit:

- Air conditioning, fossil fuel heating systems, and related electrical upgrades capped at a combined $600 credit
- Windows, regardless of the number installed, capped at a $600 credit
- Exterior doors capped at $250 per door or $500 total credit
- Home energy audit capped at a$150 credit
- Insulation and air sealing with no individual measure credit cap

Additional tax credits above the previously mentioned $1,200 cap are available at 30% of total costs for certain heat pump and biomass technologies with a $2,000 cap (IRS 2022). Energy efficiency measures also need to meet certain efficiency criteria which vary by measure. Insulation, for example, is required to meet the International Energy Conservation Code (IECC) prescriptive criteria in place 2 years prior to the date of installation.

IRA Rebate Programs.

While state energy offices are still in the planning and application phase for IRA rebate programs, nothing can be said for certain as to how these programs will be implemented in each state or the exact design or requirements of the programs. However, DOE guidance on the programs gives some idea as to what rebates will be in the market. The two IRA rebate programs of focus are the Home Energy Performance-Based, Whole-House Rebates Program (HOMES Program) and the High-Efficiency Electric Home Rebate Program (Home Electrification Program).[1] These rebate programs cannot be combined with each other, meaning a household

[1] The Home Electrification Program is also commonly referred to as the Home Electrification and Appliance Rebates (HEAR) Program.

cannot receive rebates from both programs for the same project, but the IRA does allow combining IRA rebates with IRA tax credits and state/utility rebates (BPA 2024).

While the IRA tax credits are available broadly to everyone, the IRA rebate program details trend towards higher cost coverage and a focus on serving low- and moderate-income households. Within IRA language, low-income households are defined as households with total annual income less than 80% of the area median income (AMI) while moderate-income is households with total annual income from 80% of AMI to no more than 150% of AMI.

It is expected that these rebate programs will be provided as point-of-sale rebates which would limit the upfront costs for projects enabling higher participation rather than consumers having to pay the full cost and wait to be reimbursed for the rebate amount.

IRA HOMES Program.

This program targets whole home retrofit projects and provides rebates based on the energy savings of the project, either through modeled or measured savings. For the modeled savings pathway, the rebate is up to $2,000 or $4,000 for home retrofit projects depending on the percentage of energy savings achieved and capped at 50% of the project costs. For low- and moderate-income households, the rebate up to $4,000 or $8,000 per household and capped at 100% of project costs (DOE 2022). The rebate structure and eligibility for rebates will be designed by states individually and approved by the DOE, so utilities should refer to information from their SEO on how this program will be implemented which could differ from the general IRA specifications.

IRA Home Electrification Program.

This program provides rebates for the installation of high efficiency electric appliances, insulation and air sealing, and electrical upgrades in new construction/new appliance installation or to replace a non-electric appliance.[2] Measures must meet ENERGY STAR requirements and/or meet other criteria to be eligible. The inclusion of rebates for insulation and air sealing measures in this program reinforces the importance and expectation of envelope upgrades being paired with electrification measures to enable more widespread electrification.

Diverging from the HOMES Program, the Home Electrification Program is only available to low- and moderate-income households. Households with total annual income greater than 150% of AMI are not eligible for rebates. Figure 2 shows the maximum rebate amount per measure while household total rebates are capped at $14,000 per recipient. Low-income households are eligible for rebates up to 100% of project costs while moderate-income customers are eligible for rebates up to 50% of project costs.

[2] Project eligibility and project scenarios are subject to DOE specifications and potential state level requirements.

Appliance	Rebate Amount (Maximum)
Heat Pump (for space heating and cooling)	$8,000
Electric Stove, Cooktop, Range, or Oven, or Clothes Dryer	$840
Heat Pump Water Heater	$1,750
Electric Wiring	$2,500
Electric Load Service Center (Breaker Box)	$4,000
Insulation, Air Sealing, and Ventilation	$1,600

Figure 2: Maximum Measure Rebate Amounts for the IRA Home Electrification Program. *Source*: BPA 2024.

The program also offers a contractor rebate up to $500 per project to incentive contractors to perform electrification projects in low- and moderate-income communities.

Planning Utility DSM Programs with IRA Programs in Mind

Home retrofit energy efficiency programs are not new to the DSM world, but are not always the focal point of residential portfolios for a number of reasons including:

- High upfront costs can limit customers' willingness to participate even with utility incentives limiting the first-year savings potential.
- The cost-effectiveness of programs can struggle in different markets depending on the cost effectiveness tests and value streams included (more on this below).
- Utilities have been chasing other high-impact program types that can help achieve annualized savings targets for less cost, but with shorter lifetime measures.

Where home retrofit program uptake may be stagnant, IRA tax credits and rebates are infusing the market with funding to reduce upfront cost barriers and push customers over the edge to participate. Utilities can support this expansion through their own incentives stacked on top and with the market experience and customer engagement gained over years of implementation.

Market IRA Programs

The immediate action item that all utilities can take is to market IRA funding opportunities for their customers where programs align, most likely with low-income programs or other targeted customer groups. Tax credits are already available for home retrofit energy efficiency measures, so utilities can market not only the utility program incentives but also the tax credits customers can also realize. While IRA programs are still in development, utilities should be ready to market federal rebates alongside utility incentives and tax credits to give customers the full picture of their funding opportunities. Beyond marketing directly to customers, utilities can ensure home retrofit contractors in the service territory are presenting both utility incentive and tax credit information to customers.

Tax credits and rebate programs can be stacked with utility incentives and in some cases, IRA rebate programs may cover full costs of some projects. In these cases, utilities can get creative to expand projects to incentivize measures beyond what may be covered by federal incentives. Many regulatory bodies and stakeholders would likely argue that federal funds should be prioritized for use first rather than rate-payer funds in any scenario where incentives had to be adjusted in the market.

Coordinate with State Energy Offices

SEOs are going to be managing state efforts for the IRA rebate programs and while the current status varies by state, many are in the planning phase now and some have already received early administrative funding from their DOE allocated budgets (DOE 2024). Utilities may be able to glean early information on how their SEO intends to implement programs and identify areas where programs can coordinate. A step further, there may be opportunities to collaborate on programs or share resources in the future. Nadal describes the potential of an extreme scenario where a utility and an SEO potentially offer a single, blended program with a single application where the utility and SEO are collaborating on the backend, but with no confusion or duplicated efforts in the market (Nadal 2023, 4). Although this approach may have potential in states with statewide utility offerings, this may be extremely complex or not feasible in states with many utilities implementing different portfolios of programs.

Having more funding for customers in the market can be a great thing, but overcomplicating the process can also cause confusion in the market. From an implementation perspective, there should be conversations around customer journeys and contractor requirements so that different funding sources aren’t making it too difficult for project requirements to be met for rebate eligibility. Early conversations can lead to big benefits down the line for all programs and households.

Align Utility Measure Offerings with IRA Requirements

Eliminating friction is key for success in home retrofit programs for both customers and contractors (Amann and Saul-Rinaldi 2024). Where possible, utilities can align measure requirements with IRA measure requirements in order to clearly demonstrate to contractors and customers which measures would be eligible for stacked incentives. This could be setting minimum standards in line with IRA requirements or providing clarity on which tiers of equipment could be stackable and eligible across funding sources. This may not be feasible with every measure or offering, but where it is plausible could be beneficial to programs, contractors,

and customers. An example of possible alignment is with the current IRS tax credits for insulation which requires insulation materials meeting the established International Energy Conservation Code (IECC) standard in effect at the start of the year that is two years prior to installation of the materials or systems (IRS 2022). Table 1 shows the 2021 IECC insulation R-Value requirements which would apply to insulation measures currently to be eligible for IRS tax credits. Defining utility insulation rebates to reach at least this level of insulation would open the door to customer eligibility for both utility and IRA funding.

Table 1. 2021 IECC Insulation R-Values

CZ	Ceiling	Wood-framed Wall	Mass Wall	Floor	Basement	Slab	Crawl Space Wall
1	30	13 or 10ci	3/4	13	0	0	0
2	49	13 or 10ci	4/6	13	0	0	0
3	49	20 or 13+5ci or 0+15ci	8/13	19	5/13	10ci, 2ft	5ci or 13
4	60	20+5ci or 13+10ci or 0+15ci	8/13	19	10/13	10ci, 4ft	10ci or 13
5	60	20+5ci or 13+10ci or 0+15ci	13/17	30	15/19 or 13+5ci	10ci, 4ft	15ci or 19 or 13+5ci
6	60	20+5ci or 13+10ci or 0+20ci	15/20	30	15/19 or 13+5ci	10ci, 4ft	15ci or 19 or 13+5ci
7/8	60	20+5ci or 13+10ci or 0+20ci	19/21	38	15/19 or 13+5ci	10ci, 4ft	15ci or 19 or 13+5ci

Values labeled “ci” specify continuous insulation. *Source*: International Code Council. 2021. *International Energy Conservation Code*. Section R402.1.3. Falls Church, VA: International Code Council. https://codes.iccsafe.org/content/IECC2021P2/chapter-4-re-residential-energy-efficiency#IECC2021P2_RE_Ch04_SecR402.

Alignment of measure requirements and educating contractors of the multiple avenues of funding can make for easier selling to customers and allows for opportunities to scale up retrofit projects where customers may have budgeted for more than they need to pay. If a customer originally wanted a new HVAC system and ceiling insulation, perhaps stacked incentives across utility and IRA sources leaves them with some extra budget to add more measures to the project to further the impact of their investment.

DSM Policy and Evaluation Trends

Traditional DSM programs have been primarily focused on resource savings – a program provides benefits to all customers by conserving utility resources and provides direct benefit to participating customers. Much like the intentions around the IRA, jurisdictions are beginning to see value in DSM programs beyond utility resource savings. Potentially the most common example is in decarbonization and viewing DSM programs to support state or jurisdiction level

climate and decarbonization goals. Beyond decarbonization, some jurisdictions are also seeing the value of programs to improve health, comfort, and safety or achieving other societal goals such as creating clean energy jobs and addressing equity challenges (Nadal 2023).

As the scope widens as to the value brought by DSM programs, it also brings up questions as to the applicability of existing key metrics for programs as well as what should be valued in program evaluations.

Decarbonization – Electrification Plus Energy Efficiency

As states develop more aggressive long-term climate goals, there tends to be a trickle-down effect to utility DSM programs where decarbonization comes to the forefront at least as a secondary or tertiary metric to track along with traditional metrics. In more than 10 states, decarbonization has come front and center in that DSM programs have been encouraged to implement fuel-switching or electrification through specific guidelines or fuel-neutral goals (ACEEE 2022). In the residential sector, this has led to a primary focus on space and water heating electrification technologies but also on best practices on tying these technologies with energy efficiency to maximize emissions reductions.

There are several studies that dive into the emissions reductions of electrification and the further reduction when paired with energy efficiency upgrades like insulation and air sealing (ACEEE 2023, Cohn and Wang Esram 2022, Jones et al. 2023, Specian 2023). By creating a tighter envelope, homes can maintain indoor air temperatures and reduce heating loads which can lead to down-sizing HVAC equipment reducing system costs and load on the grid (Cohn and Wang Esram 2022, 34-35).

Expanding the Horizons of Benefit Cost Analysis and Program Metrics

With the introduction of IRA funding and as jurisdictions begin to track metrics of DSM programs beyond utility system metrics to measure program impacts against broader state and jurisdictional policy goals, a logical next step is to re-evaluate the benefit cost analysis (BCA or cost-effectiveness tests) often used to assess programs and portfolios to compare the benefits and costs of alternative options. Traditionally, jurisdictions may track multiple BCA metrics but utilize one as its primary BCA. While utilities do not decide how cost-effectiveness is applied in their jurisdictions as they are often established by the utility commissions, changes in policy or direction of DSM programs could provide an opening to discuss the potential to change BCA frameworks with the commission, evaluators, and DSM stakeholders within a state.

In most states, the primary BCA is the TRC or UCT which provide a comparison of the utility resource savings against the program administrator costs or program administrator and customer costs respectively for each test respectively. With the introduction of IRA funding, the TRC test could be updated to include impacts from federal funding on cost and benefit value streams. According to the California Standard Practice Manual, any tax credits are considered a reduction to costs in the TRC test which could increase the cost-effectiveness of impacted measures or projects (CPUC 2001). It could also be argued that federal rebates to customers would also act as a reduction to costs, but the impact of both federal tax credits and rebates would likely need to be formalized in each jurisdiction's BCA framework.

The TRC and UCT can also be construed as a barrier to implementing climate change policies because they often fail to account for non-energy benefits (NEBs). NEBs can include a multitude of benefit types including economic development, equity, emissions, health and safety,

and participant comfort benefits. The ability to quantify the value of NEBs can vary in complexity and can typically be applied as quantified values or as adders in a dollar or percentage to the benefits of a program.

The National Standard Practice Manual for Benefit-Cost Analysis of DERs (NSPM) is designed to provide objective, policy- and technology-neutral guidance that jurisdictions can apply using a systematic approach to develop BCA practices and inform assessments of DER investment (Woolf et al. 2020). DERs in this case can include EE and DR, but also new technologies and program types if warranted such as beneficial electrification, distributed generation, or distributed storage. The NSPM framework also allows for jurisdictions to deviate from the five traditional cost-effectiveness tests to create a jurisdiction specific test tailored to a jurisdiction's policy goals. One of the core principles, among many, of the NSPM is alignment with policy goals, meaning that costs and benefits that are included in the test should align with specific jurisdictional goals which opens the door to consider a variety of costs and benefits outside of utility resource savings and customer/utility costs like the function of the SCT. For example, in jurisdictions with decarbonization goals, utilizing a BCA that values the emissions reductions is a way to ensure that investments in these programs are beneficial towards broader policy goals.

Sample BCA Analysis Considering IRA Impacts and DSM Evaluation Trends

The sections above have shown that IRA funding can impact existing primary BCA frameworks, such as considering federal tax credits and rebates as reductions in customer or incremental costs, and that policies driving DSM are beginning to look beyond solely the resource savings that programs provide opening the door to discussions on more inclusive BCA frameworks. To illustrate these concepts and their application in the BCA, we have taken an insulation and air sealing project and conducted a BCA analysis comparing illustrative Jurisdictional Specific Test (JST), TRC, and UCT cost-effectiveness test results by value stream for both a low-income and non-low-income customer project.

This example project isolates only the insulation and air sealing measures while a home could also be replacing or electrifying HVAC systems which can vary based on existing and replacement equipment. Isolating these measures shows the impact of changes on the cost-effectiveness of these measures showing how they can realize further value for any utility looking to leverage IRA tax credits or rebate programs, not just utilities evaluating decarbonization. Of course, utilities and SEOs responsible for distributing decarbonization funding for electrification should also see the benefits of encouraging or even requiring insulation and air sealing with electrification to maximize the long-term decarbonization benefits (ACEEE 2023).

There could be other impacts from federal funding on utility DSM programs identified through impact evaluations, such as net-to-gross findings, but this analysis does not speculate on those potential impacts.

Project and BCA Assumptions and Setup

The BCA results below are based on a simplified and theoretical insulation and air sealing project utilizing easily sourced measure data and assumptions for project level impacts. The BCA framework utilizes assumptions from the Maryland EmPOWER BCA framework including the Maryland Jurisdiction-Specific Test (MJST) which includes benefits such as GHG

emissions reductions to align with climate policies, low-income benefit adders to align with equity policies, and health and safety benefits to encourage weatherization and fuel switching (Cosgrove 2022). The MJST is most similar to the SCT though tailored to Maryland specific policies as described in the NSPM framework above. Utility resource savings are presented as utility avoided costs for simplicity, but include avoided costs associated with electric and gas energy, capacity, T&D, and DRIPE as well as RPS costs. States that use NSPM-based JST frameworks include Maryland, Minnesota, Michigan, and others (NESP 2023).

Measure data including energy and demand impacts, effective useful life, and incremental cost was taken from the Michigan Energy Measure Database for ease of utilizing a single source with aligned costs and energy impacts (Michigan Public Service Commission 2024). Deemed measure savings were used to produce illustrative results which would vary in reality based on climate, home type, home heating fuels, project scope, and other factors. Measures assumed to be included in the project include:

- Ceiling Insulation – R-19 base to R-60 retrofit
- Wall Insulation – R-11 base, add R-5 continuous retrofit
- Door Weatherstripping
- Infiltration Reduction – 20% reduction in infiltration

Actual home retrofit projects can contain a multitude of measures impacting several end-uses including HVAC and water heating. Costs and energy impacts from home retrofit projects can vary significantly based on the scope of the retrofit and the baseline characteristics of a home.

BCA value streams included in each test vary, but across all tests the value streams are defined as:

- **Program administration costs** – an estimate of a portion of utility costs associated with implementing home retrofit programs scaled to a per project basis.
- **Incremental costs** – due to the nature of insulation and air sealing measures, the full cost of the project was assumed as the incremental cost.
- **Utility Incentive Costs** – value of utility program incentives
- **Utility avoided costs** - as described in the BCA Assumptions and Setup above.
- **Federal Tax Credits** – value of IRA tax credits only for non-low-income customers.
- **Federal Rebates and Tax Credits** – value of IRA rebates and tax credits for low-income customers.
- **Health, safety, and comfort adder –** health and safety adder applied to energy benefits for home retrofit projects that include insulation and air sealing measures and a shell comfort value added per year for participant comfort benefits.
- **Social Cost of Carbon** – value of lifetime emissions reductions utilizing Maryland Department of Environment emissions forecasts and the EPA social cost of carbon.
- **Methane emissions impact** – value of methane emissions reductions.
- **Risk adder** – a percentage adder to electric energy benefits.

BCA Value Streams and Results

Sections below illustrate the BCA results of the Jurisdictional Specific Test (JST and similar to societal cost test in this case), the Total Resource Cost Test (TRC), and the Utility Cost Test (UCT, also known as the program administrator cost test) along with the scale of the value streams, both costs and benefits, included in each test.

Non-Low-Income BCA Results. Figure 3 illustrates the value streams for the JST, TRC, and UCT tests applied to a non-low-income insulation and air sealing project. Notably, the social cost of carbon and federal tax credits push the project to be cost-effective in the JST. In this case, the test could be considered a modified TRC test with the inclusion of federal tax credits and health, safety, and comfort adders. The inclusion of these additional values streams increases the modified TRC results, which would be lower if not considered. Costs and benefits in the UCT are solely related to utility costs and benefits so it considers the utility incentive costs rather than the higher customer costs for the project/measures. The UCT may be impacted by IRA funding if the utility-specific incentives are changed in recognition of federal funds also available to customers, but, given the complexities and uncertainty on incentive changes, this was not considered for this analysis.

	Value Streams	MJST Value Streams	TRC Value Streams	UCT Value Streams
Costs	Program Administration Costs	$ (329)	$ (329)	$ (329)
	Incremental Costs	$ (2,616)	$ (2,616)	$ -
	Utility Incentive Costs	$ -	$ -	$ (786)
Benefits	Utility Avoided Costs	$ 1,421	$ 1,421	$ 1,421
	Federal Tax Credit	$ 783	$ 783	$ -
	Health, Safety, Comfort Adder	$ 554	$ 554	$ -
	Social Cost of Carbon, CO2 Impact	$ 2,640	$ -	$ -
	Methane Emissions Impact	$ 280	$ -	$ -
	Risk Adder	$ 121	$ -	$ -
	Net Benefits	$ 2,854	$ (187)	$ 306
	BCA Test Ratio	1.969	0.937	1.274

Figure 3: JST, TRC, and UCT value stream summary, net benefits, and cost-effectiveness ratio for an insulation and air sealing project.[3]

In BCA testing, a test ratio above 1.0 represents a result where the benefits exceed the costs given the value streams included. Jurisdictions may consider cost-effectiveness at different levels, mandating that each program, measure, or only the portfolio needs to be cost-effective. The results shown here are for a single project and may omit additional value streams that are necessary to calculate program- or portfolio-level cost-effectiveness.

Across all three tests, costs and benefits are measured based on a distinct perspective. The JST, representing a societal perspective in this case, allows for the most inclusive valuation of benefits extraneous to utility system impacts. The JST, in this case, puts a value on the project's

[3] Federal Tax Credit only includes tax credits and does not include any potential IRA Home Energy Rebate program incentives as benefits.

contributions to state policy goals surrounding climate and equity, most notably showing a significant benefit from GHG emissions reductions.

Low-Income BCA Results. Maryland includes additional benefits in the form of adders for low-income customer projects in addition to the expanded federal funding low-income customers can qualify for in the form of IRA rebates. Low-income federal rebates and tax credits can vary based on which rebate program (HOMES or Home Electrification) the project participates in when combined with other potential measures and the tax liability of the household. Figure 4 illustrates the value streams for the JST, TRC, and UCT tests for a low-income customer project. The same project details are assumed for ease of comparison with the non-low-income results.

	Value Streams	MJST Value Streams	TRC Value Streams	UCT Value Streams
Costs	Program Administration Costs	$ (329)	$ (329)	$ (329)
	Incremental Costs	$ (2,616)	$ (2,616)	$ -
	Utility Incentive Costs	$ -	$ -	$ (1,046)
Benefits	Utility Avoided Costs	$ 1,421	$ 1,421	$ 1,421
	Federal Tax Credit	$ 1,529	$ 1,529	$ -
	Health, Safety, Comfort Adder	$ 792	$ 792	$ -
	Social Cost of Carbon, CO2 Impact	$ 2,640	$ -	$ -
	Methane Emissions Impact	$ 280	$ -	$ -
	Risk Adder	$ 121	$ -	$ -
	Net Benefits	**$ 3,839**	**$ 798**	**$ 46**
	BCA Test Ratio	**2.304**	**1.271**	**1.034**

Figure 4: JST, TRC, and UCT value stream summary, net benefits, and cost-effectiveness ratio for an insulation and air sealing project with low-income considerations.[4]

This BCA analysis shows that there are prudent considerations to be made across the range of cost-effectiveness tests, whether it is simple modifications recognizing tax credits as reductions on costs or broader changes to frameworks that align better with changing policies in each jurisdiction. These changes could be beneficial to realize the long-lasting benefits of insulation and air-sealing measures to the utility, customers, and society as a whole.

Conclusions

While changes in the DSM program environment discussed in this paper are wide ranging and not all may be applicable to every state and jurisdiction, it is illustrated in Figure 5 that there are opportunities for utilities to pursue a renewed vigor for home retrofit programs. Home retrofits are a significant investment, but between federal and utility incentives in the market, the cost barriers are coming down to enable broader and more equitable participation in these programs.

[4] Federal Tax Credit includes tax credits and an illustrative amount of benefit which could come from IRA Home Energy Rebate Programs. The scale of rebates will vary given many states have not yet released their implementation plans.

1.	**Market IRA Programs**
•Include IRA Tax Credit information for insulation and other project types where programs overlap. •Include future IRA rebate program information when available.	
2.	**Coordinate with SEOs**
•Begin conversations with state energy offices on rebate program designs. •Discuss implementation plan and how state and utility programs can operate home retrofit offerings without confusion in the market. •Utility and SEO programs should encourage or require whole home retrofits including insulation and air sealing for energy efficiency and electrification to maximize the long term impacts.	
3.	**Align utility Offerings with IRA Programs**
•Where feasible and prudent, align measure requirements or incentive tiers with IRA tax credit and rebate programs to allow for ease of stacking incentives in the market.	
4.	**Explore Regulatory Policies**
•Explore state policies and open discussions with regulatory bodies on how DSM programs are supporting state and local policies. •Explore whether existing BCA frameworks recognize the value of DSM programs in support of state and local policies and whether changes are needed to create better alignment.	
5.	**Incorporate Changes into Utility Planning and Design**
•Create a feedback loop to continually ensure alignment of offerings and optimal impact in the market. •Study the impacts of expanding home retrofit programs to meet state and local policy goals, where whole home retrofits, including insulation and air sealing, can ensure the most impactful outcomes to customers, utilities, and the jurisdiction overall.	

Figure 5. Steps utilities can take to account for federal and state policies and apply those changes to DSM portfolios.

Not every jurisdiction may have parallel policies and implementation of federal rebate programs will vary by state and may still be uncertain, but every jurisdiction could benefit from its own analysis to gauge where there are opportunities to improve programs and maximize the impact of all funding in the market. In many ways, a slight variation in perspective can open regulatory eyes to value and benefits not always shown through traditional utility resource-centric BCA results and metrics. It may prove in the long run that these changes in perspectives can provide an opening to drive long lasting energy savings and GHG emissions reductions through energy efficiency and electrification home retrofits.

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