



# **Comments to the Maryland Public Service Commission on EmPOWER 2021-2023 Cycle Results and Q3-Q4 2023 Semi-Annual Reports**

**Prepared by**



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**(As amended and restated on  
April 16, 2024 for formatting)**

In 2023,  
EmPOWER  
programs  
generated  
nearly \$1  
billion in  
benefits.

These comments contain observations and analysis of EmPOWER Maryland residential program results for 2023 and the 2021-2023. They summarize progress made in the recently ended cycle—both in terms of performance and program strategies—and note opportunities and challenges ahead.

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# Executive Summary

The 2021-2023 EmPOWER program cycle yielded significant successes and substantial net benefits for consumers and the State of Maryland as a whole. Over the three years EmPOWER generated more than 26 million MWh of lifecycle electricity savings, with electric and gas savings worth more than \$2.6 million in present dollars. EmPOWER energy efficiency programs generated savings at an average cost of 3.5 cents/kwh, roughly one third the cost of generated electricity. In addition, EmPOWER generated a host of other economic, environmental and social benefits.

At the same time the EmPOWER portfolio has significant flaws. In particular, the program is misaligned with Maryland climate and building policies by providing incentives for the installation of new long-lived gas appliances and by failing to implement HVAC and water heating program strategies at scale and in the manner needed to transform heat pump markets.

In the residential sector—the primary focus of these comments—the EmPOWER electric utilities achieved an average savings of more than 2.3% of electricity sales. Although the Exelon utilities (Baltimore Gas and Electric, Delmarva Power & Light (DPL), and Potomac Electric Power (Pepco)) relied substantially on front-of-meter savings not paid for by EmPOWER, Potomac Edison and SMECO reached or exceeded their 2.0% statutory goals with energy efficiency and demand response savings alone.

Washington Gas's residential portfolio achieved its savings target in 2023 for the first time in at least six years. This was not quite enough for it to achieve its savings target for the full three-year cycle, however. BGE fell dramatically short of its gas savings targets, achieving only half of what it set out in its plans for the 2021-2023 cycle.

All utilities once again ended the cycle significantly under budget (~15% below overall).

DHCD achieved only 60% of its forecasted savings across the three-year cycle. The agency succeeded at achieving high savings per participant, but it fell far short (<40%) of its overall participation targets. Reaching and engaging income-eligible participants will be the most important step to dramatically ramping up savings in the coming cycle.

On the electric side, most utilities achieved their targets in most program areas. (See Figure 4.) The Lighting and Behavioral programs again contributed the most to annual savings (Figure 5), although several utilities fell short of Behavioral savings targets this cycle. Of note, BGE achieved less than half of its Behavioral gas forecasts. Considering lifetime savings—which are more closely correlated with lifetime greenhouse gas (GHG) reductions—the Residential Retrofit program produced the most savings. Most utilities also excelled against savings targets for their Residential Retrofit programs, with all but SMECO substantially exceeding forecasts.

As in previous years, the utilities fell most short of targets with their HVAC programs. Only SMECO hit its targets, with other utilities coming in at 60-75%. BGE achieved less than 2% of its gas savings forecast for HVAC. Although some utilities have made incremental progress in

shifting program strategies to engage the supply chain, it appears that most heat pump market activity is happening outside of program influence, indicating many market participants (e.g. contractors and distributors) are ambivalent at best about utility offerings. Utilities continue to promote central air conditioners (CAC) more than heat pumps, despite the far greater energy and bill savings that heat pumps offer. Most other jurisdictions have ended CAC incentives because they compete with efforts to promote heat pumps.

Lack of market engagement is true as well for heat pump water heaters, which are part of the Appliance program. Heat pump water heaters incentivized through EmPOWER represent <1% of water heater sales.

The results for heat pump and heat pump water heaters are not aligned with state policies, including a target recommended by the Maryland Commission on Climate Change for heat pumps to represent 50% of sales for HVAC and water heating by 2030.

Continued EmPOWER incentives for customers to install long-lived gas appliances is even more problematic. Even if the new gas appliances are incrementally more efficient than the gas appliances, they result in unsustainable levels of GHG emissions for one or two decades to come, well past statutory emission targets for 2031. WGL provided incentives for more than 18,000 gas appliances, including those installed in 12,000 new homes. If EmPOWER had successfully promoted heat pumps in those new homes, the GHG savings would have been greater than all of WGL's programs this entire three-year cycle. Subsidies for installation of gas appliances also puts customers at economic risk over the long term, exposing them to increasing gas rates or the cost of retrofits to electric appliances the end of life for gas appliances.

The utilities achieved mediocre results in their once renowned demand response (DR) programs. Their DR results have largely stagnated, with utilities not achieving real-world demand response results at target levels; SMECO was the exception. Although a significant number of customers participate in DR, there is still substantial room for growth in how these customers are engaged to help manage load throughout the day or year.

Additional key findings from individual program areas:

- Disruptions in implementation vendor services left most utilities well short of savings targets for Appliance Recycling.
- Utility performance varied significantly in the Residential Retrofit programs; for example, DPL achieves more than twice as much savings per participant as BGE in Home Performance, and Pepco converts more than twice as many audits into retrofits as BGE.
- In 2023, more than six times as many income-eligible customers participated in the utility QHEC program than the comparable Department of Housing and Community Development (DHCD) Base Efficiency program, despite the fact that the DHCD program generates three times the savings per project as QHEC.

- Utility performance for New Construction programs ranged from ~70% of savings target for BGE to 200% for DPL. Potomac Edison and SMECO achieved savings in this program at roughly half the cost of Pepco.
- The utilities did poorly in engaging New Construction participants with electric appliances and achieved very little participation in their Zero-Energy Ready Homes programs.

## Definitions

**Annual savings** refers to the savings achieved in the first year after a measure is installed or otherwise paid for. Annual savings can be used to measure greenhouse gases reductions or energy savings, in this report we only use it for the latter.

**Lifecycle savings/reductions** refers to the energy savings or greenhouse gas reductions achieved throughout the expected life of the measure, taking into account projected changes over time (e.g., avoided emissions from future electricity savings will be lower). When lifetime savings are put in monetary terms, projected future energy costs are used and everything is discounted to present value dollars.

**Gross savings** refers to the total savings (either annual or lifecycle) from measures promoted by EmPOWER programs, without consideration to whether the measures might have been installed or pursued absent the program.

**Net savings** refers to the estimated savings (either annual or lifecycle) from measures promoted by EmPOWER programs that are *attributed* to the program and determined under the evaluation framework to have not occurred absent the program.

**Cycle to Date (CTD)** refers to totals since the start of the three-year cycle, i.e., from 2021 through 2023. When reported savings (or spending or participation) are compared to *forecasts* on a CTD basis, the forecasts are also pro-rated for the proportion of the cycle elapsed; since this is the final report of the cycle, CTD reflects performance or forecasts for the full cycle.

**Program Year:** refers to full-year totals

## Acronyms

AMI: Area Median Income or Advanced Metering Infrastructure, depending on context

ASHP: Air-source heat pump

BGE: Baltimore Gas and Electric Company

BTU: British Thermal Unit

CAC: Central air conditioner

DHCD: Department of Housing and Community Development (Maryland)

DPL: Delmarva Power & Light Company

DR: Demand Response  
ESRPP: ENERGY STAR Retail Products Platform  
GHG: Greenhouse gas  
HEIP: Home Energy Improvement Program (SMECO only)  
HER: Home Energy Report  
HPWH: Heat pump water heater  
HPwES: Home Performance with EnergyStar  
HVAC: Heating, ventilation and air conditioning  
IOU: Investor-owned utility  
IRA: Inflation Reduction Act (U.S.)  
KWh: Kilowatt-hour  
LED: Light emitting diode  
MEA: Maryland Energy Administration  
MEEHA: Multifamily Energy Efficiency and Housing Affordability Program (DHCD only)  
MEET: Maryland Energy Efficiency Tune-Up (DHCD only)  
ML: MailLog. This is a reference to a filed document identifier on the Maryland Public Service Commission's website.<sup>1</sup>  
MMBTU: Million BTU  
MWh: Megawatt-hour (1,000 kilowatt-hours)  
OHEP: Office of Home Energy Programs (Maryland)  
QHEC: Quick Home Energy Check-up  
SMECO: Southern Maryland Electric Cooperative, Inc.  
WGL: Washington Gas Light Company  
ZERH: Zero Energy Ready Homes

## Citations

All values not individually cited come directly from the Semi-Annual report tables provided by the utilities and DHCD. This includes simple sums of totals across the utilities or simple mathematical calculations (e.g., reported savings divided by forecasted savings).

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<sup>1</sup> Filed documents can be searched by MailLog number through this page:  
<https://webpsc.psc.state.md.us/DMS/mailllogsearch>

# EmPOWER Residential Program

## Descriptions

Each EmPOWER program is designed to target specific technologies, customers, or both. Programs focus on different decision points related to energy use and equipment purchase. For example, some programs target customers who are shopping in a store (or online) for a new appliance and others seek to engage and motivate them when they are at home reviewing their energy bills. Other programs target the contractors and suppliers who influence customer choices about equipment installed for them (e.g. a new heating system).

### Lighting

The EmPOWER Retail Lighting programs provided instant discounts for light-emitting diode (LED) products sold via retail channels, pop-up lighting events, online marketplaces and through partnerships with Maryland food banks targeting limited income customers. In 2022 federal standards for general service lighting increased to levels that effectively transformed residential lighting to high efficiency LED technology. The residential lighting program as offered in 2021-2022 will not be offered in the 2024-2026 cycle.

### Appliance Rebate

The Appliance Rebate programs offer instant, online, and paper rebates for select ENERGY STAR products, including room air conditioners, dehumidifiers, room air purifiers, heat pump water heaters, refrigerators, freezers, clothes washers, clothes dryers, pool pumps, advanced power strips, and smart thermostats.

The EmPOWER electric utilities deliver appliance program rebates through separate “downstream” and “midstream” channels, which seek to influence equipment purchases in different ways. The suite of eligible measures varies from utility to utility except for those offerings delivered through the ENERGY STAR® Retail Products Platform (ESRPP), which is a midstream channel. The traditional downstream offerings involve individual customer applications, whereas the midstream point-of-sale offerings are delivered through instant coupon rebates, instant markdown, or a midstream retailer incentive (i.e., the ESRPP) with participating retailers. All five electric utilities also offer a midstream heat pump water heater initiative offering incentives through participating distributors, which typically sell equipment to contractors not end-use customers.

### Appliance Recycling

The Appliance Recycling program encourages the early retirement and recycling of inefficient operating appliances by offering customers a rebate and free appliance pick-up. The program primarily targets recycling of refrigerators and freezers, but also offers ancillary pick-ups for room air conditioners and dehumidifiers in addition to local community turn-in events.



## **HVAC**

The HVAC program promotes efficient heating and cooling technology for homes, including efficient air conditioners, heat pumps, and furnace technology, along with smart thermostats installed with HVAC measures. For most HVAC equipment, contractors and distributors are highly influential about the choice of equipment that customers have effective access to, whether due to stocking, installer knowledge, or other factors. Starting in 2018, HVAC programs largely transitioned to a midstream channel model, which targets incentives and engagement at equipment distributors and installation contractors. Although some residential retrofit projects include HVAC measures, the HVAC Program is the primary EmPOWER program for influencing replacement of heating and cooling equipment.

## **Residential Retrofit**

The Residential Retrofit program group includes Quick Home Energy Check-up (QHEC), Home Performance with Energy Star (HPwES) and SMECO's Home Energy Improvement Program (HEIP) which combines elements of the two other programs offered by the other electric utilities. Washington Gas supports residential retrofits through its Coordinated Program, through which WGL and electric utilities share costs and savings in homes with electric and gas savings. The residential retrofit programs are distinct from most other EmPOWER programs in that they employ a "whole home" (vs. technology specific) approach.

## **QHEC**

QHEC (and HEIP) include an initial walk-through where a certified technician inspects the condition of a home, identifies opportunities for savings, and offers the direct installation of smaller measures that provide immediate savings, such as smart power strips or efficient flow showerheads. QHEC is free to EmPOWER ratepayers.

## **HPwES & HEIP**

HPwES begins with a more comprehensive energy audit—including a blower door test, for example—to identify energy savings opportunities. Direct installation measures are also offered. Audit results point participants to performance-based rebates for air sealing and insulation, heating and cooling equipment, and other weatherization measures. Participants in need of financing may be directed to the Maryland Clean Energy Center's Advantage Loan Program.

## **New Construction**

The EmPOWER incentive program for residential new construction is based on the national ENERGY STAR® program and is referred to by the utilities as ENERGY STAR for New Homes. The basic program and incentive structure target whole home energy performance. Homes that earn the ENERGY STAR label are estimated to be at least 10% more energy efficient than the prevailing energy code and are backed by established national quality standards. In the 2021-2023 cycle, utilities began offering specific incentives for so-called "additive measures"—individual additional measures such as high efficiency heating, cooling, and water heating equipment—as well as an option to certify to U.S. DOE's Zero Energy Ready Homes

(ZERH), a standard of efficiency intended to allow the home to be powered through as much energy as could be generated onsite.

### **Energy Efficiency Kits**

Potomac Edison and SMECO offered energy efficiency kits sent through the mail to customers. The kits contain basic energy efficiency measures, such as LED bulbs, that customers can install themselves to reduce energy consumption. The kits may be offered to customers opening new utility accounts, upon request, or other circumstances. DHCD started a kits-based program in 2022, targeting limited income households. With the end of most residential LED measures, energy efficiency kits will be substantially limited in 2024-2026.

### **Behavioral**

The EmPOWER Behavioral programs save energy by providing insights to customers through printed and emailed home energy reports (HERs), digital tools, and messaging to customers. These tools leverage advanced meter infrastructure (AMI) data to influence energy saving behavioral changes by customers (compared statistically to non-targeted customers). Energy savings accrue as end-users adopt behaviors recommended in the reports based on usage patterns and historical trends. In EmPOWER, savings from behavioral programs are assumed to last for a single year.

Behavioral programs utilize social norms and feedback to achieve energy reductions through behavioral modifications. Many programs offer advice to improve energy consumption, though programs continue to evolve to target specific behaviors relevant to the end user such as no- or low-cost actions, seasonal tips, cross-promotional messaging, or disaggregated insights. Generally, behavioral programs result in habitual curtailment or small efficiency upgrades (such as lightbulbs). Savings tend to be largest in the summer and winter when space conditioning appliances are most heavily relied on. Behavioral programs may also recommend participation in other utility programs, though this spillover represents a small fraction of overall program savings which are not accrued in behavioral program totals.<sup>2</sup>

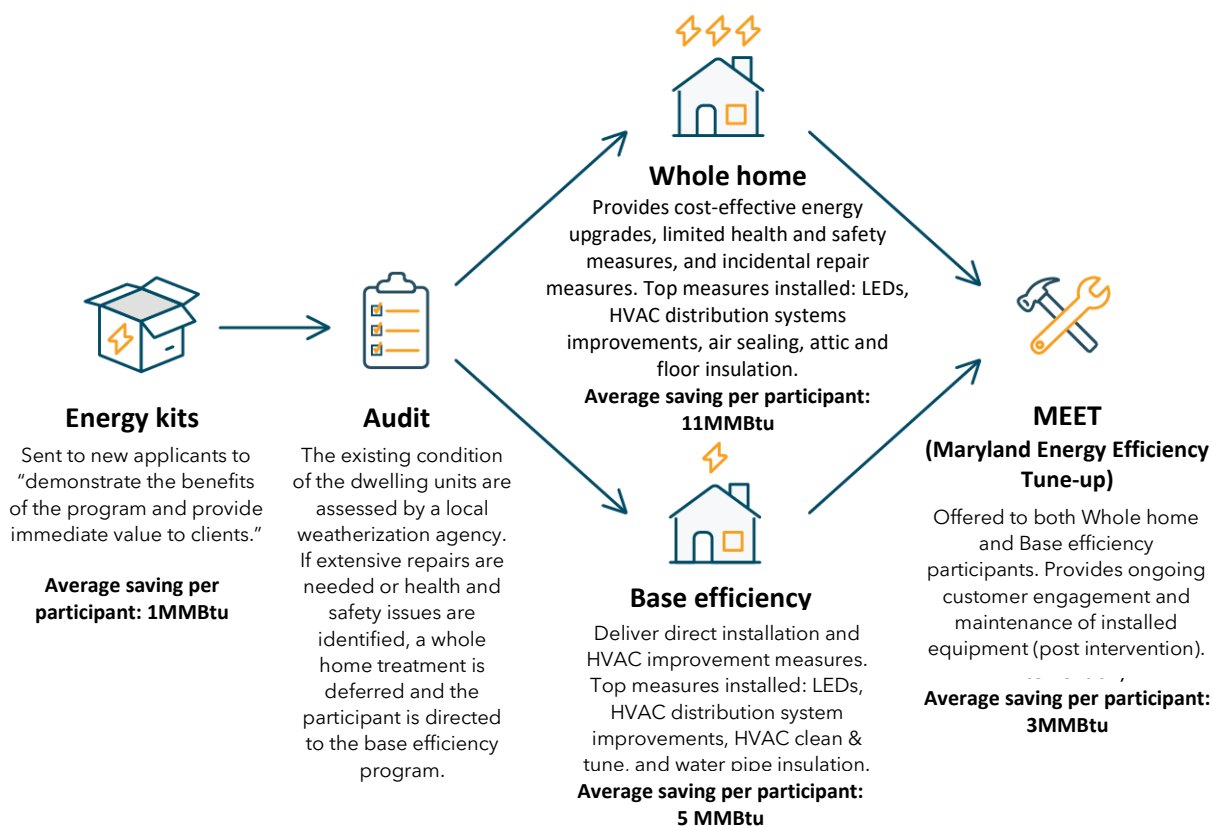
### **Limited Income**

The Maryland Department of Housing and Community Development (DHCD) programs serve both single family and multifamily markets. Eligible customers have household incomes less than 250% of the Federal Poverty Level. Although participation in DHCD programs has no direct cost to participants, identifying eligible customers and engaging and supporting them to participate in programs is an enormous and complex task. For the single-family segment, a comprehensive suite of programs targets customers at different stages of their journey toward energy efficiency, based on specific barriers to participation, as illustrated in Figure 1.

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<sup>2</sup> Allcott, Hunt, and Todd Rogers, "The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation." *American Economic Review*, 104 (10): 3003-37 (2014).

Figure 1. DHCD program summary.



Marylanders in the multifamily market are eligible to receive an energy kit. DHCD also runs the Multifamily Energy Efficiency and Housing Affordability Program (MEEHA) to generate deep energy savings in buildings that are home to a minimum of 20% of households at 80% of the average median income (AMI) or less.<sup>3</sup>

## Demand Response

With the exception of Potomac Edison, the EmPOWER electric utilities offer customers and members a variety of options to encourage participation in Demand Response (DR) programs, increasingly referred to broadly as "demand flexibility." These programs use a variety of technologies, equipment, and behavioral/economic incentive strategies to encourage changes in residential load at critical or strategic moments when electricity demand is at its peak to offset costs that would otherwise be incurred to add capacity to the

<sup>3</sup> <https://dhcd.maryland.gov/HousingDevelopment/Pages/EnergyEfficiencyWeatherization.aspx>

distribution system. They help demand follow supply rather than the other way around, which can be highly cost-effective.

There are two broad approaches to DR programs: direct load control (DLC) through smart devices (in exchange for financial incentives) and behavioral DR which send customers information and price signals to encourage demand reduction. A general trend in DLC programs is a Bring Your Own Device (BYOD) approach that allows customers to opt in using any eligible device (e.g., smart thermostat) from multiple manufacturers.

Demand Response differs somewhat from energy efficiency offerings because there is inherent economic value in the *capacity* to reduce demand, even during times when that capacity is not called on. The regional transmission organization, PJM Interconnection LLC, has strict guidelines on what can be counted as DR potential. For that reason, for DR, both the forecasted and reported “savings” in summary tables reflect potential demand reduction, not actuals.

# Benefits of EmPOWER



Energy efficiency continues to be a “least-cost resource” for the electric utility system. The more energy efficiency that is acquired, the less of more expensive resources consumers need to purchase—e.g., generated power. The cost to acquire a kilowatt-hour (kWh) of savings through EmPOWER for the cycle-to-date (CTD) was 3.5 cents, ranging from 2.6 - 5.0 cents across utilities, as shown in Table 1. This cost is significantly lower than purchased electricity, which ranges from 8.6 - 11.1 cents per kWh for customers purchasing power from their utility under Maryland’s standard offer service program.<sup>4</sup> Much of the savings from EmPOWER programs offered during this cycle will last well into future years.

Table 1: CTD energy and cost savings—all EmPOWER electric utility programs.

Utility	Reported Program Expenditures (\$)	Reported Lifecycle Savings (MWh)	Cost per Lifecycle Savings (c/kWh)
<b>POTOMAC EDISON</b>	\$111,392,497	4,299,707	<b>2.6</b>
<b>BGE</b>	\$423,699,638	11,143,344	<b>3.8</b>
<b>PEPCO</b>	\$248,478,676	7,380,904	<b>3.4</b>
<b>DPL</b>	\$80,118,396	2,277,441	<b>3.3</b>
<b>SMECO</b>	\$78,526,007	1,553,276	<b>5.0</b>
<b>Total</b>	\$942,215,214	26,654,672	<b>3.5</b>

<sup>4</sup> The weighted average Standard Offer Service (SOS) price from October 1, 2023 to May 31, 2024 for the participating electric utilities ranges from \$0.0653 to \$0.0833 per kWh, based on the data available at <https://www.psc.state.md.us/electricity/standard-offer-service/>.

Energy efficiency investments deliver myriad economic benefits to the electric system, such as avoided capital investments in peak generation capacity, avoided investments in transmission and distribution infrastructure, reduced line losses, and avoided reserves. These savings accrue to all ratepayers—regardless of whether they directly participate in EmPOWER programs. Although less pronounced than with electricity, reduced use of natural gas also has some broader utility system benefits.<sup>5</sup>

Of course, in addition to all the system-wide benefits, Marylanders who participate in EmPOWER energy efficiency and demand response programs receive a variety of direct benefits, such as reduced energy bills, reduced operation and maintenance costs, improved health, and increased comfort.

Beyond the direct benefits to ratepayers and program participants, EmPOWER programs result in societal benefits. EmPOWER helps Maryland achieve the greenhouse gas reduction targets in the Climate Solutions Now Act of 2022, discussed further in following sections. It also results in improved air quality, reduced energy burdens for low-income customers, jobs and workforce development benefits, and increased energy security and resilience.

EmPOWER benefits and costs are measured using a primary cost-effectiveness test, approved by the Commission, called the Primary Maryland Jurisdiction-Specific Test. This test was updated (and renamed) in 2022 with input from stakeholders and approval from the Commission.<sup>6</sup> The test cannot measure all costs and benefits, but it provides a robust tool for evaluating EmPOWER programs, plans, and investments.

In 2023, EmPOWER generated nearly \$1 billion in lifetime savings, contributing to the more than \$14 billion from EmPOWER since its inception.

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<sup>5</sup> Both gas and electricity utility systems must be sized and built to meet peak demand conditions and in the long-run, lower peak demand reduces system costs. However, electricity supply costs are also highly sensitive to peak demand reductions in the short term.

<sup>6</sup> Commission order 90261. June 15, 2022.

# EmPOWER Performance



## Overall EmPOWER Savings in 2023

**In 2023, EmPOWER energy efficiency and conservation programs generated over 8.4 million MWh of lifecycle electricity savings, as much power as used in more than 700,000 homes in a year.**

As shown in Table 2 below, in 2023 all electric utilities' reported savings exceeded the statutory target of saving 2% of 2016 sales, when accounting for both savings accrued from residential, commercial and industrial efficiency programs and savings from non-EmPOWER funded programs which the Commission allowed the utilities to count toward goals in this cycle.

The investor-owned utilities (IOUs) report achieving between 2.2 - 2.6% savings, including Conservation Voltage Reduction (CVR) savings. SMECO achieved 2.2% savings and did not claim any CVR savings in 2023.

Under EmPOWER, each utility seeks approval from the Commission for a *forecasted* savings target for each year of its three-year plan. Averaged over the three-year cycle, those forecasts must meet statutory savings targets. For 2023, each utility forecast savings substantially in excess of the minimum savings target in statute. Only Potomac Edison exceeded its forecasted savings goal.

The final column in Table 2 shows reported savings in 2023 from EmPOWER-funded energy efficiency and demand response (EE & DR) programs only, expressed as a percentage of 2016 sales. Potomac Edison and SMECO achieved or exceeded 2% savings without CVR.

Table 2: 2023 reported electric utility savings compared to forecasts and baseline sales.

Utility	Forecasted Savings		Reported Savings		Reported EE & DR Savings
	Annual MWh	% of Sales	Annual MWh	% of Sales	% of Sales
<b>POTOMAC EDISON</b>	164,543	2.2%	167,652	<b>2.3%</b>	<b>2.0%</b>
<b>BGE</b>	766,151	2.4%	745,466	<b>2.4%</b>	<b>1.7%</b>
<b>PEPCO</b>	421,246	2.9%	373,031	<b>2.6%</b>	<b>1.7%</b>
<b>DPL</b>	98,191	2.3%	91,003	<b>2.2%</b>	<b>1.4%</b>
<b>SMECO</b>	81,044	2.4%	75,042	<b>2.2%</b>	<b>2.2%</b>

The EmPOWER statute in place in 2023 had no statutory gas savings targets. However, the Commission establishes such targets for gas utility plans administratively, and the gas utilities are required to forecast savings for each year of their Commission-approved plans. Table 3 shows forecasted and reported gas savings for 2023, as well as for the full 2021-2023 cycle.

Washington Gas achieved its savings target in 2023 for the first time in at least six years. This was not enough for it to achieve its savings target for the full three-year cycle. All of the shortfall was in the residential programs, discussed in the following section. (In fact, WGL’s commercial and industrial savings outperformed forecasts in 2023 and the cycle as a whole, making the picture worse for its residential program performance.)

BGE made only incremental improvements on its poor performance in 2022, saving only half of its forecasted gas savings in 2023 and the cycle as a whole. BGE forecasts almost zero gas savings from commercial and industrial programs, so all of its shortfall is also in the residential sector. Gas savings are shown in Table 3.

Table 3: Reported gas utility savings compared to forecasts.

Utility	2023 Forecasted Savings, therms	2023 Reported Savings, therms	2023 Reported Savings, % of Forecast	Full Cycle Forecasted Savings, therms	Full Cycle Reported Savings, therms	Full Cycle Reported Savings, % of Forecast
<b>WGL</b>	2,462,952	2,836,469	<b>115%</b>	7,064,945	6,457,853	<b>91%</b>
<b>BGE</b>	5,404,198	2,622,933	<b>49%</b>	15,952,164	7,755,799	<b>49%</b>



The most recent cost-effectiveness evaluation for EmPOWER was for program year 2022.<sup>7</sup> At that time, all electric utilities demonstrated cost-effectiveness, as measured by the primary societal cost test, for both residential and commercial sectors. The statewide average was 2.1, indicating \$2 of benefit for every \$1 spent. Looking at the residential sector, the electric utilities had a range of cost-effectiveness, with BGE and Potomac Edison on the higher end (~2.3) and SMECO on the low end (~1.7) and the PHI utilities in between (~1.9). Washington Gas programs were also cost-effective for both residential and commercial sectors, with a portfolio average of 2.8 (and 3.2 for the residential sector).

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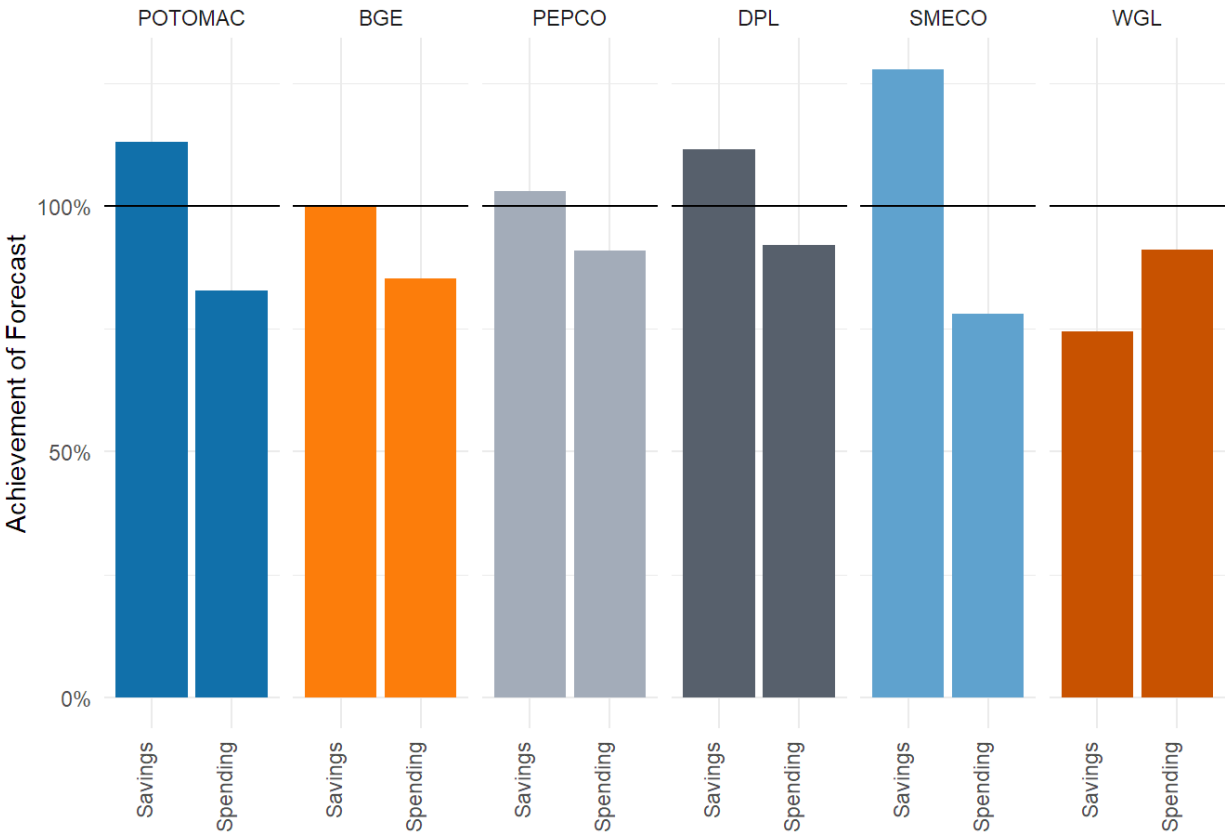
<sup>7</sup> EmPOWER Maryland 2022 Cost-Effectiveness Results Report. Guidehouse & Cadmus. October 2023. and Washington Gas Maryland:2022 Cost-Effectiveness Report. Guidehouse. September 2023.

# Residential Energy Savings

## All EmPOWER electric utilities achieved their 2021-2023 cycle savings forecasts while underspending their budgets.

Figure 2 shows the reported savings for the 2021-2023 cycle for residential programs as compared to the forecast for each utility, as well as corresponding budgets. For BGE, the figure presents electric savings performance. All electric utilities achieved or exceeded their electric savings targets. Washington Gas fell short of its residential energy savings forecast while spending roughly 90% of its budget. Reported savings relative to forecasts across all six EmPOWER utilities ranged from 75% to 128%.

Figure 2. CTD residential portfolio achievement of forecasted goals.



Behind those residential portfolio totals is highly varied performance by program and by utility. Figure 3 gives a snapshot of each electric utility’s performance in the major program areas. Later sections provide a closer review of the individual programs.

Figure 3. CTD achievement of forecasted savings in major program areas.

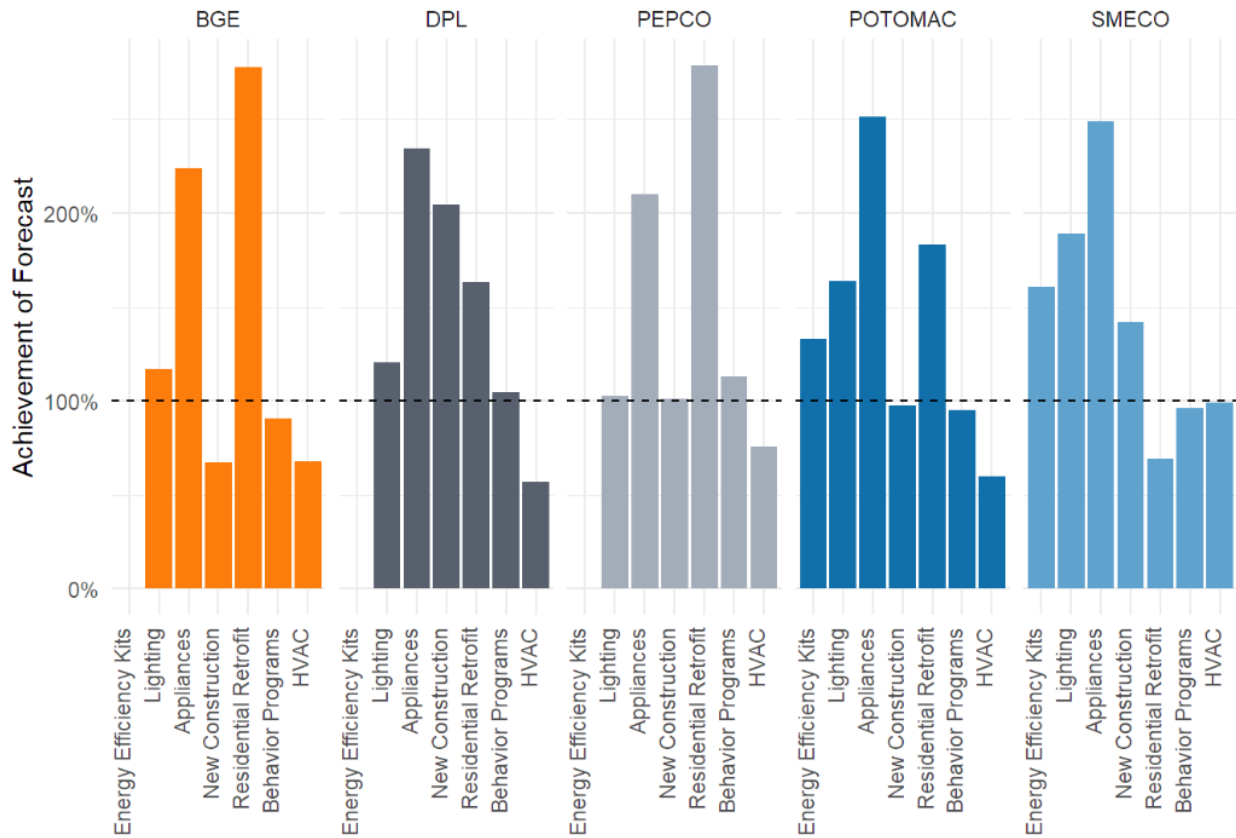
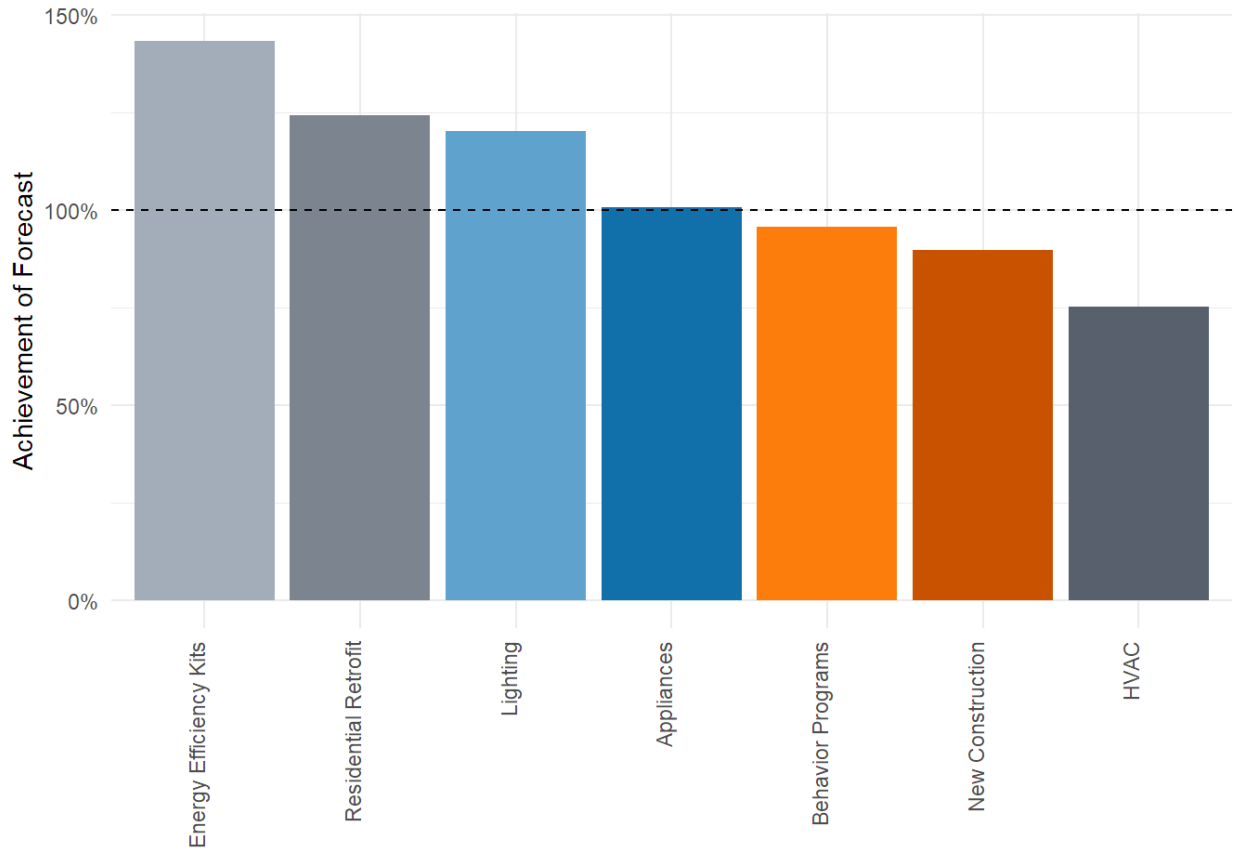


Figure 3 shows the Appliance program area to be the highest or second highest achieving, in terms of savings, across all utilities. The HVAC program area is the lowest performing program for all utilities except SMECO; for most utilities HVAC was the only program to fall substantially short of target. Half of BGE’s six programs underperformed relative to target, but the strength of its Appliances and Residential Retrofit programs compensated enough for BGE to meet its residential savings forecast. (Only Potomac Edison and SMECO had an Energy Efficiency Kits program in this cycle.)

The aggregated achievement of forecasts for the major program areas is shown in Figure 4, below. Aggregated achievement represents the sum of all electric utility savings and spending compared to forecasts. Figure 4 accounts for the size of different utilities to reflect absolute (not relative) progress across EmPOWER as a whole. As seen in Figure 3, above, New Construction demonstrates the most variance across utilities; the fact that the two largest utilities were behind target puts the program overall somewhat behind target. HVAC again stands out for poor performance overall; in other areas the electric utilities as a whole are on track.

Figure 4. CTD achievement of forecasted savings in major program areas, aggregated of all electric utilities.



The figures below show absolute energy savings for each program area, aggregated across the utilities. Figure 5 shows annual savings, showing the dominance of lighting and behavioral programs (which are assigned a one year measure life). Figure 6 shows lifecycle energy savings, which shows the decline of lighting savings in this cycle and especially in 2023. In 2023, the residential retrofit programs generated the greatest quantities of lifecycle energy savings.

Figure 5. CTD Annual savings for each program area by year, aggregated for all electric utilities.

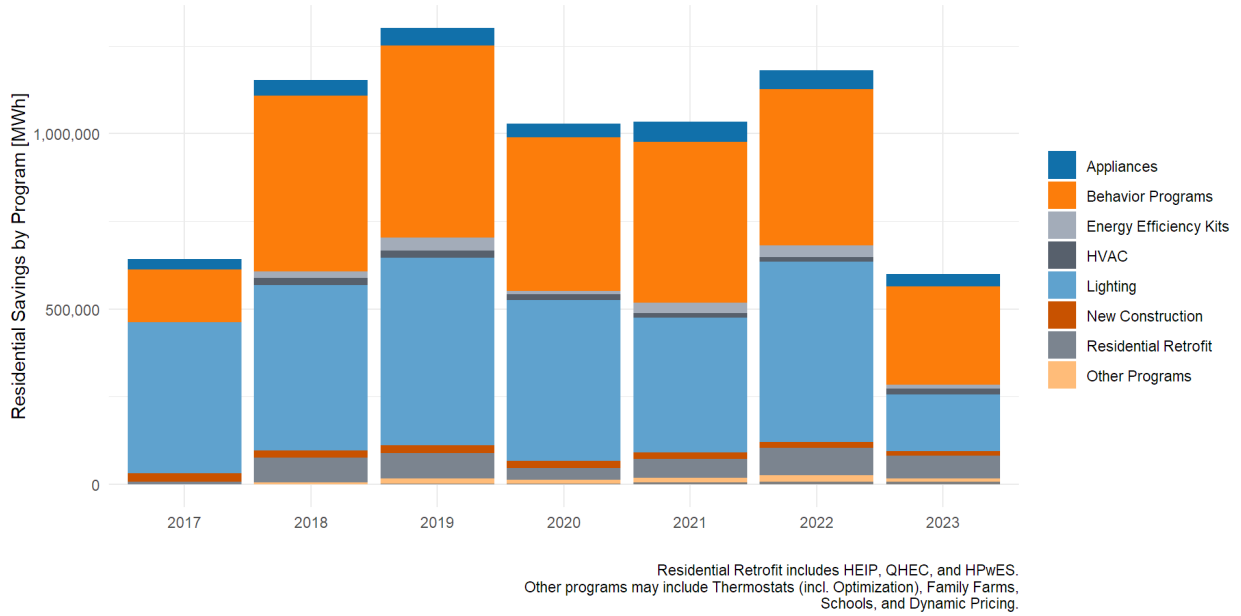
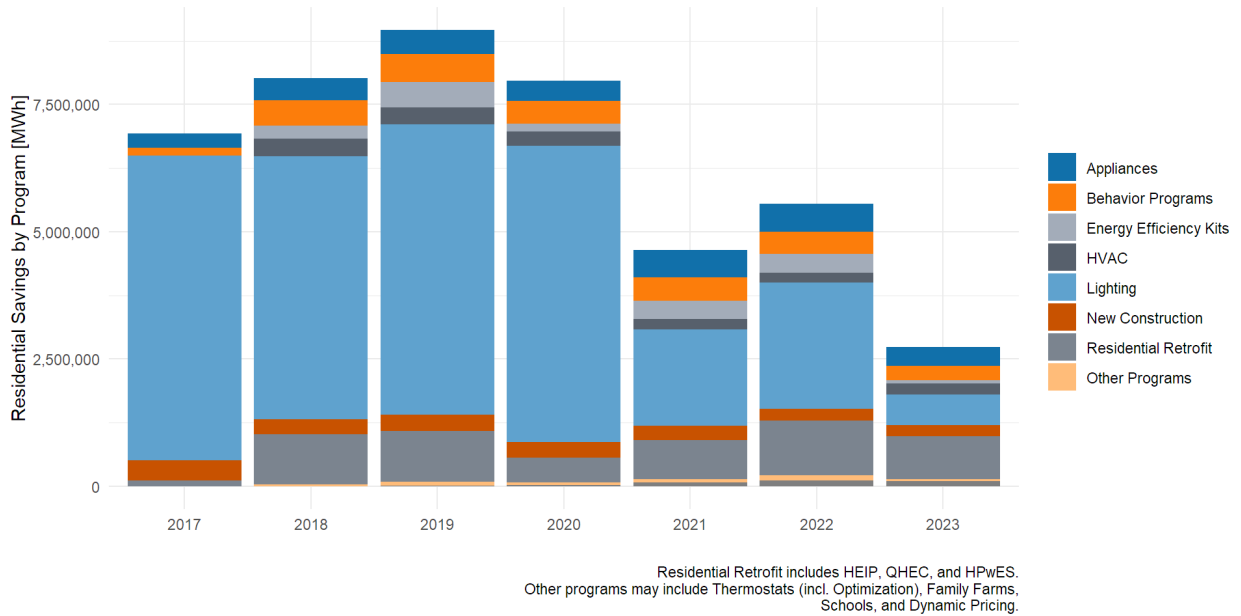


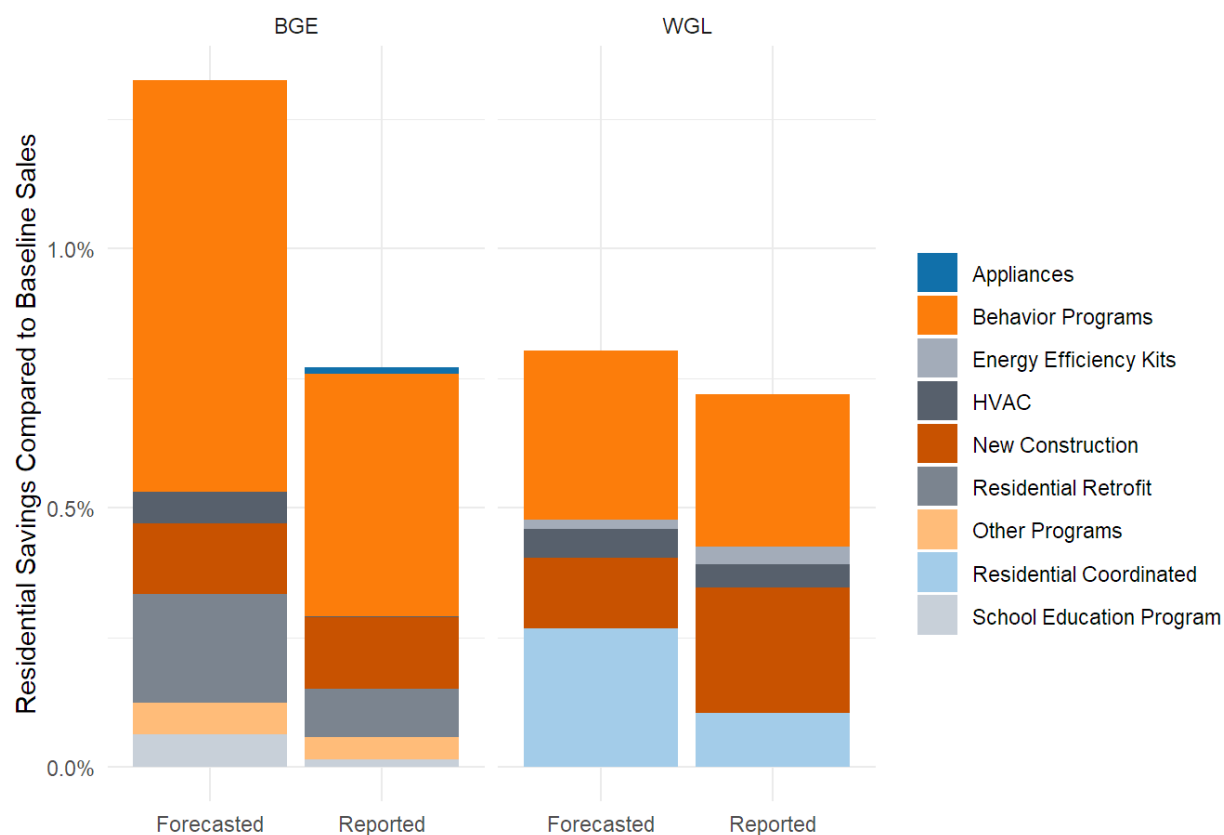
Figure 6. CTD Lifecycle savings for each program area by year, aggregated for all electric utilities.



Looking at the gas utility residential portfolios, shown in Figure 7, the biggest driver for WGL not meeting forecast is underperformance in the Residential Coordinated program, which is WGL’s contribution to gas-saving measures in the residential retrofit programs administered by the electric utilities. WGL reported substantially more savings in New Construction than forecast.

BGE continued to substantially underperform in its gas-saving programs, meeting less than 50% of CTD savings forecasts and failing to hit targets in any program area. BGE’s own residential retrofit program also struggled to achieve gas savings.

Figure 7. CTD achievement of forecasted gas savings in major program areas.



The Behavioral Program was each utilities’ largest source of absolute savings. However, both gas utilities—and especially BGE—fell meaningfully short of savings targets. This is particularly troubling because this program does not rely on the installation of long-lived gas appliances (which will emit greenhouse gases for a decade or more) and was forecasted to account for a large share of EmPOWER gas savings this cycle.

As of the end of 2022, the electric utilities’ residential programs had a range of cost-effectiveness as measured by the societal cost test. The numerical values indicate the ratio of benefits to costs:

- The most cost-effective programs were Energy Efficiency Kits (~7.5), followed by Behavioral (~5.0) and New Construction (~4.2).
- Looking across utilities, there is considerable variation in the New Construction program, with cost-effectiveness ranging from 4.3 or 6.3 for Potomac Edison and BGE to 1.7 for Pepco.

- Within the Home Performance/Home Energy Improvement Programs, Pepco, DPL, and SMECO are all <1.0 while Potomac Edison and BGE were at 1.1 and 1.5 respectively.
- Two programs had an EmPOWER-wide cost-effectiveness below 1.0: Appliance Rebates and HVAC (both ~0.8). DPL achieved a cost-effectiveness for its HVAC program of only 0.3.

A closer examination is warranted of opportunities to improve cost-effectiveness of the Appliance rebate program. It is also important to acknowledge that that it generated a significant quantity of gross savings, especially on a lifecycle basis. The HVAC program continues to need a more substantive overhaul. In the context of “market transformation”, cost-effectiveness may not be the most appropriate measure of success; however, the HVAC program is not succeeding sufficiently in market transformation, either, as described further below.

All Washington Gas residential programs were cost-effective, ranging from 2.1 (Behavioral) - 5.4 (New Construction). No cost-effectiveness test is able to fully measure consistency of a program or portfolio with Maryland policy objectives. Although the Maryland societal cost-test assigns a value to avoided GHG reduction, in the case of gas appliances, the baseline is an inefficient gas appliance. Therefore, it does not account for benefits or costs stemming from state policy that calls for a shift away from gas appliances altogether. If it did, it might assign a cost to the future need to replace an EmPOWER-rebated gas appliance with a heat pump, for example, or establish heat pumps as the baseline for replacement of heating equipment.

## Greenhouse Gas Reductions

In December 2023, Maryland finalized its state Climate Pollution Reduction Plan<sup>8</sup> to chart out the course of policies and investments needed to meet statutory targets in the Climate Solutions Now Act, including a 60% reduction in greenhouse gas (GHG) by 2031 and net zero emissions by 2045.<sup>9</sup> The plan requires steep reductions between 2025 and 2031, coinciding with the next two EmPOWER cycles. The plan specifically identifies EmPOWER as a key contributor to reduction in energy use in buildings—and fossil fuel use specifically.<sup>10</sup>

For this Semi-Annual period, the EmPOWER utilities have reported greenhouse gas emissions reduction in their summary tables for the first time. Last year the Commission's independent evaluator provided the current year and cycle-to-date GHG reductions for all program administrators, separated by fuel. The utilities provided GHG values for 2023, not separated by fuel. DHCD did not report GHG reductions. Comprehensive and consistent reporting on GHG reductions for the 2024-2026 cycle is one of the most critical uncompleted tasks assigned to the EmPOWER Process Improvement and Reporting (ERPI) Work Group.

Those reports show that in 2023, EmPOWER utilities generated 2.4 million metric tons of GHG emission reductions on a gross lifecycle basis. This is significantly more than the 1.8 million metric tons achieved in 2022.

For the CTD, EmPOWER programs generated 5.9 million tons of GHG reduction, with residential programs accounting for nearly half (2.9 million tons). Residential GHG reductions by program administrator are shown in Figure 8.

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<sup>8</sup>Maryland Climate Pollution Reduction Plan, December 2023.

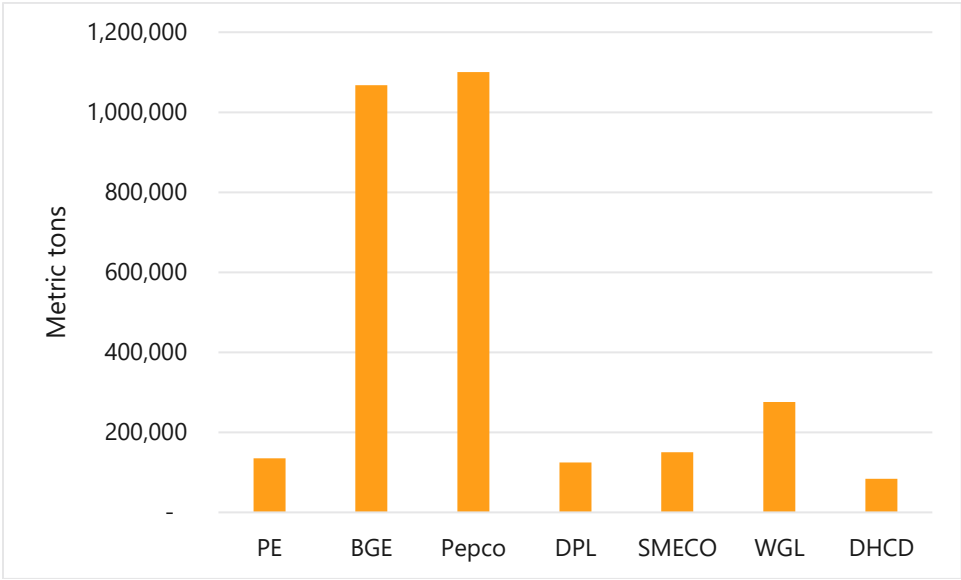
<https://mde.maryland.gov/programs/air/ClimateChange/Maryland%20Climate%20Reduction%20Plan/Maryland%27s%20Climate%20Pollution%20Reduction%20Plan%20-%20Final%20-%20Dec%2028%202023.pdf>

<sup>9</sup> Md. Code Ann., Envir., § 2-1204.1 - 2-1204.2 (2022).

<sup>10</sup> Maryland Climate Pollution Reduction Plan, December 2023. e.g., p. 38.



Figure 8. CTD residential lifecycle greenhouse gas reductions by program administrator.



The residential share of CTD lifecycle GHG emissions reductions was 49% of overall EmPOWER GHG reductions, a bit higher than the residential share of electricity sales in Maryland (~45%). The share of GHG reductions coming from residential programs varies significantly across utilities, however, as shown in Table 4. DHCD’s programs are primarily residential so nearly all of the agency’s GHG reductions come from that sector.

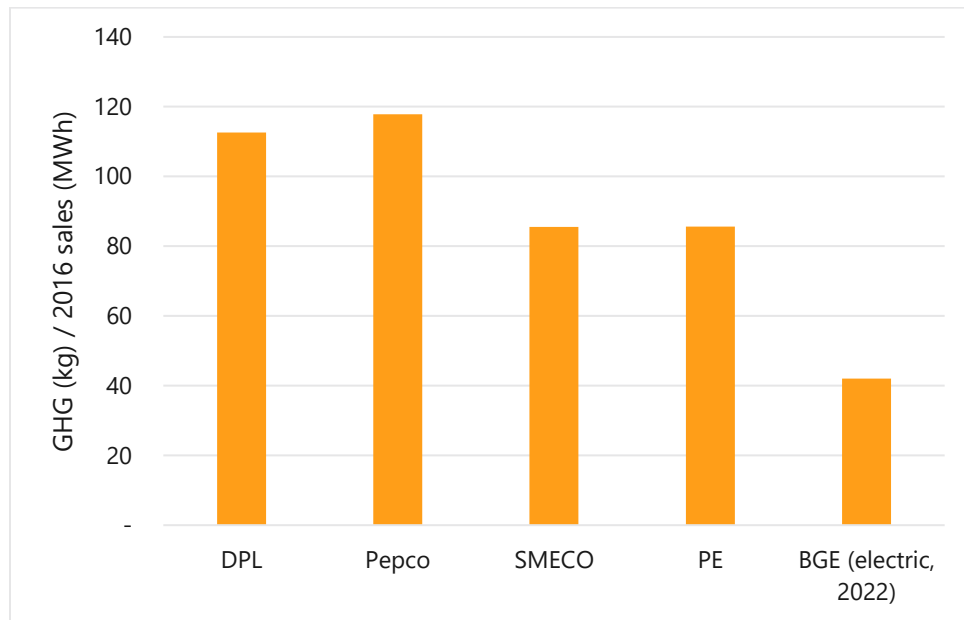
Table 4. Each program administrator’s CTD residential share of its total greenhouse gas reductions (lifecycle).

Administrator	Residential share of Lifecycle GHG
Potomac Edison	21%
BGE	45%
Pepco	64%
DPL	26%
SMECO	52%
WGL	70%
DHCD	97%
Weighted Average	<b>49%</b>

When we compare the electric utilities’ GHG reductions to the volume of electricity sales we see very substantial differences. Figure 9 shows each electric utility’s total GHG reduction (on a gross lifecycle basis) in proportion to their electricity sales (using the 2016 baseline). Because BGE did not separate GHG reductions by the type of energy saved, to be

comparable to the electric utilities, the figure includes 2022 values for its GHG reductions from electricity savings.

Figure 9. CTD lifecycle GHG reductions from electricity savings per unit of electricity sales, by utility.



Demographic differences do not adequately explain this variation; programs, measures and incentives are also drivers. Without greater detail in reporting about GHG reductions (e.g. by fuel saved), it is difficult to understand what accounts for differential performance. However, until utilities are directed to achieve specific GHG outcomes, they do not have a direct incentive to investigate and pursue changes to programs that might increase GHG impact.

## Gas Appliances

During the 2021-2023 cycle, several parties petitioned the Commission to mirror action in other leading climate and clean energy jurisdictions by ordering the phase-out of ratepayer funded incentives for new gas-burning appliances. Massachusetts, California and neighboring Washington DC, for example, have all taken this step because they find it inconsistent with their climate policies to provide incentives for gas equipment that will last a decade or more when cleaner alternatives exist.

According to the new Maryland Climate Pollution Reduction Plan:

The policies in this plan, if fully implemented, are projected to achieve the 2031 goal and put Maryland on a path to achieve net-zero emissions by 2045. The policies will *nearly put an end to the fossil fuel era* and accelerate the transition to a clean energy economy. In turn, the state will experience improved air quality, health, wealth, and the

prospect of keeping our planet habitable for future generations.<sup>11</sup>  
[emphasis added]

And:

Household energy costs will decrease significantly under this plan. Today, the average household that uses heat pumps and drives EVs spends around \$2,600 less annually in energy costs than those with natural gas heating and gasoline-powered cars. Savings for the all-electric household increase to around \$4,000 annually compared to homes that are heated with oil or propane. Those savings are projected to increase over time as fossil fuels become more expensive and electricity rates remain comparatively stable. Robust federal and state incentives, paired with education, technical assistance, and training for building owners, contractors, automobile dealers, and other market actors, can help ensure that everyone can transition from fossil fuels and become part of the clean energy economy.<sup>12</sup>

According to the state's new climate action plan, in September 2023, Maryland joined with 24 other states in the U.S. Climate Alliance in committing to quadruple the number of heat pumps installed by 2030.<sup>13</sup>

These directives are at odds with continued incentives for long-lived fossil fuel burning appliances. While ratepayer-funded incentives for new gas appliances may induce some customers to elect higher efficiency furnaces and other equipment than they otherwise would, they compete against efforts to encourage customers to adopt cleaner, efficient heat pumps. Each investment in a new appliance, especially HVAC equipment, has consequences for 10-20 years. To meet Maryland's climate goals, it is likely that some of the gas appliances installed in the 2021-2023 cycle under EmPOWER programs will be removed and replaced by cleaner equipment—potentially at additional utility customer expense—before the end of their useful lives.

The use of EmPOWER incentives for gas appliances is also contrary to the long-term economic interests of individual households. By locking-in fossil fuel appliance for 10-20 years, customers will either face considerable risk of escalating gas distribution rates or the customers will face electrification retrofit costs before their newly purchased gas appliances reach the end of their useful lives.

As shown in Figure 10 below, in the 2021-2023 cycle, Washington Gas provided incentives for the installation of more than 6,600 gas appliances—primarily for space and water heating—in existing Maryland homes through its Residential Prescriptive and Coordinated Retrofit Programs.

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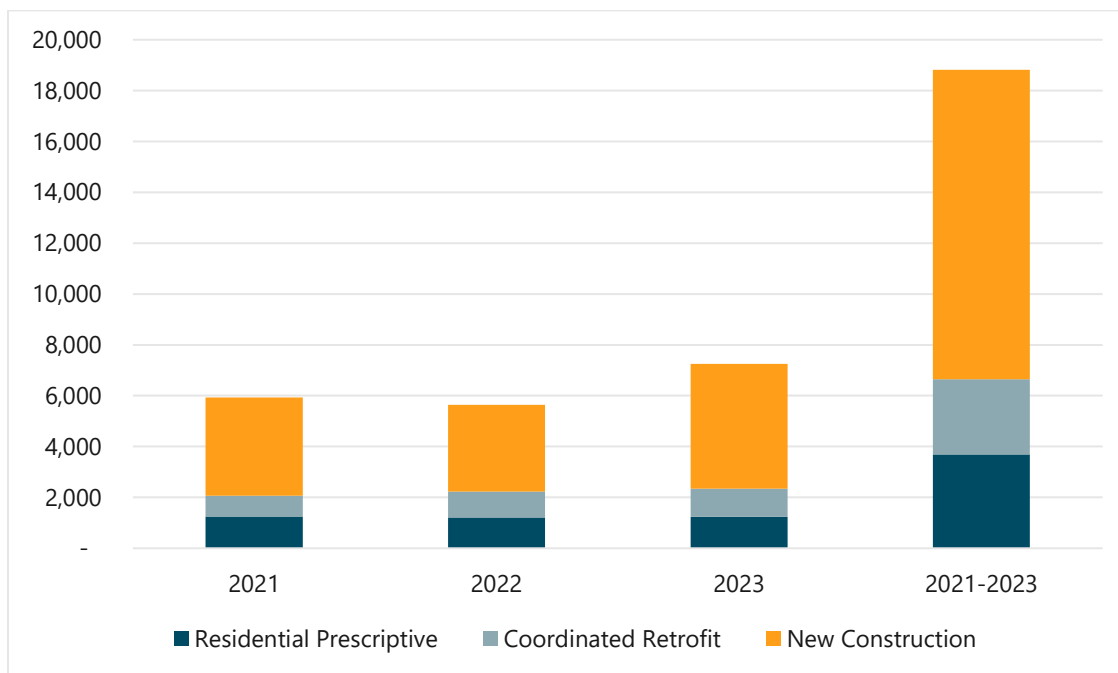
<sup>11</sup> Maryland Climate Pollution Reduction Plan, December 2023, p. 11.

<sup>12</sup> Maryland Climate Pollution Reduction Plan, December 2023, p. 9.

<sup>13</sup> Maryland Climate Pollution Reduction Plan, December 2023, p. 41.

During the recently concluded cycle, WGL also provided incentives for gas appliances in more than 12,000 new homes.<sup>14</sup> Incentives for gas appliances are particularly problematic in new construction. It is easiest and cheapest to achieve all-electric homes that do not directly emit GHGs if the home is designed for this from the start, in new construction. For example, new electric homes can be easily wired for electric appliances and the corresponding electric panel capacity. Recognizing this, several jurisdictions have adopted all-electric building codes. Homes that are built to rely on the use of gas appliances require additional costly retrofits that could have been avoided.

Figure 10. Number of gas appliances included in WGL programs, 2021-2023



To illustrate the magnitude of gas usage and GHG emissions from these appliances, if those 12,000 homes had been built as an ENERGY STAR all electric home (instead of an ENERGY STAR mixed fuel home), the avoided GHG emissions over 20 years would have been more than 410,000 metric tons.<sup>15</sup> That is more than the lifecycle GHG reductions claimed by WGL for all of its programs over the entire 2021-2023 cycle.

BGE's New Construction program also provides incentives to projects that include new gas appliances, with roughly the same number of new homes in 2021-2023 as WGL.

OPC continues to urge that the Commission prohibit incentives for the installation of gas appliances under EmPOWER.

<sup>14</sup> The figure is based on one gas appliance per participant in these programs. In many households, especially new homes, there may have been two or more gas appliances.

<sup>15</sup> Calculated using NREL ENERGY STAR homes energy use calculator, comparing ES v3.2 electric home vs ES v3.2 mixed fuel home and using EmPOWER Maryland lifecycle emission factors for electricity and gas use.

# Program-Specific Findings



## Programs reviewed:



Lighting



Appliances (Rebates & Recycling)



Residential Retrofit



HVAC



Behavior



New Construction



Limited Income - DHCD



Demand Response

In the following pages we offer specific evaluation of how the major programs performed in 2023 and the 2021-2023 cycle.

The starting point for our analysis is comparison of performance against forecasted targets, for savings, participation, and/or spending.

In most cases we also examine trends in savings over time and across utilities, as well as trends in savings per participant and the cost to acquire a unit of savings (typically a kWh).

The program comments do not include specific recommendations, because the utilities have just initiated a set of recently approved programs for the 2024-2026 cycle. (Although most programs in the recently approved plans are quite similar to those operated in 2023.)

# Lighting

The EmPOWER Retail Lighting programs provided instant discounts for light-emitting diode (LED) products sold via retail channels, pop-up lighting events, online marketplaces and through partnerships with Maryland food banks targeting limited income customers. In 2022 federal standards for general service lighting increased to levels that effectively transformed residential lighting to higher efficiency LED technology. As of the end of March 2023, EmPOWER utilities sunset retail lighting programs, continuing only targeted light bulb promotions through the end of June with regional Maryland foodbanks and hard-to-reach stores serving lower income households. As such, absent new program strategies, the residential lighting program will not exist in this form in 2024-2026.

**All EmPOWER electric utilities exceeded 125% of three-year savings forecasts, despite ending retail lighting incentives in March 2023 in response to federal standards, market developments, and Commission orders.**

## Key Findings

- The utilities' lighting programs created enough gross savings in 2022 to allow them to end the cycle well ahead of targets, despite ending most residential incentives in early 2023.
- The end of the retail lighting program illustrates the ability of EmPOWER to enable "market transformation," as consumers continue to enjoy the benefits of more efficient lighting products.

## Trends in performance and program strategies

In July 2022 the Department of Energy (DOE) issued two separate final rulings related to federal standards for general service lamps that are impacting how the EmPOWER upstream Lighting programs promote high efficiency LEDs, and their ability to contribute significant and cost-effective energy savings to the program.<sup>16</sup> To support the market transition, the DOE allowed for a "sell-through" period, with financial penalties delayed until November 2022 for manufacturers or importers and March 2023 for sale by retailers and distributors.

This is a successful example of "market transformation": incentive support and engagement with distributors and retailers to gradually shift the market so that LEDs become the typical

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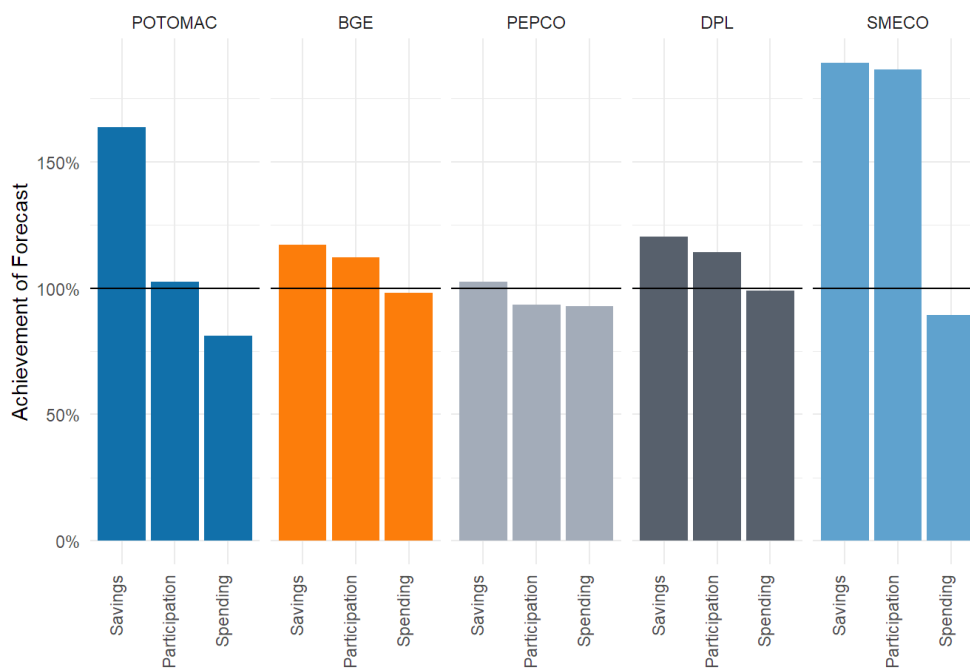
<sup>16</sup> The first ruling effective July 8, 2022, created a more inclusive definition of General Service Lamps (GSLs) to encompass the majority of residential lighting bulb types. The second ruling instated a 45 lumens per watt performance requirement—a level at which currently only high efficiency LED technologies can meet.

purchase, which can trigger new standards and/or an end to incentives. A key to this approach is targeting an increasing market share and working with the full supply chain to change business as usual. Several leading states are using this approach for heat pumps, some with considerable success. (As described previously and again below, EmPOWER's heat pump-related programs are not well designed for a market transformation approach.)

The utilities' sustained participation throughout the program cycle in advance of the new standard going into effect, adding additional high efficiency lighting products and new promotional strategies in the program, notably a significant shift to Maryland Foodbank distributions in 2023. Figure 9 illustrates lighting program performance across the utilities cycle-to-date, highlighting the continued success in meeting and exceeding savings goals within budgeted program spending.

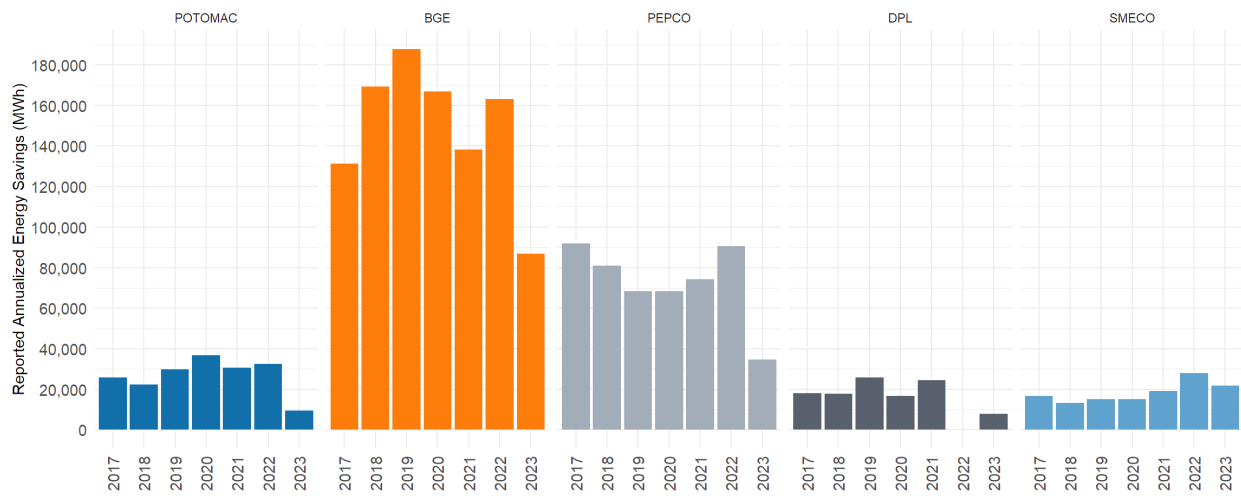
All five EmPOWER electric utilities exceeded 125% of cycle-to-date savings forecast, led by Potomac Edison and SMECO - at or above 160% of forecast - while remaining below budget for spending.

Figure 11. CTD Lighting program achievement of forecasted goals.



The transition away from lighting in 2023, highlighted in Figure 12, represents a significant impact to overall EmPOWER utility savings with most experiencing a greater than 50% decline in annual energy savings.

Figure 12. Annualized Lighting Program Savings (MWh) from 2017 to 2023.



In preparation for the end of retail lighting programs EmPOWER utilities re-allocated incentive budgets from lighting to other program areas to ensure the continuity and cost-effectiveness of EmPOWER residential programs in absence of lighting programs.

## Challenges ahead

Absent a significant shift in market strategy in 2023, utilities simply terminated the retail lighting programs for the next program cycle. Although traditional retail lighting programs ended, evaluators may want to continue to assess retailer shelf stock in Maryland, as well as low price and higher performance LED models to assess remaining opportunities for EmPOWER utility programs to impact savings and performance of retail residential lighting.



# Appliance Rebate

The Appliance Rebate programs offer instant, online, and paper rebates for select ENERGY STAR products, including room air conditioners, dehumidifiers, room air purifiers, heat pump water heaters, refrigerators, freezers, clothes washers, clothes dryers, pool pumps, advanced power strips, and smart thermostats. The EmPOWER electric utilities deliver Appliance program rebates through separate “downstream” and “midstream” channels, which seek to influence equipment purchases in different ways.

**Utilities exceeded overall savings targets for the cycle while also continuing to struggle to engage the market for one of the most important appliances: heat pump water heaters.**

## Key findings

- All utilities exceeded or substantially exceeded savings targets for the cycle while spending less than budgeted.
- This overall performance belies the continued poor performance of one of the most important measures: heat pump water heaters (HPWH). In 2023 EmPOWER impacted <2% of annual estimated replacement of electric water heaters.
- Although roughly half of water heaters are purchased through distributors (vs retail stores), SMECO was the only utility that had close to half of its HPWH incentives come through midstream distributors.

## Trends in performance and program strategies

Figure 13 illustrates appliance cycle-to-date program performance across the utilities with all five EmPOWER electric utilities exceeding energy savings and participation forecasts, while staying below their forecasted spending levels for the cycle period. It is noteworthy that SMECO, Potomac Edison and BGE achieved greater than 150% of forecasted savings and participation.

Figure 13. CTD Appliance rebate program achievement of forecasted goals.

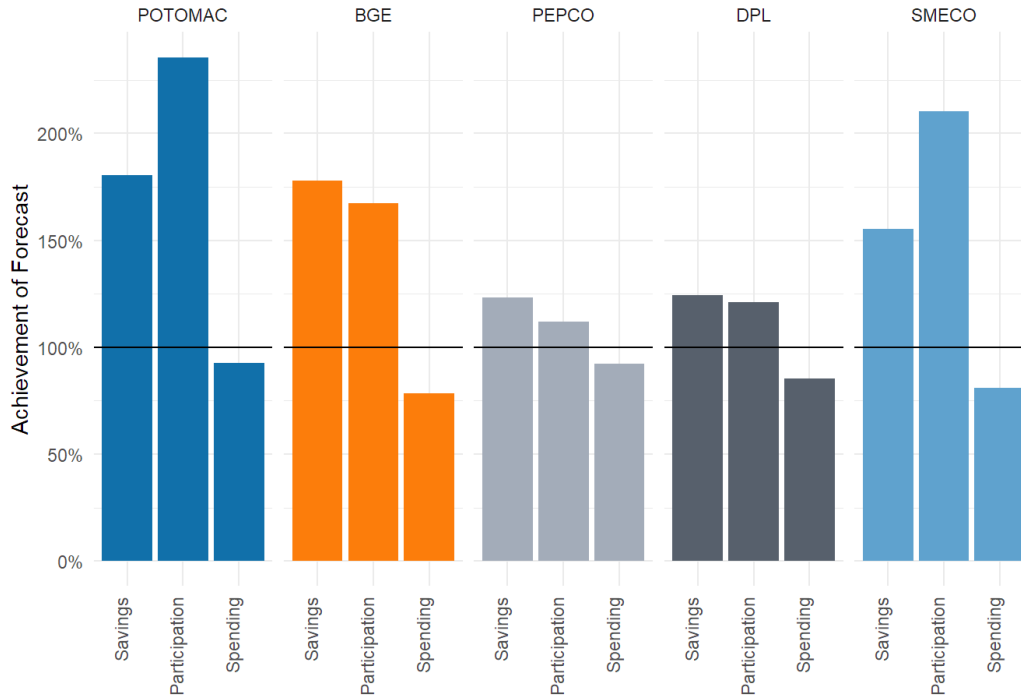
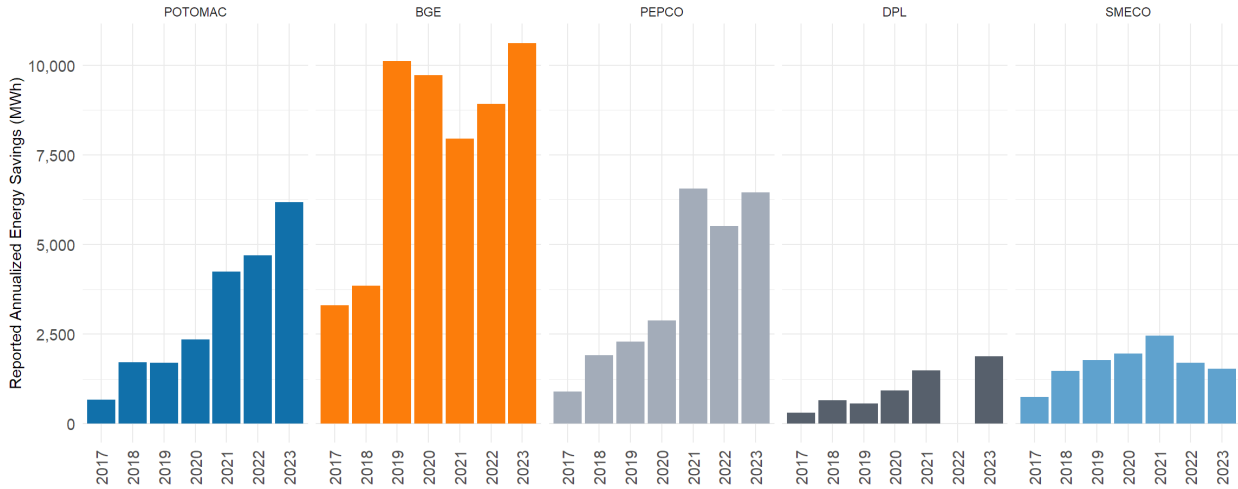


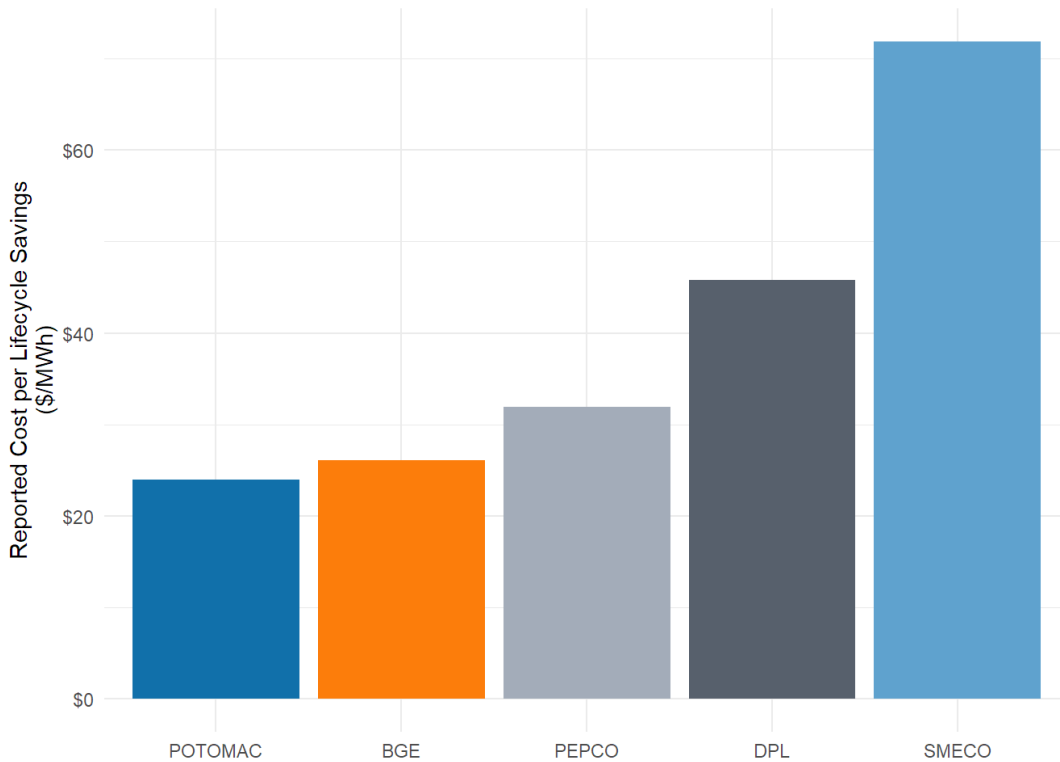
Figure 14 highlights a significant ramp up of annual savings across the majority of the EmPOWER utilities, correlating with the shift in spending away from lighting. Most of the gains in savings are coming through midstream appliance measures driven by the Retail Products Platform (RPP) and other direct retailer point-of-sale discounts, of which HPWHs represent only a small portion.

Figure 14. Annual appliance rebate program savings from 2017 to 2023.



It is noteworthy that SMECO has seen a year-over-year decrease in annual savings in the current program cycle and significantly higher costs of lifecycle savings, as reported in Figure 15. This may result from a different mix of measures from the other utilities and bears investigating.

Figure 15. Appliance rebate program lifecycle savings cost for 2023.



As noted in previous in OPC's previous semi-annual comments, and above, the EmPOWER utilities' efforts with HPWHs—a significant opportunity for savings—continue to be of particular

concern in failing to capture any substantive market share of Maryland’s water heater market. As part of the Midstream Work Group in 2022, a benchmarking study was completed highlighting an inconsistent set of rebates and processes being offered among utilities, as well as identifying successful market strategies in other regional states. Specifically, a streamlined midstream (distributor) HPWH strategy resulted in dramatically higher participation as a percentage of electric water heater sales.

Based on a 2022 report<sup>17</sup>, nationally 45% of residential electric water heaters are purchased through distributors (e.g. by contractors who purchase them from the distributor to install for end-use customers) and 55% through retailers.<sup>18</sup> The continued underperformance of the HPWH midstream distributor program is highlighted by the fact that only SMECO reported a share of midstream participation (47%) close to the national average. Across the EmPOWER utilities, midstream distributor program participation was less than one-eighth of participation in its retail program. Figure 16 below shows the breakdown of HPWH participation by market channel in 2023, as well as estimated “market share.” Here “market share” refers to the percentage of units in the program compared to the number of electric water heater sales expected to occur naturally as replacements for water heaters at the end of their useful life. (Market share of *all* water heater replacements would be far lower still.) Across the five EmPOWER electric utilities, the number of HPWH in the program was less than 2% of the estimated sales of electric water heater. Other states—notably Vermont and Maine—have reported greater than 60% market share.<sup>19,20</sup>

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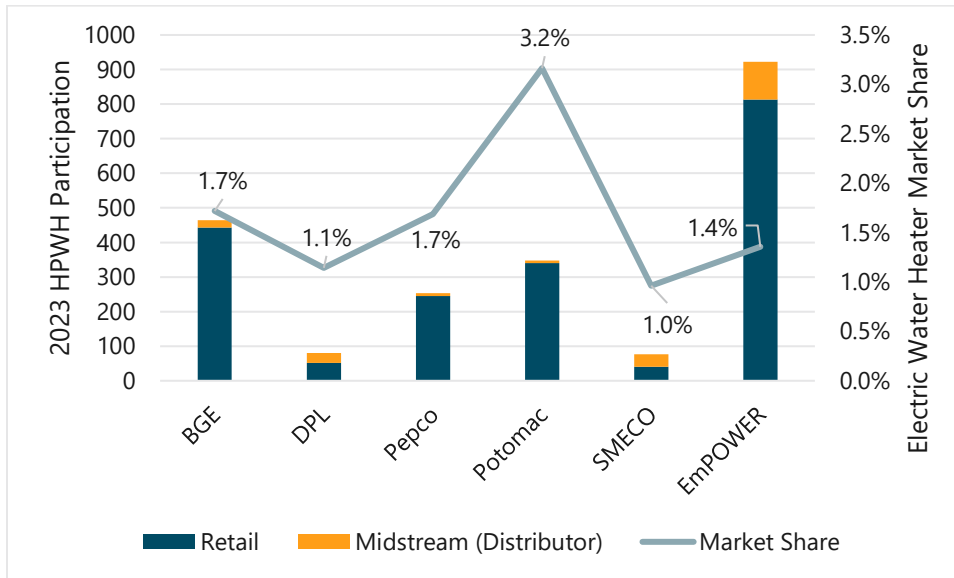
<sup>17</sup> 2022-03 Preliminary Analysis Technical Support Document: Energy Efficiency Program For Consumer Products And Commercial And Industrial Equipment: Consumer Water Heaters, Department of Energy, March 2022. <https://www.regulations.gov/document/EERE-2017-BT-STD-0019-0018>

<sup>18</sup> The rest are purchased through retail stores (either by contractors or by the customers themselves).

<sup>19</sup> [https://www.energystar.gov/sites/default/files/asset/document/2019.09.11%20Booher%20ESPPM%20HPWH%20Market%20Mechanics%20Revealed\\_Final%20%28002%29.pdf](https://www.energystar.gov/sites/default/files/asset/document/2019.09.11%20Booher%20ESPPM%20HPWH%20Market%20Mechanics%20Revealed_Final%20%28002%29.pdf), p. 11.

<sup>20</sup> <https://www.energystar.gov/sites/default/files/asset/document/3.%20Andy%20Meyer%20-%20Efficiency%20Maine%20-%20Successful%20Strategies%20for%20Going%20Midstream-%20HPWH%20-%20508%20Compliant.pdf>, p. 10.

Figure 16. 2023 HPWH participation by channel, and estimated market share.



On July 28, 2023, the Department of Energy released a notice of proposed rulemaking for consumer water heaters that will significantly increase the efficiency for electric storage tank water heaters to a level equivalent to a HPWH by 2030. If the ruling is finalized, this will effectively establish a market transformation timeline for EmPOWER utilities to ramp up programs to support increased contractor training and program participation.

EmPOWER utilities should evaluate market opportunities to support new subcategories of heat pump water heaters, notably 120 volt HPWHs, which can avoid the need to upgrade electrical service panels, as well as assessing the impact of grid service opportunities through larger tank sizes, use of water mixing valves to reduce thermal loss, and load management capabilities. Current reporting by utilities on HPWH participation varies by utility, but reporting is limited to market channels and in some cases range of tank sizes. To achieve a better understanding of the HPWH market and the opportunities, EmPOWER utilities should aggregate reporting of all available data (e.g. market channel, model number, tank size, HPWH type, etc.).<sup>21</sup>

In a December 2023 Commission order, EmPOWER utilities were directed to develop a Uniform Program Manual (“UPM”) by January 1, 2025. According to the order, “The UPM must clearly identify measure eligibility, rebate amounts, application requirements, outreach to trade allies, marketing to customers, and other issues identified by the Midstream Work Group and stakeholders as important to the success of the program.”<sup>22</sup> At the time of this semi-annual report, a review of EmPOWER utility websites continue to promote HPWHs with

<sup>21</sup> Many data points for HPWHs can be easily captured by looking up the model number in the publicly available ENERGY STAR certified products database instead of requiring partner reporting.

<sup>22</sup> Commission Order No. 90957, p. 65.

varying rebate levels, eligibility requirements and limited visibility to participating contractors, distributors and retailers.

The Appliance Rebate program is one of the few EmPOWER programs that was not cost-effective in 2022, as measured by Maryland's societal cost test. If this continues to be true in 2023, the utilities should be required to provide additional explanation of why this is true. (However, we expect cost-effectiveness to be higher in 2023 for the non-PHI utilities, which significantly increased savings without going over budget.)

## Challenges ahead

Cost remains as a key barrier to adoption of HPWHs, especially during emergency replacement scenarios. EmPOWER utilities should evaluate and promote new subcategories of HPWHs, notably 120 volt HPWHs, and simpler replacements of existing electric storage water heaters to more rapidly scale program participation and contractor engagement. Empower utilities should work with evaluators to assess the impact of HPWH installations with larger tanks, use of mixing water valves to improve tank efficiency, and load management strategies to reduce peak loads in Maryland.

Utilities should accelerate and expand investments to rapidly identify, pilot, and deploy at scale new appliance technologies and program strategies. Emerging technologies like, advanced refrigerators, window-installed heat pumps, induction cook tops, and smart window shades are examples of innovations that may require different strategies beyond the existing established retailer partnerships.

# Appliance Recycling

The Appliance Recycling program encourages the early retirement and recycling of inefficient operating appliances by offering customers a rebate and free appliance pick-up. The program primarily targets recycling of refrigerators and freezers, but also offers ancillary pick-ups for room air conditioners and dehumidifiers in addition to local community turn-in events.

## Key findings

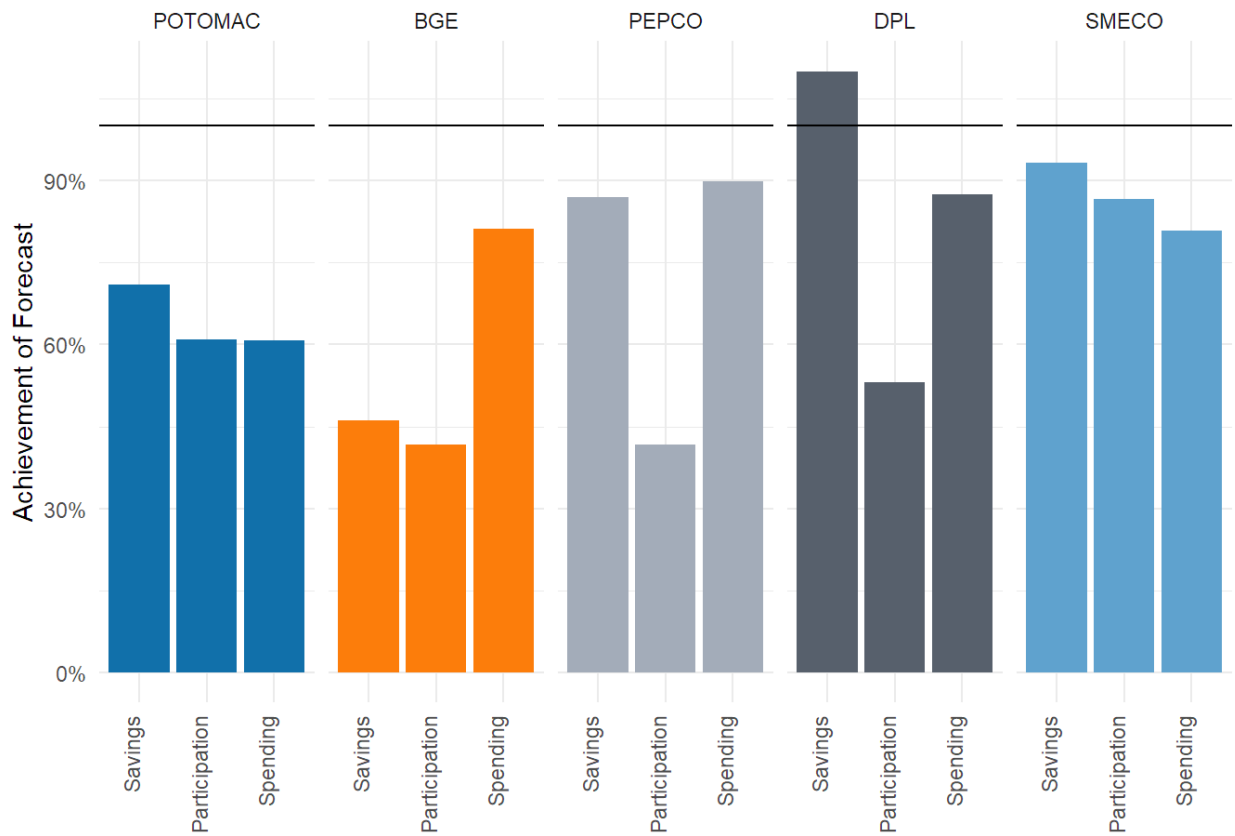
- Only one utility (DPL) achieved its Appliance Recycling savings target for the cycle, although SMECO and Pepco came close.
- All utilities were affected by the closure of a key program implementation vendor in Q3 of 2023.

## Trends in performance and program strategies

The EmPOWER utilities' Appliance Recycling programs include limited time offers (LTO) and options for curbside or indoor contactless pickup to strengthen participation. However, the primary third-party vendor offering full-suite recycling program services, ARCA Recycling, ceased operations in August 2023. All of the EmPOWER utilities' performance was affected by ARCA's closure.

As shown in Figure 17, only Delmarva exceeded its cycle-to-date appliance recycling targets for forecasted savings, and Pepco and SMECO reported achieving nearly or above 90% of their respective savings target. BGE reported achieving approximately 50% of its savings goals, while its spending is close to 80% of forecast.

Figure 17. CTD appliance recycling program achievement of forecasted goals.



## Challenges ahead

In the 2024-2026 cycle, BGE proposed having the flexibility to eliminate the full Responsible Appliance Recycling accreditation for recovery of blown-in insulation and refrigerants and opting for meeting the minimum state and local requirements for appliance recycling. Although this shift could increase the number of eligible third-party vendors and reduce costs to implement the recycling program, it could also make it harder to evaluate free-ridership in the program.

Removing used inefficient appliances from the market provides energy savings and ultimately reduces consumer utility bills. At the same time, the secondhand appliance market can be an important affordable option for lower income households to replace older or broken appliances. DHCD programs, including the Base Energy Efficiency program, offer no-cost appliance replacements for limited income customers—if they know about the program and it is easy to participate. Utilities should partner with DHCD for greater engagement of limited income customers that need to replace their appliances. (Appliance recycling presents a good opportunity for utilities to be more involved in driving participation in limited-income programs without competing with DHCD.)



# HVAC

The HVAC program promotes heating and cooling technology for homes, including air conditioners, heat pumps, and gas furnaces and boilers, along with smart thermostats installed with HVAC measures. For most HVAC equipment, contractors and distributors significantly influence customer choices of equipment and access, whether due to stocking, installer knowledge, or other factors. Starting in 2018, HVAC programs largely transitioned to a midstream channel model, which targets incentives and engagement at equipment distributors and installation contractors. Although some residential retrofit projects include HVAC measures, the HVAC Program is the primary EmPOWER program for influencing replacement of heating and cooling equipment.

**Space heating and cooling improvements make up over 70% of the opportunity for cost-effective GHG reduction in Maryland homes, but the HVAC Program currently represents only about 5% of EmPOWER GHG reductions.**

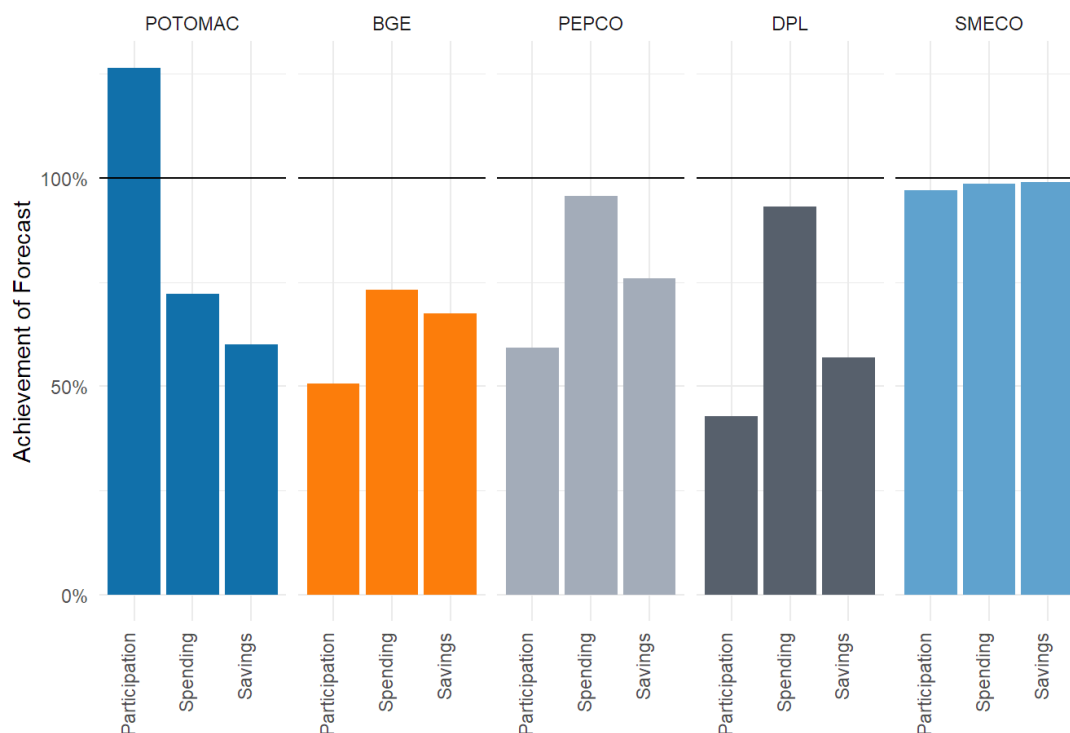
## Key findings

- Only SMECO achieved its HVAC electric savings target for the cycle, with other utilities achieving only 60-75% of savings, despite a better year in 2023 than 2022.
- BGE achieved only 1.5% of forecasted gas savings, a confounding result.
- As with HPWH, the EmPOWER HVAC program is impacting a relatively small portion of the air source heat pump market (let alone the larger HVAC market), indicating the continued disconnect between the program and the supply chain that midstream programs are intended to focus on.
- All utilities except SMECO underspent their budgets by substantial margins. Potomac Edison was able to exceed participation targets by relying more heavily on smart thermostats.

## Trends in performance and program strategies

Despite forecasting growth in HVAC program savings in the 2021-2023 cycle, four of the five electric utilities achieved roughly 60% to 75% of the CTD savings forecast, continuing a trend since 2020. Only SMECO came close to meeting program cycle savings targets. Figure 18, below, shows achievement of forecasted participation, spending and savings.

Figure 18. CTD HVAC achievement of forecasted electric goals.



With the exception of SMECO, utilities underspent and under achieved on savings. The disconnect between the high participation reported by Potomac Edison and low energy savings is attributed to the significant share of smart thermostats in the overall program. (While important enablers of energy and demand savings, smart thermostats generate much lower savings per unit than improvements to space heating and cooling equipment.) This reflects the change in reporting, with most utilities no longer reporting smart thermostat participation separately from HVAC measures.<sup>23</sup> The impact of this reporting change makes it more difficult to track program success in achieving more substantive gains in reducing heating and cooling energy impacts through HVAC upgrades.

EmPOWER electric utilities reported progress with increased incentives, onboarding distributors, contractor engagement and sales promotions—including limited time offers. BGE and SMECO highlighted the successful launch of a point-of-sale (POS) rebate with a distributor to streamline and capture participation instantly instead of retroactively with contractors submitting data to the distributor after the sale and subsequent rebate reimbursement. BGE and SMECO did not report whether this POS option would be expanded to other participating distributors or consistently across EmPOWER utilities.

<sup>23</sup> BGE continues to separately report smart thermostat and HVAC participation, spending and energy savings.

EmPOWER electric utilities reported approximately 5,000 air source heat pumps (ASHPs) in the midstream HVAC program compared to 5,300 central air conditioners (CACs). In 2023 CAC participation increased by 15% compared to 2022, while air source heat pumps increased only 6%. The increase in CAC participation is concerning because ASHPs delivered nearly four-fold the energy savings to the program and customer households compared to CACs. The EmPOWER electric utilities' continued offering of CAC rebates (promoted to customers and distributors) will reduce focus on accelerating distributor sales of heat pumps. For this reason, many other jurisdictions have already ended incentives for stand-alone CAC. In an HVAC benchmarking study of other jurisdictions conducted by the EmPOWER independent evaluator in 2022, only 3 out of 10 programs were offering incentives for CAC in 2023.<sup>24</sup> BGE partially began this shift when it recently sought Commission approval to increase incentives for ASHPs but not CACs. This shift should be accentuated by the Inflation Reduction Act's federal tax credits and state pass-through funding for incentives for high efficiency heat pumps starting in 2023 and ramping up in 2024.

Market data on HVAC sales in Maryland suggests that the EmPOWER midstream programs are influencing only 36% of CAC and 14% of ASHP sales of higher efficiency equipment in the state.<sup>25</sup> While some of the total sales may be for efficient equipment not eligible for program incentives, these figures highlight the continuing need for significant changes in the midstream program in order to increase heat pump adoption in Maryland.

Table 5: 2023 EmPOWER HVAC measure quantities by utility compared to Maryland sales.

	BGE	Potomac Edison	Pepco	DPL	SMECO	EmPOWER	Maryland Sales (2021)	EmPOWER Share of Market
CAC Qty	3,302	318	1,210	72	61	4,963	13,828	36%
CAC MWh savings	1,391	99	355	20	32	1,897	N/A	N/A
ASHP Qty	3,056	580	800	238	641	5,315	37,033	14%
ASHP MWh savings	4,407	633	955	285	858	7,138	N/A	N/A

<sup>24</sup> EmPOWER MD Interviews with Residential HVAC and Heat Pump Water Heater Program Administrators. Loper Energy et al for the Maryland Public Service Commission. October 2022. p. 12. Program administrators excluding CAC as of 2023 include: Efficiency Maine, Efficiency Vermont, Eversource CT, Mass Save (MA utilities), National Grid NY, Puget Sound Energy (OR), Sacramento Municipal Utility District.

<sup>25</sup> HVAC sales data provided to the Midstream Working Group from Cometrics on 3/9/2023. Maryland sales data includes equipment <65 kBtu and with SEER >= 16,0.

Figure 19 shows annual HVAC electric savings for each utility since 2017. Although EmPOWER utilities' HVAC savings were on a general downward trajectory during most of this period, program savings across all utilities rebounded sharply in 2023. The most significant drivers of increased energy savings include higher energy savings from Tier 2 ASHPs, increases in quantities of ASHPs and CACs, and large increases in smart thermostat participation.

Figure 19. Annualized HVAC program savings by year.

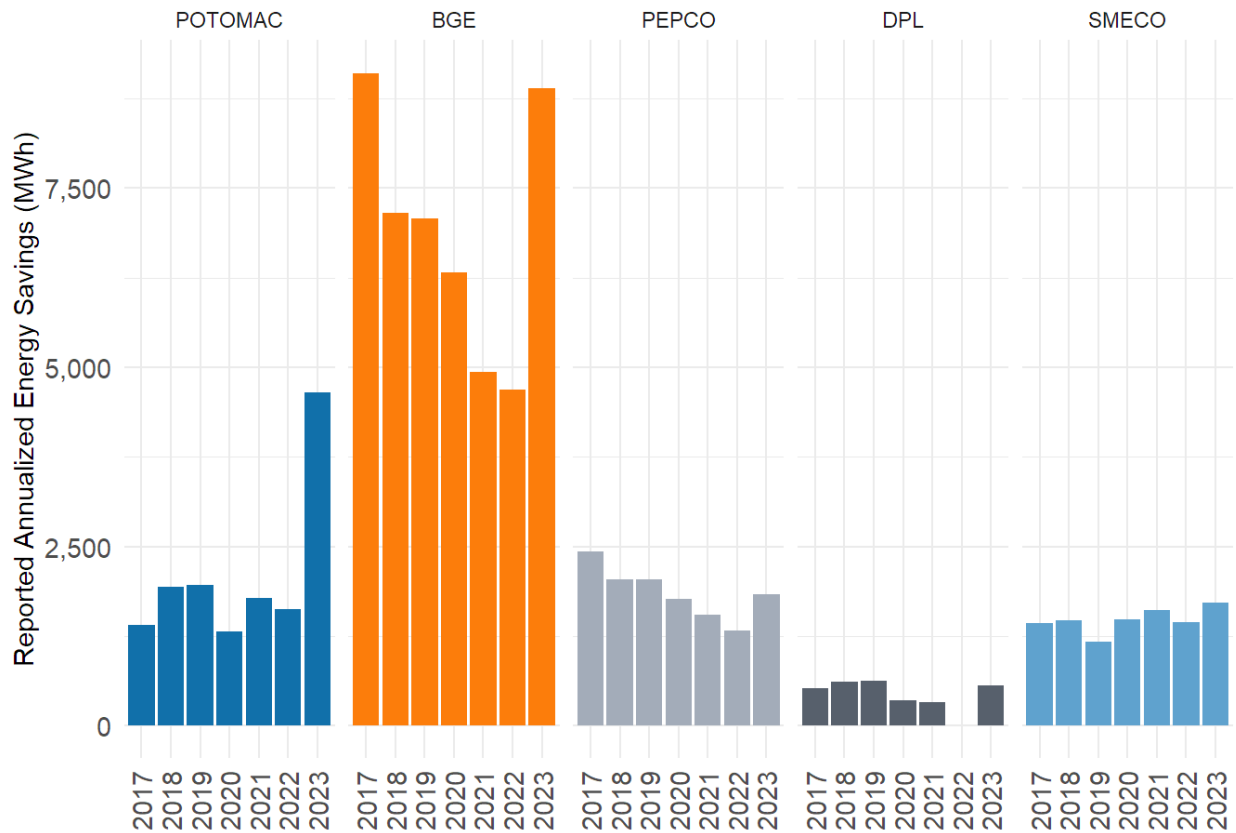
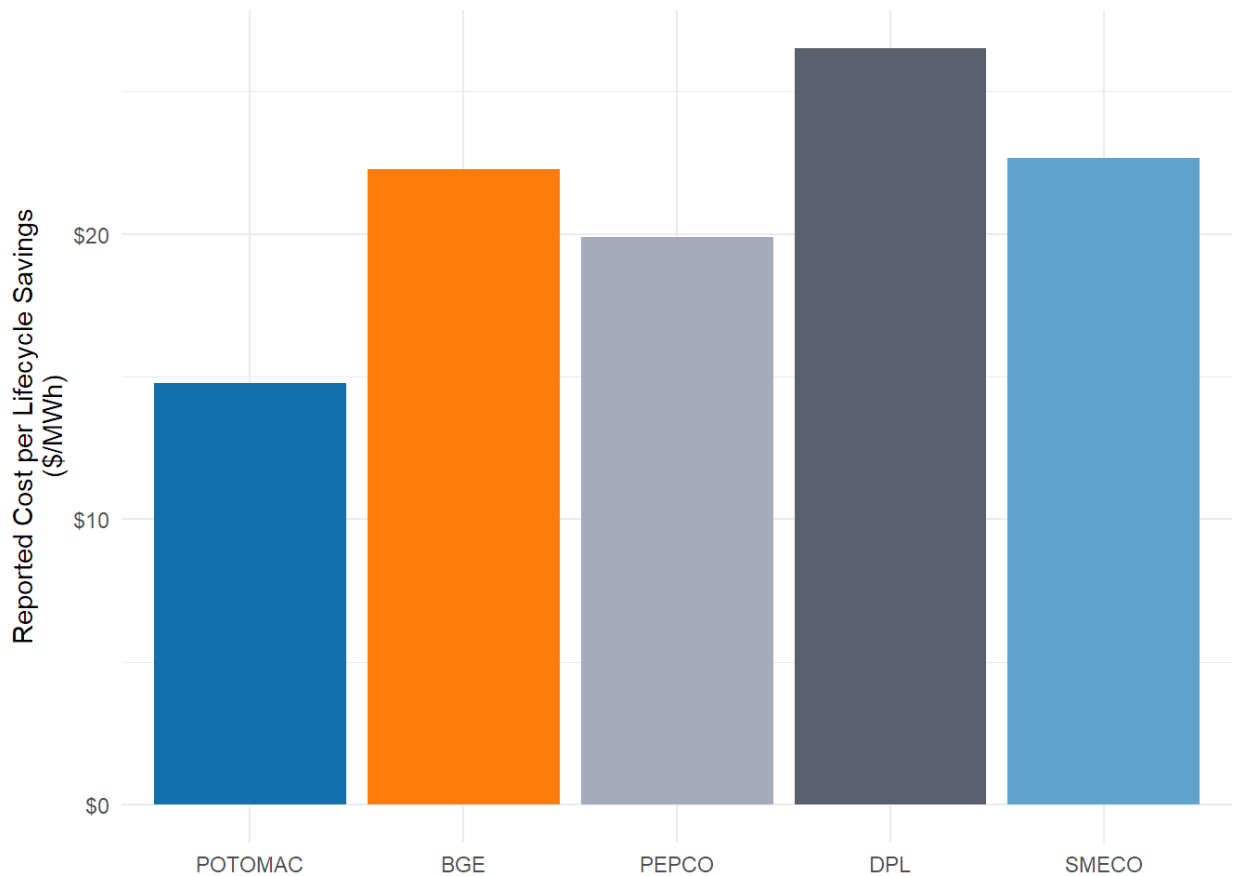


Figure 20 below shows the cost of kwh savings in 2023 for HVAC programs. HVAC program costs across the EmPOWER utilities are generally uniform; the exception is Potomac Edison, whose figures reflect the significant share of lower cost smart thermostat measures and a lower share of the higher cost rebates for HVAC upgrades.

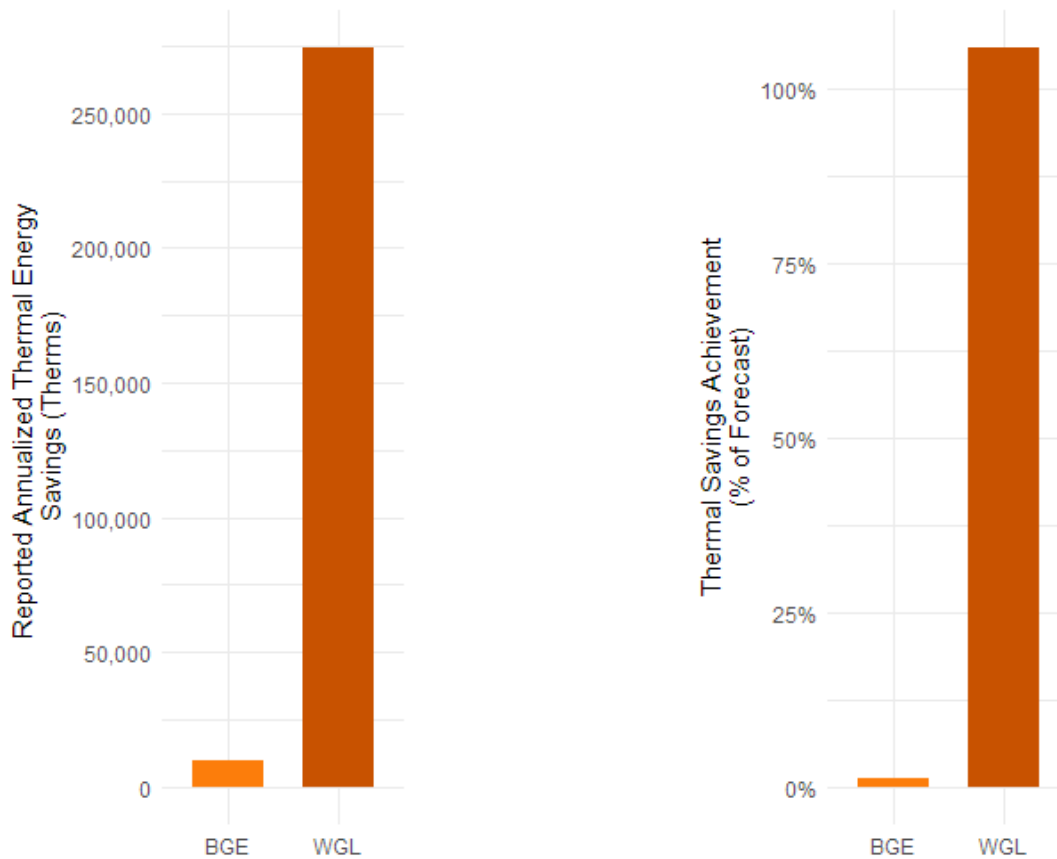
Figure 20. 2023 HVAC program costs per lifecycle savings by utility.



BGE and WGL’s CTD natural gas savings and achievement of savings relative to their forecasts are shown in Figure 21 below. In this cycle, BGE achieved *less than 2% of forecasted gas savings* in HVAC when excluding smart thermostat participation. BGE’s results are confounding. The Commission should direct BGE to explain what is happening and what remediation is planned.

In contrast to BGE, Washington Gas achieved roughly 100% of CTD forecasted therm savings from its HVAC program. Washington Gas introduced two new measures in the 2021-2023 program cycle—a furnace and boiler tune-up and a rebate for combination boilers (providing space and domestic water heating). The vast majority—over 95%—of WGL savings are from new gas furnaces and energy conservation kits.

Figure 21. CTD HVAC program gas savings achievements.



## Challenges ahead

Transitioning HVAC markets toward heat pumps is one of the most critical components of Maryland’s strategy to reduce the GHG emissions associated with buildings. The state climate plan describes EmPOWER as playing an important role in that transition; however, the HVAC program is not on track to play that role.

EmPOWER utilities have significantly increased HVAC energy savings in 2023 but are reaching only a low percentage of the overall air conditioning market with air source heat pumps. The EmPOWER utilities should establish HVAC (and HPWH) market share goals for both distributor and retail sales and report on progress.

The Commission ordered utilities to increase uniformity of HVAC/midstream program delivery through the development of the Uniform Program Manual by July 2025, which is unfortunately more than a year away. Uniformity is critical to market engagement, making this an important step. However, progress in impacting the market will depend equally on the program design choices themselves, such as universal point of sale rebates for contractors who purchase from distributors.

## Residential Retrofit

The Residential Retrofit program group includes Quick Home Energy Check-up (QHEC), Home Performance with Energy Star (HPwES), and SMECO's Home Energy Improvement Program (HEIP). HEIP combines elements of the two other programs offered by the other electric utilities. Washington Gas supports residential retrofits through its Coordinated Program, through which WGL and electric utilities share costs and savings in homes with electric and gas savings. The residential retrofit programs are distinct from most other EmPOWER programs in that they employ a "whole home" (vs. technology specific) approach.

For more explanation of the Residential Retrofit programs, please see **EmPOWER Program Descriptions** at the beginning of these comments.

**Taken as a whole, EmPOWER savings for residential retrofit programs exceeded forecasts more than most other programs. Behind this overall result is wide variation in performance across utilities that suggests each utility could improve performance.**

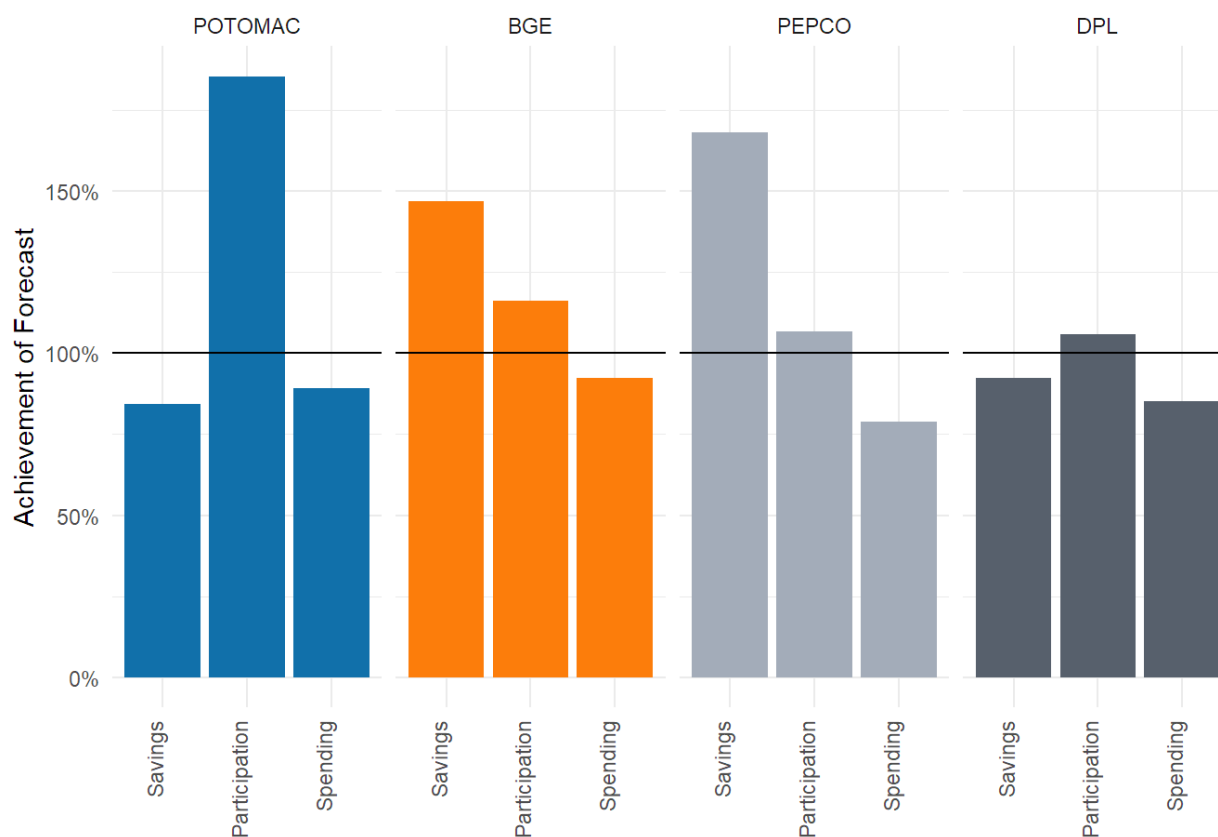
### Key findings

- Savings performance was mixed across utilities. BGE and Pepco exceeded forecasts, and the other electric utilities fell short.
- High participation rates were key to BGE and Pepco's success. DPL achieved impressive savings per participant—especially in Home Performance, where it was also able to achieve low cost per saving—but it was not enough to meet its forecasts.

### Trends in Performance and Program Strategies: QHEC

Figure 22 shows cycle to date performance vs forecasted electric goals for QHEC. Both BGE and Pepco substantially exceeded their 2021-2023 energy savings forecasts without spending their full QHEC budgets. In contrast, Potomac Edison and Delmarva Power fell short of their 2021-2023 energy savings forecasts, though also underspent their budgets.

Figure 22. CTD QHEC achievement of forecasted electric goals.



BGE achieved 225% of its annual QHEC energy savings target in 2023, in part by increasing participation while maintaining relatively steady savings per participant, as shown in Figure 23 below. It did so within budget by maintaining a lower cost of acquisition (\$/kWh), as shown in Figure 24.

Pepco also overachieved its 2023 energy savings target but did so by increasing savings per participant without increasing participation (and also staying within budget by not increasing cost of acquisition).

Although there was improvement in 2023 compared to 2022, Potomac Edison had far fewer savings per participant than it forecasted compared to the other utilities. Potomac Edison also spent more per kWh of savings than other utilities, though it did exceed its participation forecast by more than any other utility.

Variations in savings per participant shown in Figure 23 below correlate with:

- The average number of measures installed (from 7 measures installed on average in Potomac Edison’s service territory to 14 measures on average in Pepco’s service territory), and



- The type of measures installed and available as part of a utility QHEC offering.

Figure 23. QHEC Electric savings per participant by utility and by year

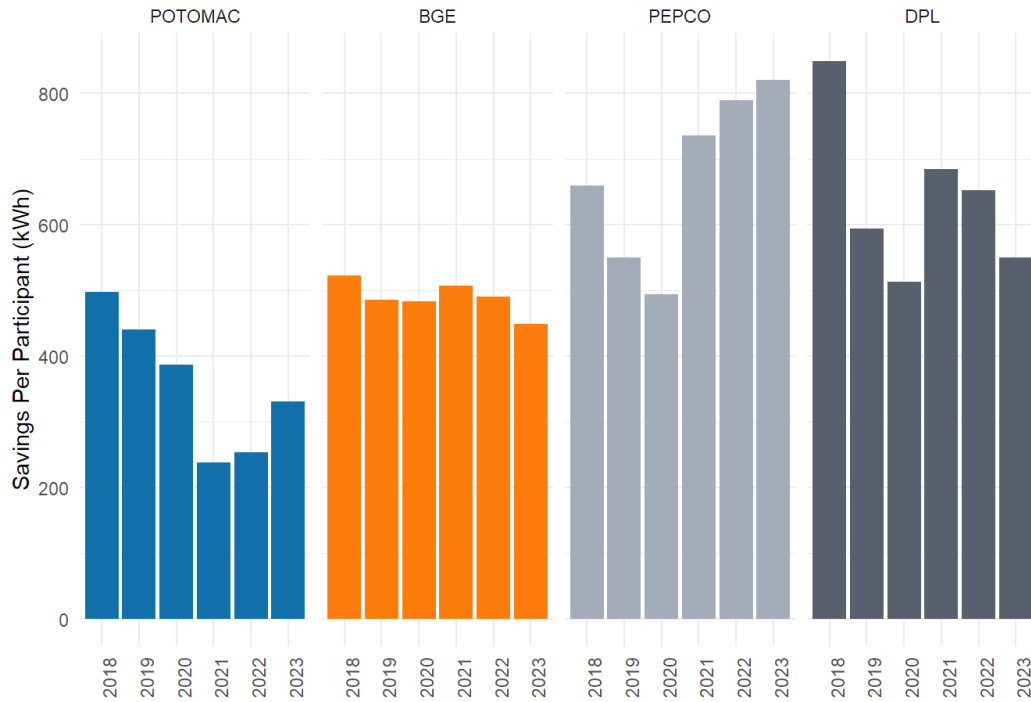
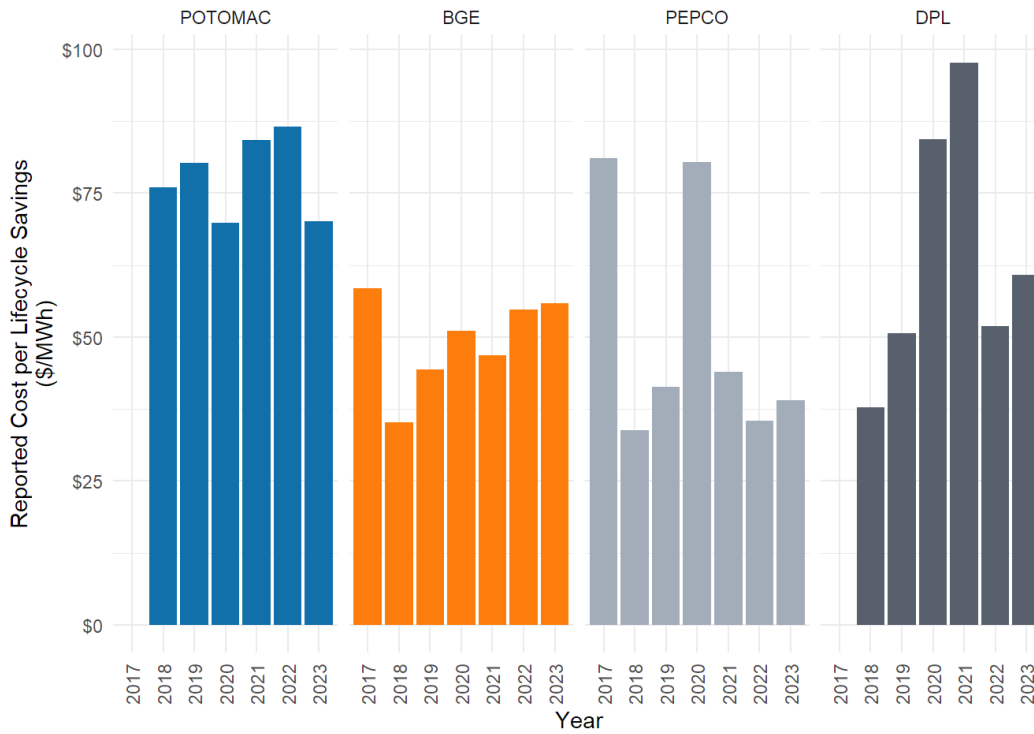


Figure 24. QHEC program costs per lifecycle kwh savings by year and by utility.



## Trends in Performance and Program Strategies: HPwES & HEIP

Three of the utilities were able to meet or exceed their 2021-2023 savings forecasts for Home Performance with ENERGY STAR, and all did so without spending full budgets. Delmarva ended the 2021-2023 cycle well short of its energy savings forecast for HPwES, as did SMECO for HEIP, as shown in Figure 25 below.

Figure 25. CTD Home Performance/HEIP achievement of forecasted electric goals.

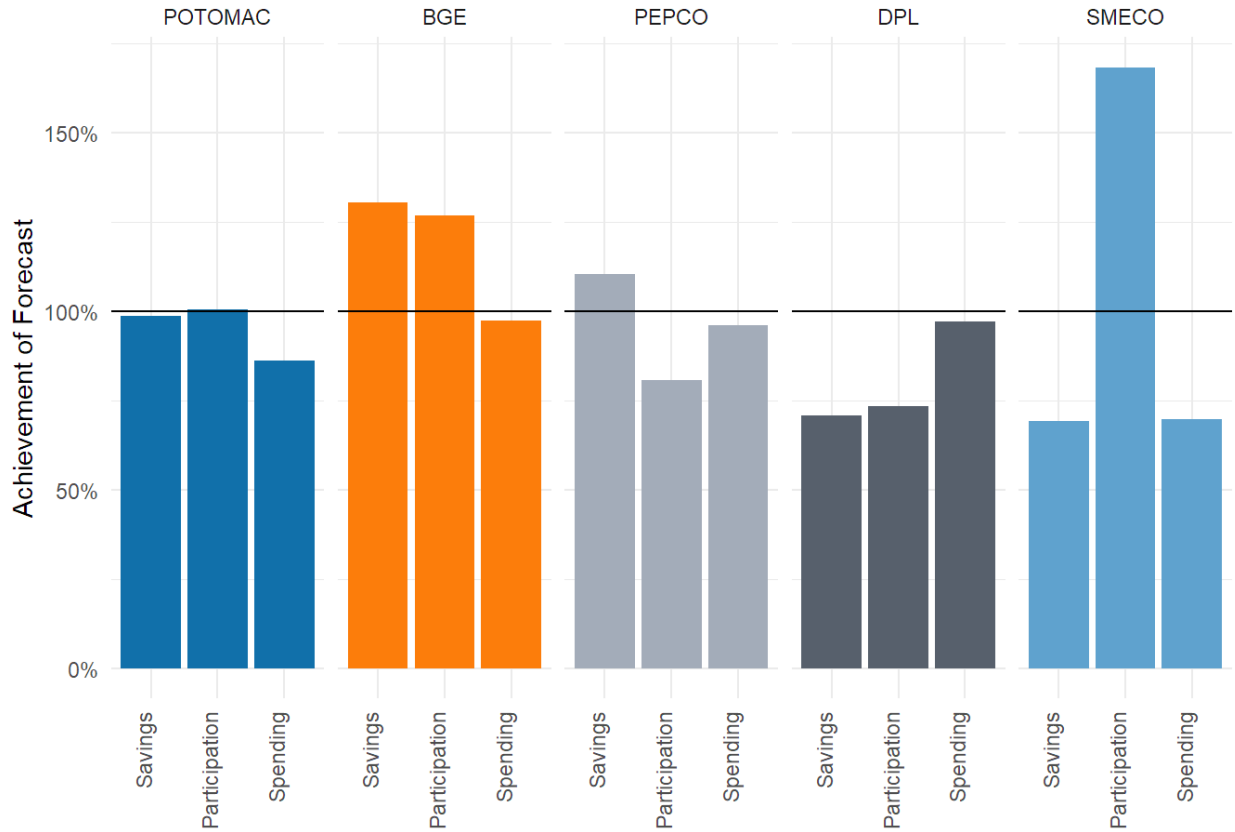


Figure 26 and Figure 27 below show the kwh savings per participant over time and cost of kwh savings for each utility.

Figure 26. Electric savings per Home Performance participant (HEIP for SMECO) by year and utility.

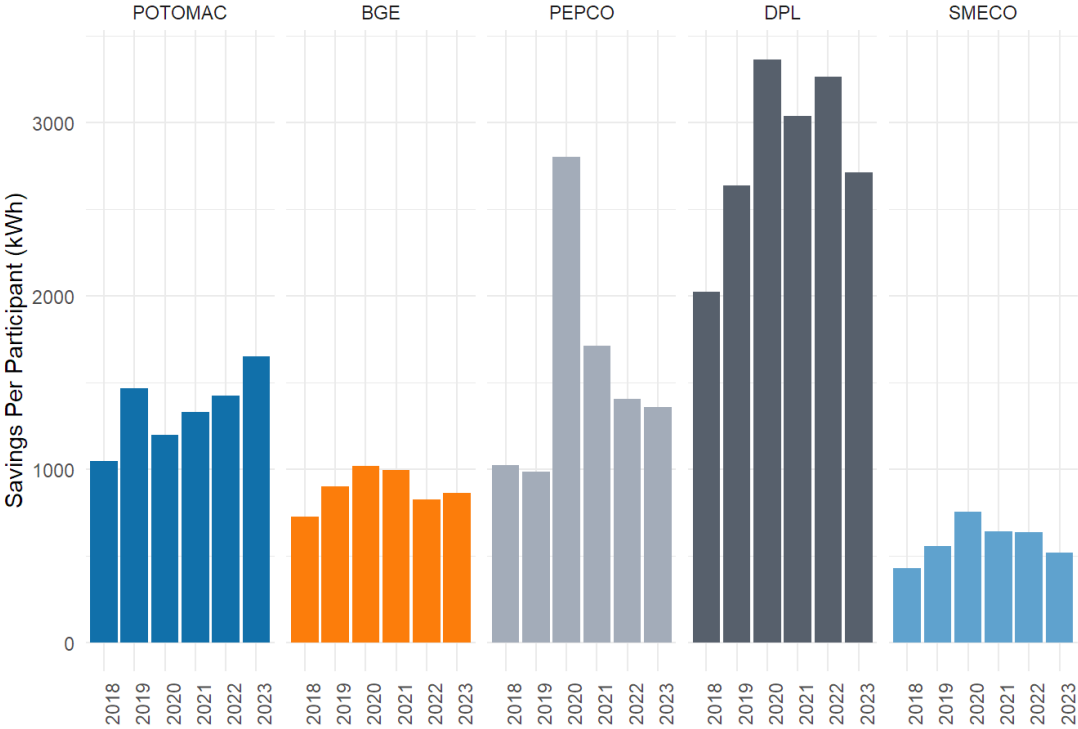
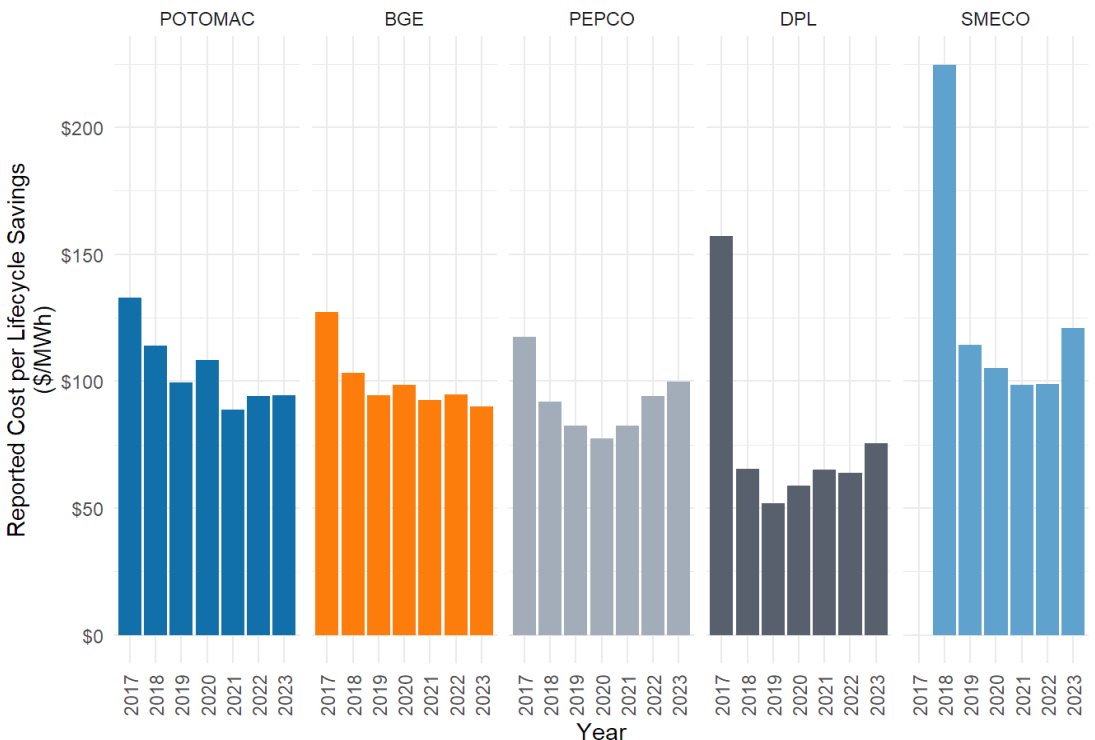


Figure 27. Home Performance/HEIP program costs per lifecycle savings by year and by utility.

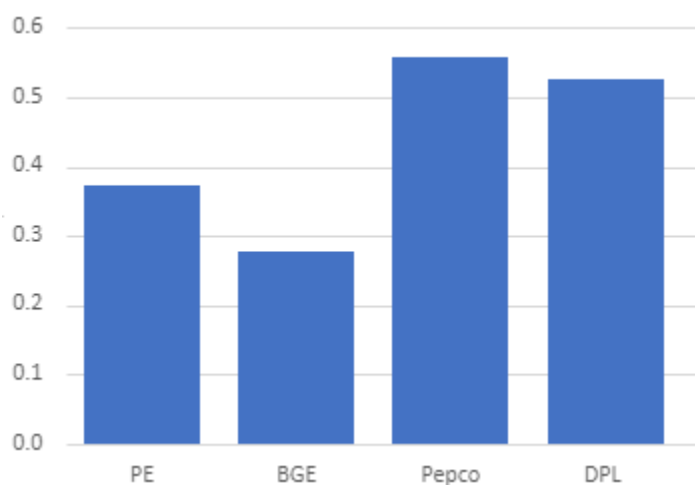


As with QHEC, BGE exceeded its Home Performance savings forecast within budget with a strong participation rate and steady cost of acquisition (\$/kWh), despite a slight decrease in savings per participant over the cycle. Likewise, Pepco fell short on participation but generated enough savings per participant to exceed its savings target, even while kWh savings per participant has been decreasing. Potomac Edison finished at its savings target under budget with higher savings per participant than other utilities but a comparable cost of acquisition.

Delmarva Power has had consistently high annual savings per participant and the lowest cost of acquisition but its underperforming participation rate hindered savings achievement. SMECO has relatively moderate savings per participant and cost of acquisition but left a substantial amount of budget unused.

Because smaller direct installation measures are offered to participants during the audit, participation in HPwES delivers immediate savings regardless of whether a retrofit job is “completed.” However, most savings result from the adoption of weatherization measures post-audit. HPwES’ success in triggering participants’ adoption of weatherization—and possibly HVAC—measures depends on its capacity to capitalize on the educational value of the audit, financial attractiveness of incentives in comparison to savings and project costs, and overcoming a host of intangible barriers to finding and working with construction contractors. Hence, differences in savings achievement are correlated with variations in participation volumes, job conversion rate, and the scope of measures program participants pursue post-audit. Figure 28 below shows that most utilities are in the range of a 0.5 job-completed-to-audit ratio.

Figure 28. CTD Ratio of completed retrofit jobs to audits within HPwES.

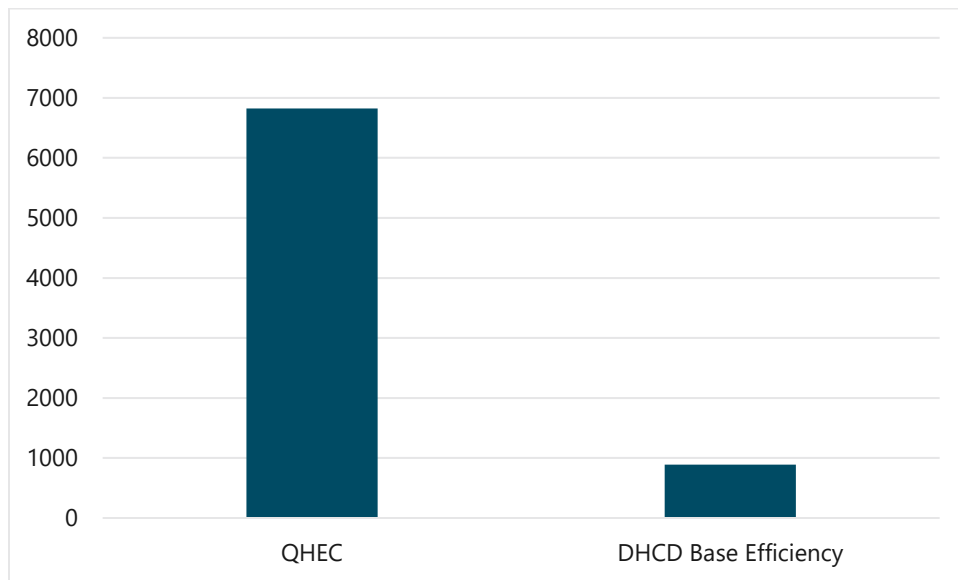


Total energy savings (both gas and electric) in MMBtu per participant for 2023 were consistent with 2022 for each utility, with an exception for Delmarva Power. Delmarva Power put unused HPwES budget from previous years toward limited time increased incentives in Q3 and Q4 to raise participation, leading to costlier savings while still underachieving on both savings and participation for the 2021-2023 cycle.

## Income-eligible ratepayers' participation in utilities' retrofit programs

QHEC is comparable in scope (i.e., a home assessment followed by direct installation measures) to DHCD's base efficiency program (see "Limited Income - DHCD" section). Figure 29 shows that while income-eligible programs are traditionally described as "DHCD programs," in 2023 income-eligible ratepayers participated in the QHEC program at a rate more than six times higher than in the DHCD-run base efficiency offering. (In fact, the number of income-eligible participants in QHEC is a conservative estimate because it is very likely there are income-eligible participants who are not identified by utilities as such<sup>26</sup>).

Figure 29. Number of identified income-eligible participants in QHEC and DHCD Base Efficiency programs in 2023.

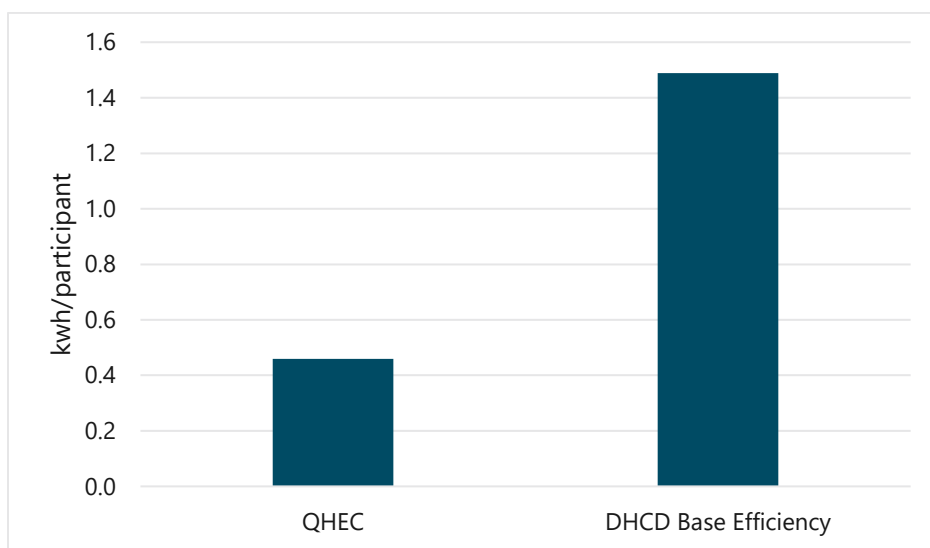


Although income-eligible households should be welcome to participate in any efficiency program—including low/no-cost options like QHEC—their participation in QHEC is not an ideal outcome for several reasons. First as shown by Figure 30 below, participation in the DHCD base efficiency program delivers three times more energy savings to eligible ratepayers than QHEC.

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<sup>26</sup> Households are identified by the EmPOWER utilities as "income-eligible" when receiving energy assistance via the Office of Home Energy Programs. Historically, only one third of eligible households apply to energy assistance. (See [2022FY - Operating Budget Analysis - N0010006 - DHS Office of Home Energy Programs \(maryland.gov\)](#).)

Figure 30. Savings per participants in QHEC and DHCD Base Efficiency programs in 2023.



In addition, it is quite likely that many of the QHEC participants would have benefited from a more comprehensive DHCD offering (e.g., the whole home program). Thus, income eligible participation in QHEC likely indicates a failure by the utilities to refer income-eligible customers to the program where they could receive the greatest benefit.

In 2023, utilities completed HPwES projects in approximately 100 limited-income households. There is no obvious reason why identified income-eligible households should be enrolled in HPwES. An HPwES audit costs participants \$100 and they must also pay a minimum of 25% of the cost of measures installed post-audit. Further, income-eligible participants should not be directed to financing products when DHCD programming offers similar measures free of charge.

## Challenges Ahead

In general terms, the utilities' residential retrofit programs offer a value proposition to many Maryland households. The utilities intend to introduce few changes in the 2024-2026 cycle, but will offer higher maximum incentives, in part to keep pace with market conditions. In many ways, the core challenge is continuing to find customers who can be motivated to pursue comprehensive retrofit projects, each of which generates large lifetime energy and GHG reductions.

Significant limited income participation in utility programs is likely to confound efforts to dramatically increase participation and savings for DHCD programs—and raise equity concerns if participants pay more or receive less than they otherwise are entitled to.

It remains to be seen how the introduction of federally funded IRA incentives for water heating and space conditioning will intersect with EmPOWER retrofit (or HVAC) programs.

## Behavioral

The EmPOWER Behavioral programs save energy by providing insights to customers through printed and emailed home energy reports (HERs), digital tools, and messaging to customers. These tools leverage advanced meter infrastructure (AMI) data to influence energy saving behavioral changes by customers (compared statistically to non-targeted customers). Energy savings accrue as end-users adopt behaviors recommended in the reports based on usage patterns and historical trends. In EmPOWER, savings from behavioral programs are assumed to last for a single year, and savings are measured in statistical comparisons between participants and control groups of like customers.

**The Behavioral Program continues to offer some of the greatest and most cost-effective energy savings in EmPOWER, which will be even more true absent retail lighting.**

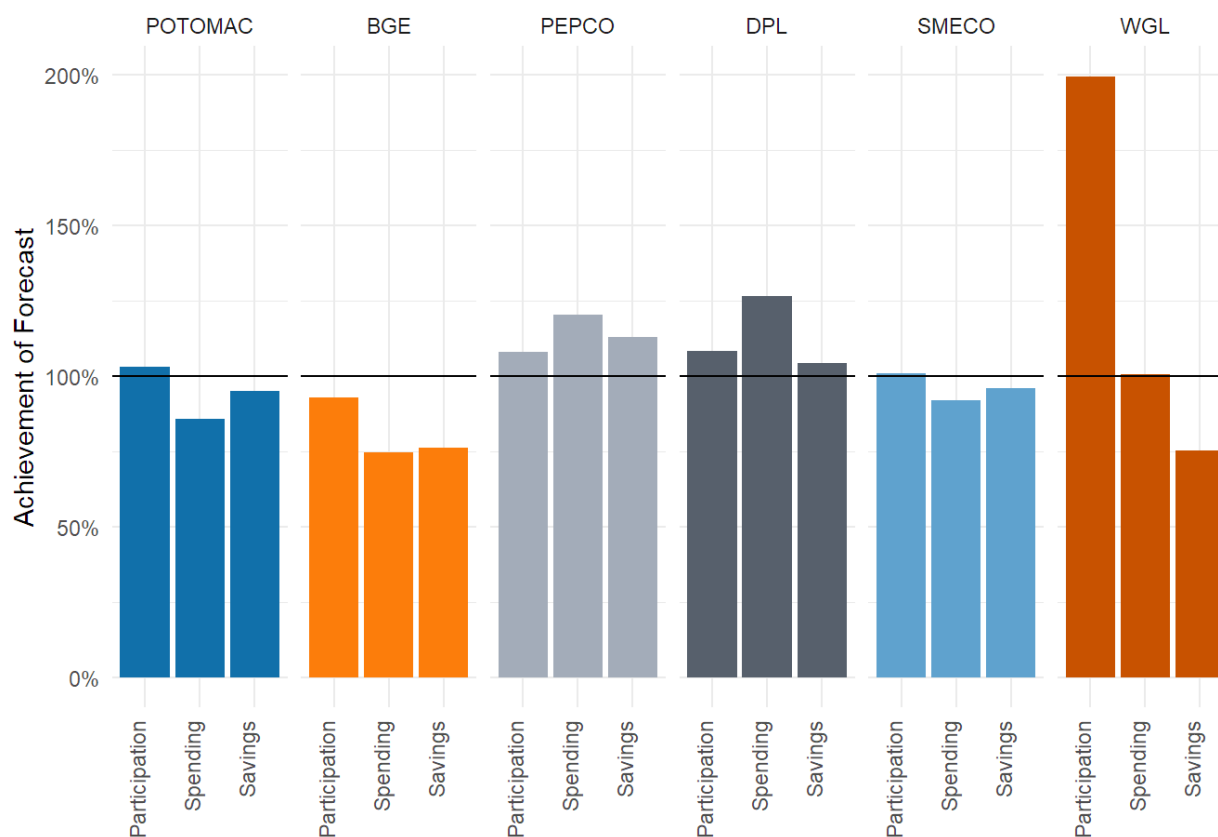
### Key findings

- Most utilities fell short of savings goals in the 2023 program year and the 2021 - 2023 program cycle. However, budgets were far lower than forecasted as well, implying a need for greater investment by utilities rather than a shortcoming of behavioral programs.
- Low-income reporting lacked specificity and measurement of impact for behavioral programs.
- Behavioral programs generated a significant proportion of residential savings for utilities and remained the most cost-effective programs. This success was achieved with a measure life that research indicates is discounting the true value of these programs.

### Trends in performance and program strategies

Pepco and Potomac Edison were the only two utilities to meet savings forecasts in 2023. Pepco and Delmarva were the only two utilities to meet savings forecasts for the 2021 - 2023 cycle as a whole, as shown in Figure 31. In both cases, however, the electric utilities that met their savings goals were also the only ones to exceed forecasted budgets, and all electric utilities exceeded 90% of the savings forecasts for 2023 and the program cycle.

Figure 31. CTD Behavioral achievement of forecasted goals.

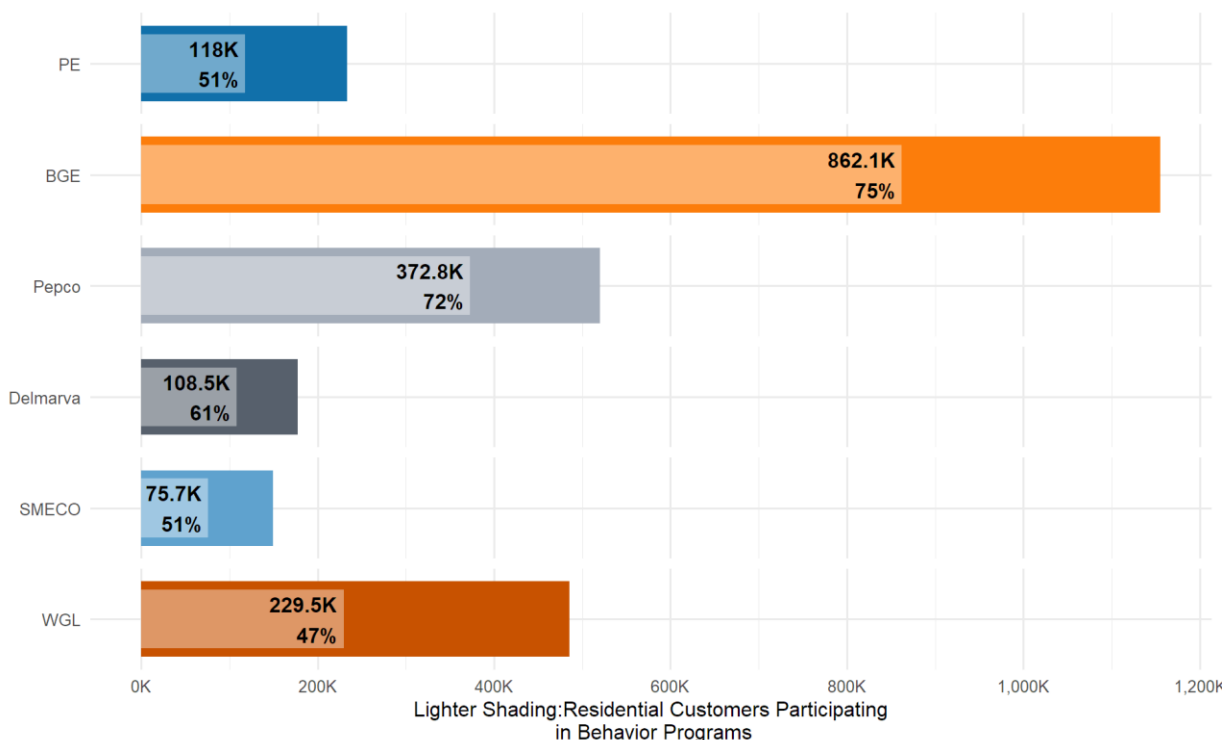


Washington Gas was the only other utility to exceed the cycle’s forecasted budget, but only by 1%. While Washington Gas only achieved 75% of the forecasted savings this cycle, it achieved encouraging year-over-year improvements, having increased annualized therm savings by more than a third since 2021 with the same relative number of participants. BGE was only able to achieve 49% of the forecasted gas savings this cycle, which contributed substantially to EmPOWER’s underachievement of gas savings overall.

Most utilities continue to report successful deployment of programs that provide energy-related information and now, with the more widely deployed AMI, customized user insights to achieve savings. By measuring program results in terms of energy, engagement, and program participation, utilities are able to run behavior-based programs cost-effectively to nearly the whole population. This level of saturation—excluding the retained control group used to measure how energy use changed as a result of the intervention—has emerged as a program best practice that combines mass-marketing with energy savings. The percentage of each utility’s customer base enrolled in behavioral programs is shown in Figure 32.



Figure 32. Percent of residential customers participating in behavioral programs by utility.



BGE forecast the Smart Energy Manager behavioral program would have nearly one million participants this cycle and reported achieving 93% of the forecast. The program spent 74% of budget and achieved 97% of its forecasted electric savings.

The expenditures per MMBtu saved varies significantly across the EmPOWER utilities, as shown in Table 6 below. Although BGE reports electric and gas savings separately, the expenditures and participants of the behavioral program are reported as a combined factor. As a result, the utility's reported cost per energy savings figure does not accurately capture the value of the program. BGE's current reporting method double counts the expenditures, as the total program expenditures are used to calculate the savings rate for each program individually. A more accurate representation of program achievements would be to report the cost per energy savings in MMBtu, combining electric and gas savings. Here, the BGE Smart Energy Manager spent \$5.72 per MMBtu saved. To compare, the way the utility currently calculates cost per energy saved equates to \$7.33 per MMBtu for electric savings and \$26.06 per MMBtu for gas savings. The utility should continue to report electric and gas savings separately, but use a standard unit of energy, such as MMBtu, when reporting combined program metrics. Still, the ratio of dollars saved per dollar spent is positive for all behavioral programs in 2023. Pepco reported the highest leveraged lifecycle savings, returning \$6.22 for every dollar spent on the behavioral program in 2023. At the other end, the lowest reported lifecycle savings still garnered a 25% return on the program investment.

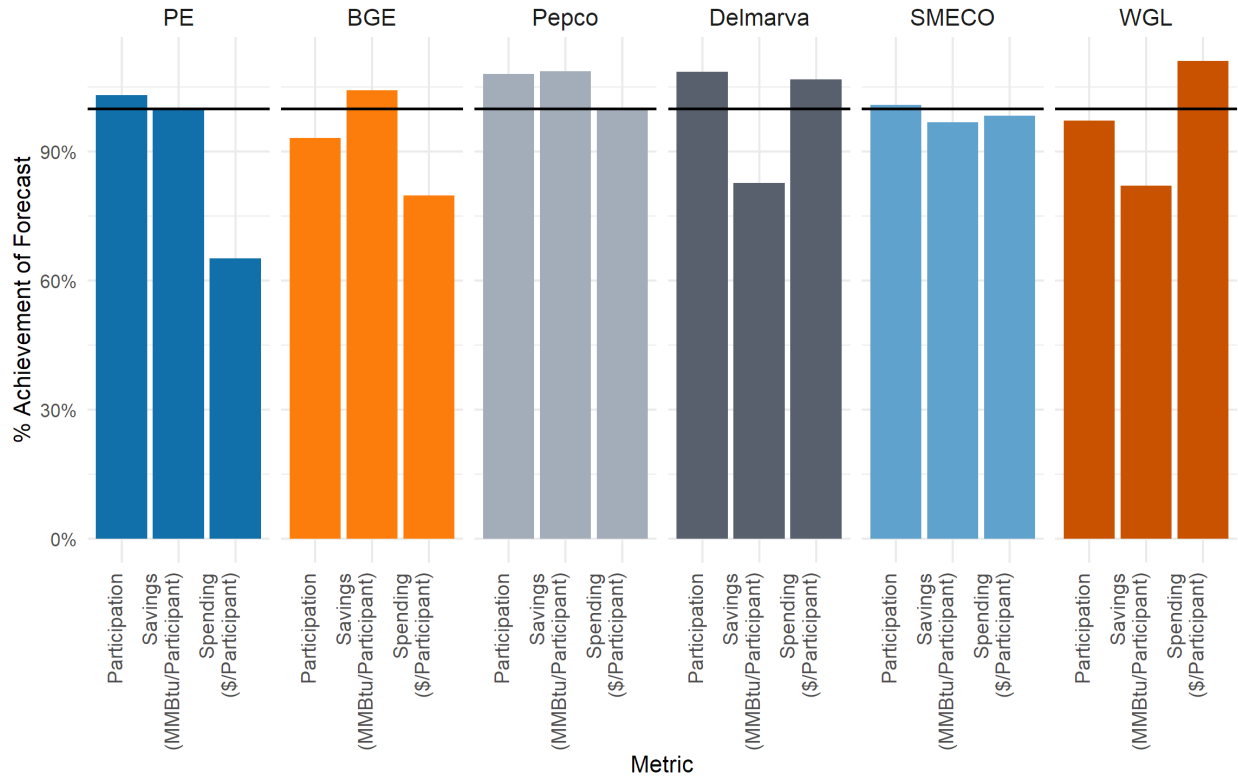
Table 6. Cost of lifecycle savings (\$/MMBtu) for Behavioral programs, 2023.

Utility	\$/MMBtu	Ratio of Lifecycle Financial Savings to Expenditures of Behavioral Programs
<b>BGE</b>	\$5.72	5.0
<b>DPL</b>	\$11.80	3.6
<b>PE</b>	\$9.00	1.3
<b>Pepco</b>	\$6.88	6.2
<b>SMECO</b>	\$23.68	1.8
<b>WGL</b>	\$11.75	1.6

Delmarva, Potomac Edison, Pepco, and SMECO all exceeded participation forecasts, with BGE and WGL over 90%. Despite this, only Potomac Edison and Pepco achieved or exceeded savings forecasts for the current year. Potomac Edison managed to exceed both participation and savings forecasts by 3% while spending only 67% of the projected budget. Though BGE did not meet its savings forecast, its savings per participant, shown in Figure 33, indicates it would have if more participants were enrolled.

Washington Gas fell short of its forecasted savings per participant (80%) for the current year but spent more per participant than forecast (108%). This is also true of Delmarva. Pepco also surpassed its forecasted spending per participant by 8%, but also exceeded expected savings per participant.

Figure 33. Behavioral program achievement of forecast per participant by utility.<sup>27</sup>



BGE savings metric includes reported MWh savings ONLY

### Limited income participation

Only BGE, Potomac Edison, and SMECO reported limited income participation, all of which were approximately 4% of the total participant base. (As with “limited income participation” in all EmPOWER utility programs, the 4% figure is based on individuals known to the utility to participate in income-eligible programs; it thus represents a significant undercount of actual limited income participation.) BGE and Potomac Edison both reported expenditures for limited-income participation; however, their reports simply calculated the utilities’ average expenditure per participant applied to number of limited-income participants. The same method was not followed to calculate savings. In fact, utilities note that it is not possible to truly disaggregate savings and spending for limited-income households as the customers have not been segmented into participants and a control group.

As utilities are not creating new behavioral initiatives for the limited-income population, there is little motivation to assign control and participant groups specifically for limited-income customers. Currently, EmPOWER behavior-based initiatives targeting low-income households primarily use home energy reports (HERs) as a way of measuring uptake of other EmPOWER programs (called “uplift”). Limited-income participants do not have a separate measure to calculate savings and would follow the same evaluation protocol for behavioral

<sup>27</sup> Savings are converted to MMBtu and control for enrollment underachievement in participation.

programs. Unless testing a new strategy for behavioral savings, utilities can estimate savings and spending for limited-income households so long as participation is accurately measured.

Though several utilities report DHCD program coordination through HERs, campaigns do not appear to be selective for income or measure impact. Initiatives leveraging behavioral science to support these efforts should be captured in low-income participation costs for behavioral programs. While this would reduce the cost-effectiveness of the program, it also acknowledges that limited-income customers necessarily require additional effort for engagement and that behavior-based programs can provide value beyond direct energy savings.

While savings are not calculated separately, BGE demonstrated the capability of segmenting and targeting low-income customers in behavioral programs through its Limited Income Home Energy Reports pilot. The reported metrics focus on boosting participation in other EmPOWER programs (referred to as “uplift”), which should be a primary objective of limited-income behavioral interventions. Utilities and DHCD should identify applications for behavioral programs to coordinate with DHCD programs using targeted methods rather than generalized campaigns such as bill inserts. Measuring uplift still must adhere to the same standards of evaluation as energy savings. This perspective should be considered when in the proposal and design of limited-income behavioral pilots.

The EmPOWER utilities’ behavioral programs generally fell short of savings targets during the 2021-2023 cycle; only Delmarva and Potomac Edison met their savings forecast. However, as these were the only two electric utilities that spent their budget for the cycle, this underachievement appears to stem from a lack of investment. None of the utilities that failed to spend their budgets explained why not, and it was an unexpected outcome of this cycle as behavioral programs remained a highly cost-effective and leading generator of savings across the EmPOWER utilities residential portfolios. The large savings and high level of cost effectiveness have been achieved assuming a 1-year measure life that likely discounts the true degree of savings from these programs.

There have been questions about the persistence of savings of behavior-based programs from the Commission. However, research does not support that concern. There is now more than a decade of highly credible randomized control trial studies that have corroborated multi-year persistence of behavioral savings.<sup>28</sup> Illinois, for example, has adopted 10-year and 7-year measure life for electric and gas savings respectively in the latest technical reference manual, while considering other aspects such as free ridership and spillover into other efficiency programs.<sup>29</sup>

Extending the measure life of behavioral programs to align with leading states’ assessments of their efficacy would make the programs more cost-effective. Behavior-based initiatives will

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<sup>28</sup> [Chapter 17: Residential Behavioral Evaluation Protocol. The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, September 2011 - August 2020 \(nrel.gov\)](#)

<sup>29</sup> [IL-TRM Effective 010124 v12.0 Vol 4 X-Cutting Measures and Attach 09222023 FINAL.pdf \(illinois.gov\)](#)

play a crucial role in meeting Maryland’s ambitious climate objectives. Assigning fair value to the programs in utility portfolios will provide the confidence needed to drive innovation forward and adequately allocate budget toward these directives. We recommend the Evaluation Advisory Group review how the lifecycle savings of behavior-based programs is calculated in other states and report the robustness of research supporting utilization of a different measure life.

## Program evolution

BGE has updated its customer communication tool to “HER V3,” introducing a new Efficiency Zone Normative Comparison and replacing the neighbor comparison to enhance report accuracy. The Energy Use Benchmark Performance Summary now uses ‘fair,’ ‘good,’ and ‘great’ indicators, and the tool offers detailed Energy Disaggregated Insights and Tips. These changes aim to provide personalized insights and motivate customers to reduce energy consumption. BGE also tailors reports for various customer segments, including LMI, solar, and EV owners, and launched the Electric Vehicle HER. In March 2023, BGE launched a video home energy report for limited-income households, integrating with BGE’s Assistance Finder tool and resulting in 1,545 enrollments in assistance programs.

Delmarva and Pepco launched an EV-experience HERs program and updated the rate comparison tool on their website. Pepco launched a new email campaign to improve the efficient operation of HVAC equipment and launched v.3 of its base HER in March 2023.

SMECO issued a mass survey to HERs participants with more than half of respondents reporting the program motivates them to save energy. Additionally, 91% had a positive response to the content and 81% actively and routinely read the full report.

## Challenges ahead

As described in our comments filed in 2023, we found that the plans for behavioral programs in the 2024 - 2026 program cycle fell short on expectations for technical innovation. How utilities leverage behavioral programs to meet ambitious emissions goals, and potentially beneficial electrification, will be a key point of observation for the next cycle. The market is continuously evolving with new innovations utilizing advanced meter infrastructure (AMI). Use of new AMI-enabled functions had been a focal point of program evolution in the past and should continue to improve how utilities engage with their customers and generate savings from behavioral initiatives.

Behavior-based programs are uniquely positioned to provide broad benefits to efficiency portfolios that are not accounted for as energy savings, such as integration with DHCD programs to improve enrollments. Another challenge will be refining how to measure the boost behavioral programs can provide for participation in other EmPOWER programs (“uplift”).

## New Construction

The EmPOWER incentive program for residential new construction is based on the national ENERGY STAR® program. The utilities refer to the program as ENERGY STAR for New Homes. The basic program and incentive structure target whole home energy performance. Homes that earn the ENERGY STAR label are estimated to be at least 10% more energy efficient than the prevailing energy code and are backed by established national quality standards. EmPOWER utilities have been offering the program since 2012. In the 2021-2023 cycle, utilities began offering specific incentives for so-called “additive measures”—individual additional measures such as high efficiency heating, cooling, and water heating equipment—as well as an option to certify to U.S. DOE’s Zero Energy Ready Homes (ZERH), a standard of efficiency intended to allow the home to be powered through as much energy as could be generated onsite.

**Since 2012, the EmPOWER utilities’ ENERGY STAR homes have comprised an average of 30% of the market for new residential home construction. They should build on this record with measures to help builders construct low-energy, all-electric homes with loads that can be supplied by renewable energy that could be produced onsite.**

### Key findings

- For the 2021-2023 program cycle, all utilities except BGE met or exceeded savings goals and DPL achieved twice its forecasted savings.
- The new offering of Zero Energy Ready Homes (ZERH) was not very successful. Pepco, DPL and Potomac Edison had no more than one ZERH for the entire program cycle; BGE and SMECO ZERH certifications accounted for 2-4% of program participants.
- DPL achieved impressive savings per participant, and Potomac Edison was able to spend the least per kwh of savings. Pepco had both the most expensive savings and the least savings per participant.

### Trends in performance and program strategies

For the 2021-2023 program cycle, all utilities except BGE met or exceeded savings goals, as shown in [Figure 34](#) below. BGE also fell short on participation and did not spend its forecasted budget. DPL achieved twice as much savings as forecasted, with substantial participation and no budget excess. SMECO also achieved impressive savings and participations, with some additional cost. WGL did not meet participation goals but exceeded savings goals while staying within budget.

Figure 34. CTD Residential New Construction program achievement of forecasted goals by utility.

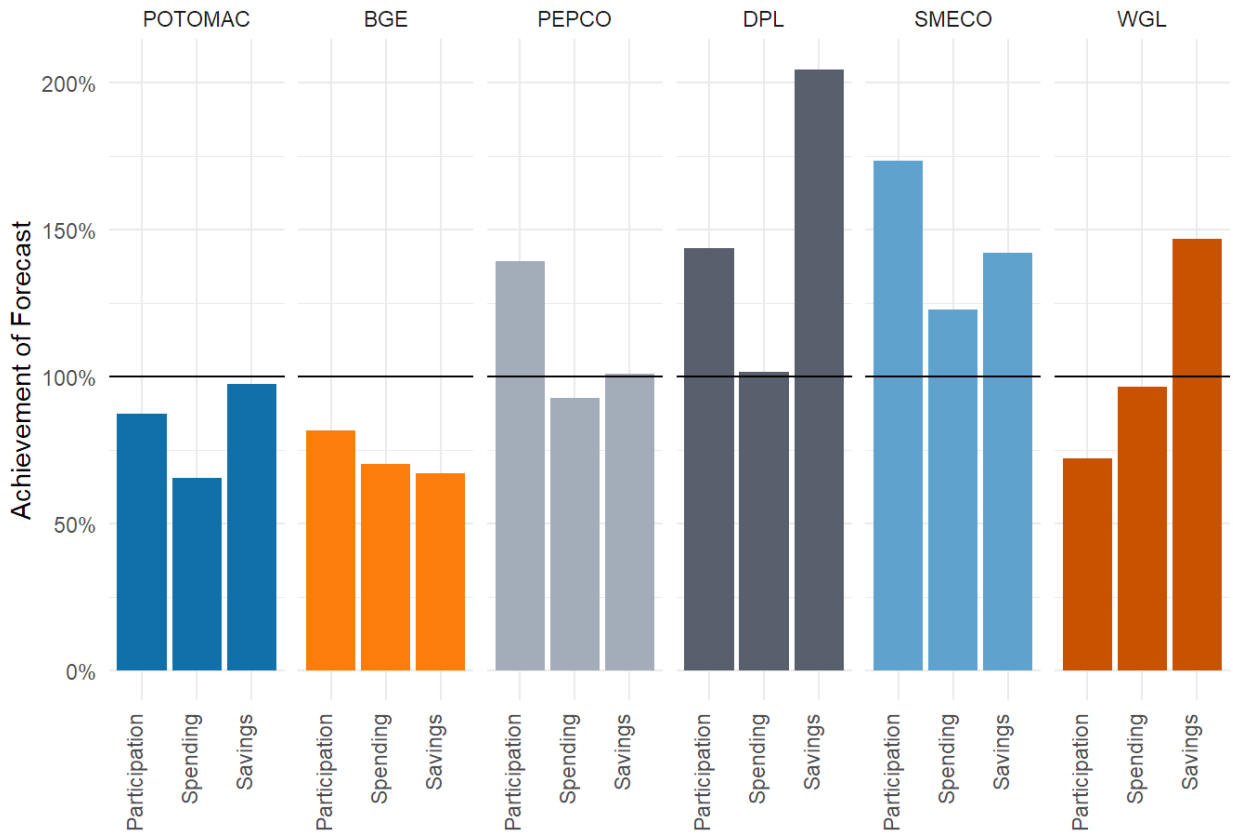


Figure 35 below shows the average electric savings per participant by year across the utilities. DPL’s high savings performance is connected to its very high savings per participant, twice that of the lowest utility (Pepco). Otherwise, the data show consistency and convergence in cost trends across the utilities.

Figure 35. Annual Residential New Construction Average Savings per Participant.

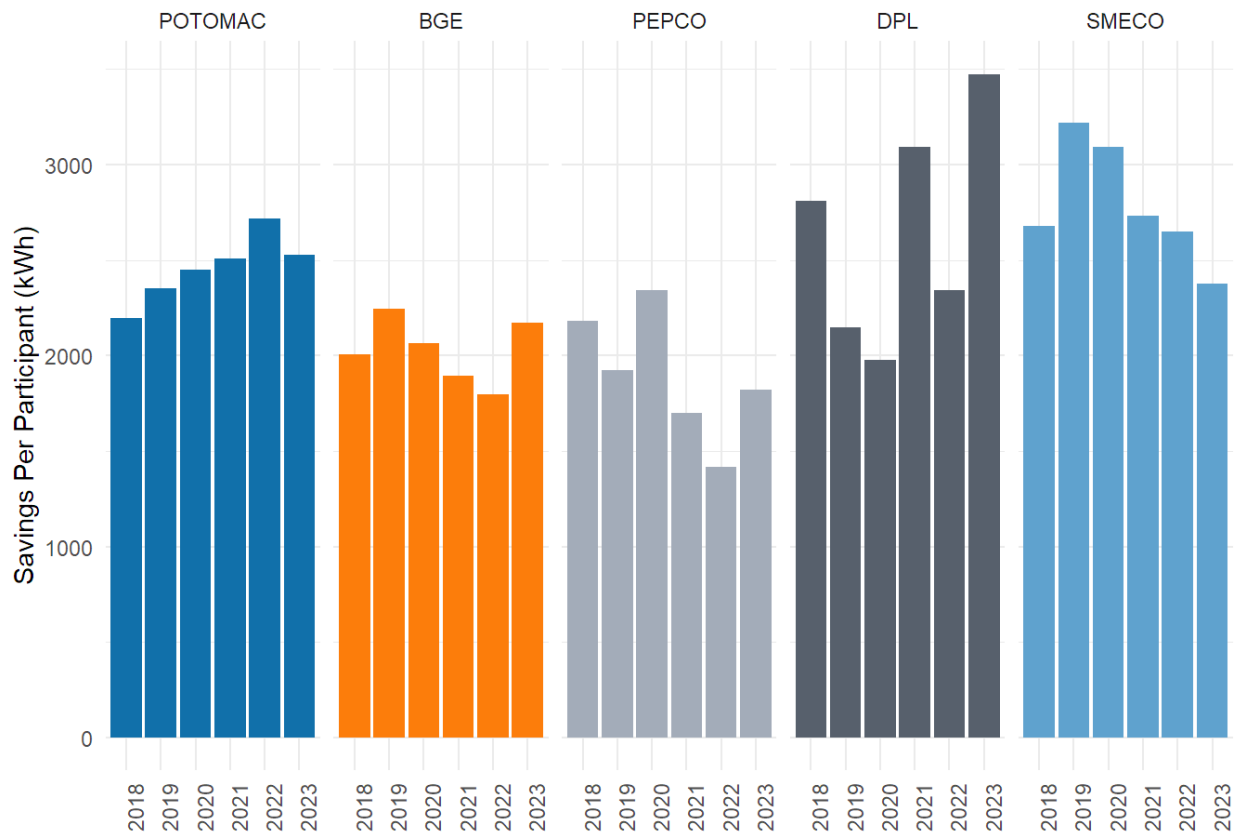
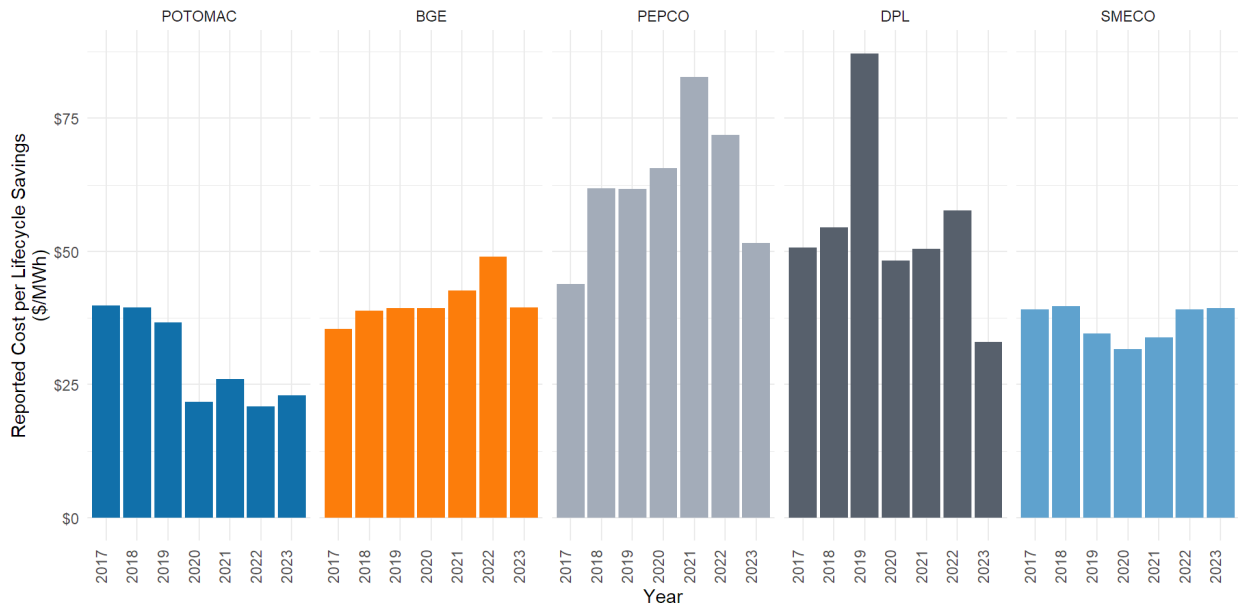


Figure 36 below shows the average cost of savings per kwh across utilities. The utility with the highest lifecycle savings (Pepco) spent twice as much to save a kwh as the lowest (Potomac Edison.) As noted by other parties regarding EmPOWER utilities’ 2024-2026 plans, the utilities have a surprising degree of variation in costs considering they are intended to offer substantially the same programs. In the case of the New Construction program, some degree of variation could be explained by pursuit of projects with deeper savings or greater innovation—however none of them reported significant participation in Zero-Energy Ready Homes, and three utilities reported zero or only one project.

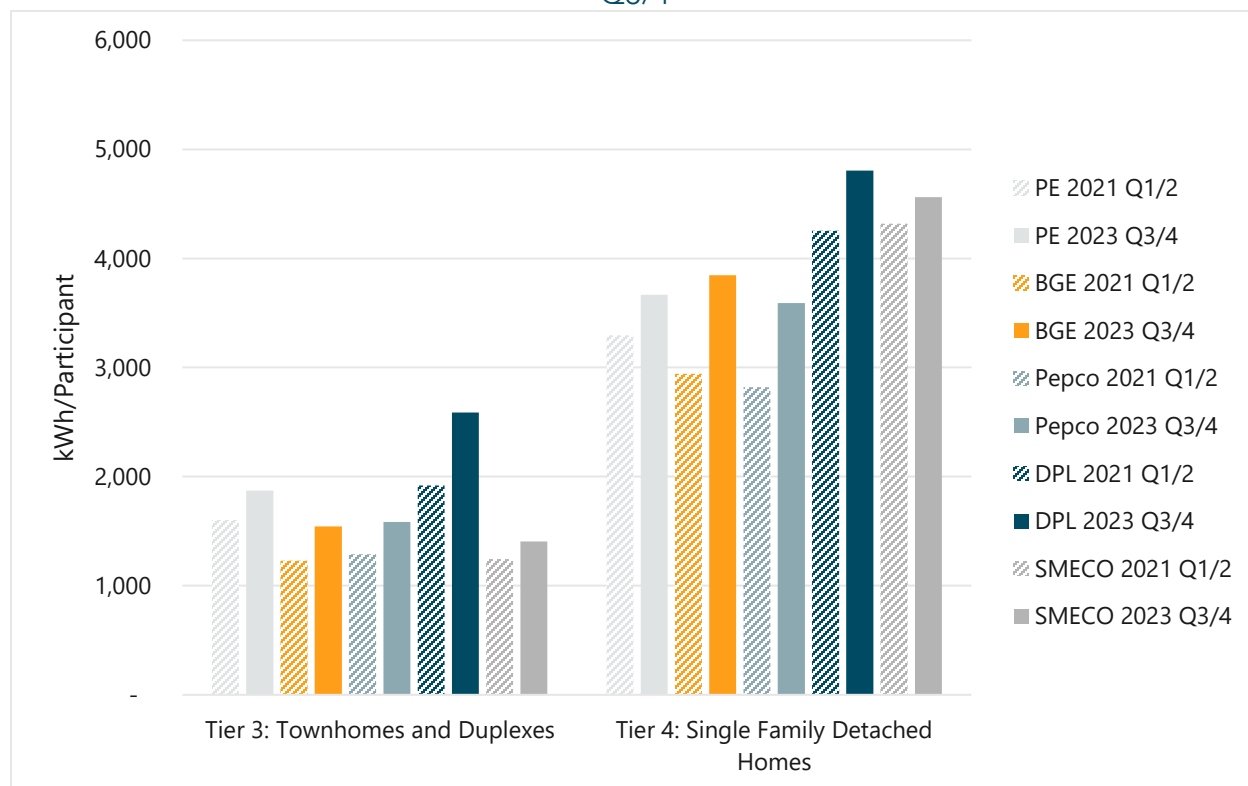


Figure 36. Residential New Construction Reported Program Cost per Lifetime Savings, 2023.



At the beginning of the program cycle, little or no additional measures and/or ZERH participation were reported by utilities. In the final reporting period, all utilities reported some level of participation in additive measures and/or ZERH certification. As shown in Figure 37, per participant savings increased across these two reporting periods for all utilities.

Figure 37. Residential new construction electric savings per participant: 2021 Q1/2 vs 2023 Q3/4



(Only Tier 3 and Tier 4 are included because only these tiers saw participation by all utilities for the two reporting periods.)

With the offering of ENERGY STAR Next Gen in the 2024-2026 program cycle, which is focused on high efficiency electrification, the electric utilities should expect to realize even greater per participant savings.

As shown by the number of utility projects, below, the use of the Zero Energy Ready Homes offering in this cycle was not very successful overall, despite new IRA tax credits for ZERH homes built in 2023. ZERH certification does not require renewable power generation or any electric appliances; in addition to high efficiency standards, it requires certain construction and electrical wiring capacity that make renewables, EV charging, and/or electric appliances easier and cheaper to add at a later time. Over 90% of BGE’s ZERH certified homes had either a gas furnace or a gas water heater, for example. These are disappointing results because every home built today should be made “ready” for an electrified future. ZERH results by utility:

- Potomac Edison: zero projects (only a few forecasted in future years based on conversations with builders)
- BGE: 115 projects (2% of all home participants)
- Pepco: 1 project

- DPL: zero projects. Had forecasted several submissions in 2023 from a LMI developer. Project delays pushed completion to 2024.
- SMECO – 91 projects (4% of all home completions).

Participation in “additive measures” was somewhat more successful. All utilities reported some uptake of individual additive measures, but the overall uptake was relatively small. Across the electric utilities, additive measures were reported in approximately 10% of projects.<sup>30</sup>

- All utilities reported some participation in the HPWH measure. For those utilities that reported detailed additive measure participation, HPWH were installed on an average of about 5% of projects across utilities, ranging from 3% to 8%. (DPL did not report which additive measures were installed just an overall quantity).
- The greatest participation rate was the air source heat pump measure, with 10% of Pepco participants.
- BGE reported 8% of participants installed high efficiency central air conditioning units. Other utilities reported 1% or less for this measure.

## Challenges ahead

According to the utilities, there was a disproportionate negative impact to the residential new construction program following the Covid-19 pandemic, leading to some utilities seeing greater supply chain issues and a general slowdown in the residential new construction industry. The utilities’ claim is not consistent with national data on home construction, which show high levels in 2021 and early 2022.<sup>31</sup> Late 2022 and 2023 saw lower new housing starts due to very high interest rates; however, experts such as the National Association of Home Builders expect housing starts to increase in the coming year.

The introduction of ENERGY STAR’s Next Gen program should be a positive change allowing for additional savings and could support beneficial electrification. This standard incorporates the type of additional measures promoted in 2021-2023. However, given the relatively small uptake of additional measures to date, the utilities will need to improve and enhance education, training, and marketing for customers and builders.

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<sup>30</sup> Due to the way utilities report measures and participants, we cannot determine whether multiple additive measures were installed in the same home. Therefore, these estimated percentages may be even smaller.

<sup>31</sup> U.S. Census. Monthly New Residential Construction. February 2024.

<https://www.census.gov/construction/nrc/current/index.html>

## Limited Income - DHCD

The Maryland Department of Housing and Community Development (DHCD) programs serve both single family and multifamily markets. Eligibility is limited to customers who have household incomes less than 250% of the Federal Poverty Level. Although participation in DHCD programs has no direct cost to participants, identifying eligible customers and engaging and supporting them to participate in programs is an enormous and complex task. For the single-family segment, a comprehensive suite of programs targets customers at different stages of their journey toward energy efficiency, based on specific barriers to participation. Both single and multifamily participants may receive an energy efficiency kit with small, self-installed efficiency measures. DHCD also runs the Multifamily Energy Efficiency and Housing Affordability Program (MEEHA) to generate deep energy savings in buildings in which at least 20% of households have incomes below 80% of the average median income (AMI).<sup>32</sup> (See the **EmPOWER Program Description** section above for more explanation about DHCD program design.)

**DHCD-run programs served 2.5 percent of eligible households in 2023,<sup>33</sup> well short of its goal. A substantial increase will be needed in the coming years not only to meet statutory goals but to provide equitable energy services to limited income households.**

### Key findings

- In 2021-2023, DCHD fell short of its goals for participation, spending, and energy savings. Participation was only 38% of forecast for the program cycle, while program spending was 80% of forecast and energy savings was 61% of forecast.
- In 2023 DHCD almost doubled the number of applications (i.e. people coming to the program excluding referrals from the Office of Housing & Energy). The department attributes this to increased outreach, marketing, and attendance at local events.

### Trends in performance and program strategy

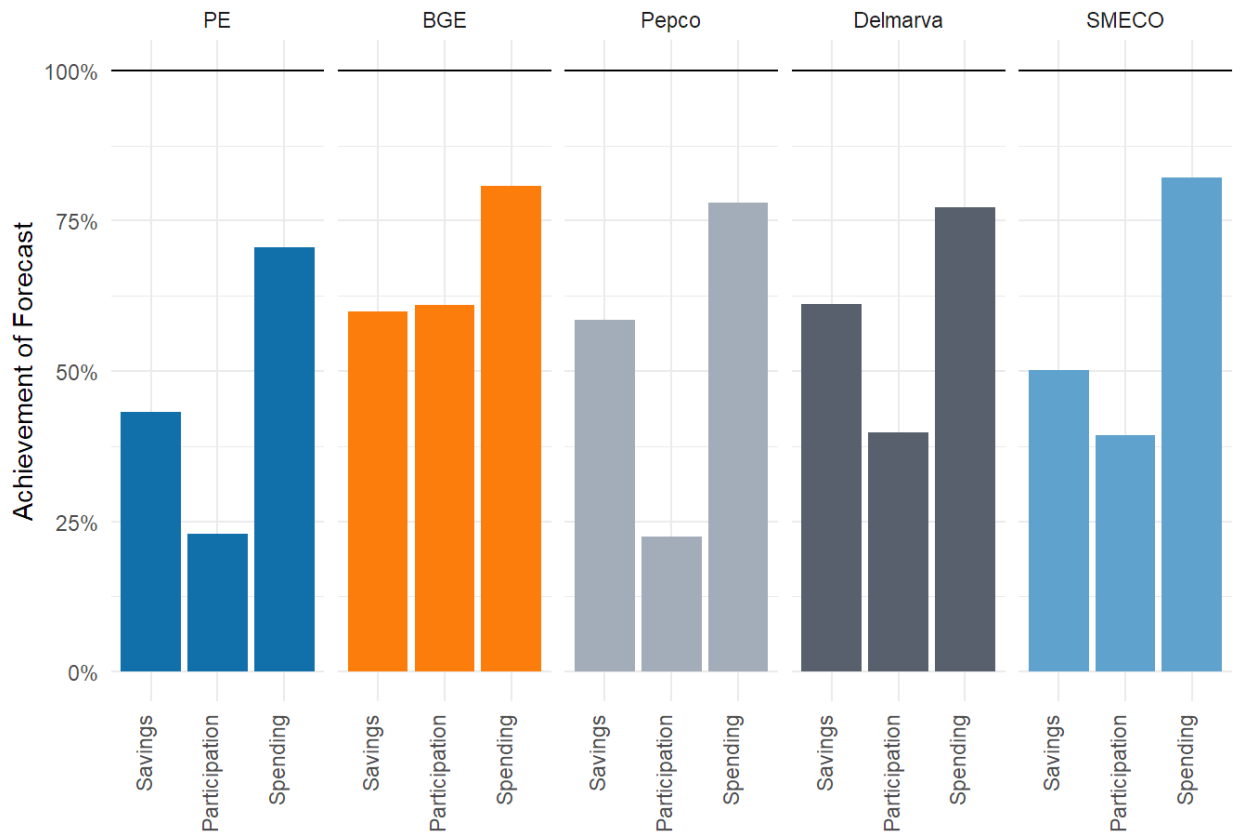
After diversifying its services for the 2021-2023 program cycle, DCHD maintained a consistent set of program offerings throughout the 3-year period. While the participation rate increased with the new offerings at the beginning of the cycle, the lack of growth in subsequent years resulted in DHCD being behind targets on participation, spending, and

<sup>32</sup> <https://dhcd.maryland.gov/HousingDevelopment/Pages/EnergyEfficiencyWeatherization.aspx>

<sup>33</sup> 13,500 served out of an estimated 530,000 households below 250% of the federal poverty limit.

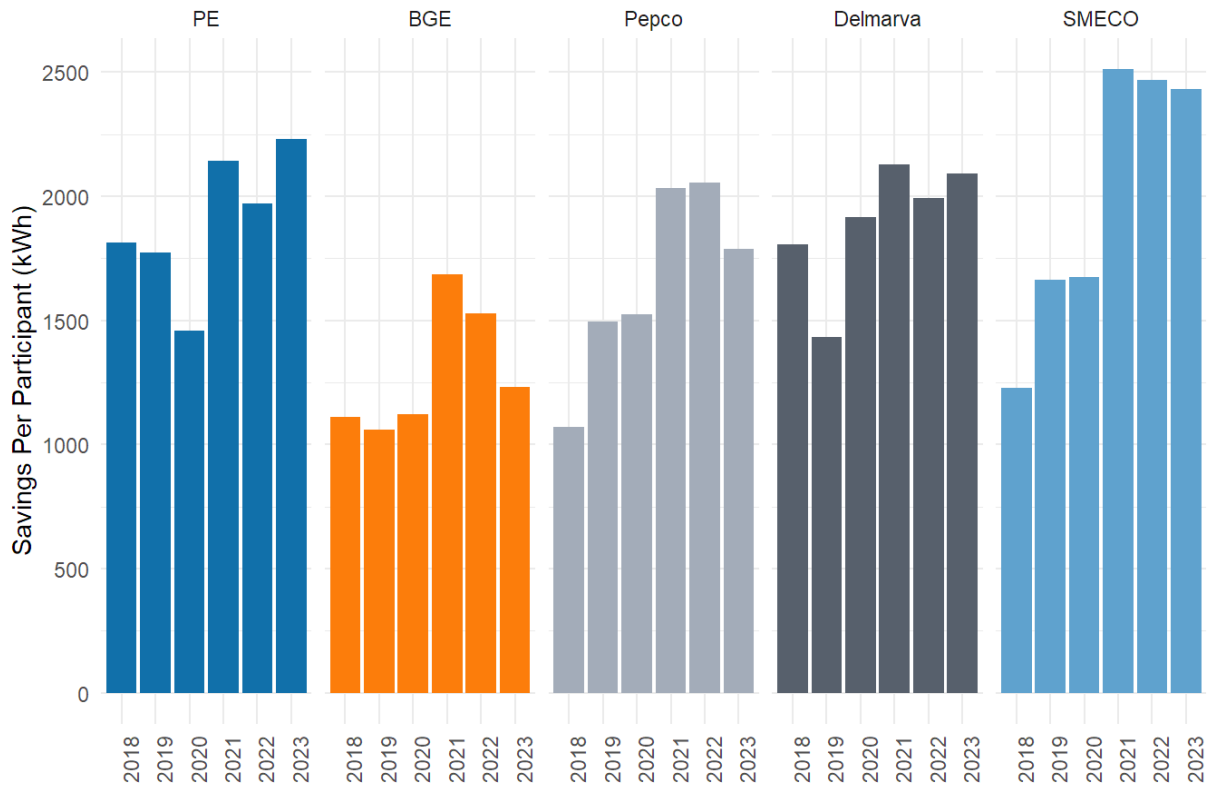
energy savings. Figure 38, below, shows DHCD’s achievement of forecasts by utility service territory.

Figure 38. CTD achievement of forecasted savings, participation and spending for all DHCD programs, by utility service territory.



DHCD’s savings per participant also increased in the 2021-2023 cycle compared to previous years, as shown in Figure 39. In fact, DHCD has substantially exceeded its own forecasts for savings per participant. DHCD’s main challenge was participation rates.

Figure 39. DHCD Historic single family electric savings per participant.



In the last year DHCD substantially grew the number of applications it received from channels outside of Office of Home Energy Programs (OHEP) referrals - from 990 applications in 2021 to 1,759 in 2023. The department attributes this growth to increased outreach, marketing, and attendance at local events. The growth in new application channels is an important accomplishment and necessary for engaging new individuals and communities that have not been served. There was a large increase in customers coming in through the Critical Medical Needs initiative, which DHCD attributed to better education and outreach activities with organizations serving people that could need these services. To meet legislative requirements it is critical to build a larger pipeline of new participants.

## Challenges Ahead

With savings and participation goals increasing substantially in the next 3-year period, DHCD will need to pay close attention to the success of its strategies to increase its service capacity. The Limited Income Work Group should be utilized to support DHCD in assessing progress and supporting new strategies for increasing participation and impact.

Federally funded rebates aimed at low-moderate income people and disadvantaged communities will start to become available in the next year. It will be important for EmPOWER funded LMI programming to coordinate closely with these new funding streams to serve

more people and address some of the barriers to participation that many households experience with EmPOWER programming (e.g., home repairs and health and safety measures beyond the scope of EmPOWER, electrification measures).

# Demand Response

With the exception of Potomac Edison, the EmPOWER electric utilities offer customers and members a variety of options to encourage participation in Demand Response (DR), or “demand flexibility” programs. These programs use a variety of technologies, equipment, and behavioral/economic incentive strategies to encourage changes in residential load at critical or strategic peak moments on the grid to offset costs. They help demand follow supply rather than the other way around, which can be highly cost-effective. Some programs rely on specific equipment (e.g. smart thermostats) incented by the utilities, and others allow customers to “Bring Your Own Device” (BYOD), allowing more flexibility for customers with existing equipment.

## Key Findings

- Most electric utilities failed to achieve their forecasted demand response capacity; however, except for SMECO, they also were unable to mobilize the DR capacity they did report when it came time to call actual demand “events.”
- DR enrollments increased only marginally in 2023.
- DR programs have made some progress in allowing a more diverse array of devices (including those the customers purchase outside of the DR program); however, the programs rely almost exclusively on managing air conditioning load.

## Trends in performance and program strategies

The residential DR programs offered by the EmPOWER utilities have different branding and characteristics. These differences add complexity to analysis and stakeholder understanding of these programs.

Table 7. Branded names of EmPOWER Demand Response programs by type

Program Type	BGE	Pepco	DPL	SMECO
<b>Direct Load Control</b>	Connected Rewards Peak Rewards (closed to new enrollments)	Energywise	Energywise	CoolSentry (transitioning to SmartTemps)
<b>Behavioral DR</b>	Smart Energy Rewards	Peak Savings Credit		My Energy Target



Utility reports do not always make clear where they refer to capacity to achieve demand reduction or actual reduction in demand during a peak event. In summary tables, both “Forecasted Coincident Peak Demand Reduction” and “Reported Coincident Peak Demand Reduction” refer to capacity to reduce demand. The former reflects the utilities’ aspirations at the beginning of the cycle and the later the results of actual DR enrollments.<sup>34</sup> Not all enrolled participants join DR events. Actual reduction in peak demand, in response to utility “events”, is not listed in summary tables but can be found in “DR Call Logs” tables.

Table 8 below shows both performance metrics. The third column shows the relationships between forecasted and “Reported” demand reduction (i.e. potential capacity). In the final column, it shows actual demand reduction from events in 2023 compared to the “Reported” capacity for residential DR programs provided by the utilities.

Table 8. Residential demand reduction performance

	Forecasted Coincident Peak Demand Reduction (MW)	“Reported” Coincident Peak Demand Reduction Capacity (MW)	“Reported” Compared to Forecasted Capacity	Max Demand Reduction During a Peak Event in 2023 (MW)	Demand Reduction During Events Compared to “Reported”
<b>BGE</b>	336	247	74%	156	63%
<b>PEPCO</b>	221	225	102%	141	63%
<b>DPL</b>	41	34	83%	21	62%
<b>SMECO</b>	45	40	87%	53	134%

Only SMECO performed well regarding actual demand reduction performance. Although Pepco achieved its forecasted goal for program capacity, it and the other Exelon utilities only achieved 63% of that in response to demand events.

During Q3-Q4 2023, BGE and DPL conducted two “economic” calls in response to a widespread need to reduce the cost of peak demand. Pepco conducted two “targeted” calls, for local demand reduction, and one economic call. SMECO conducted nine economic calls, reporting 53MW savings. All these call events pertain to air conditioning equipment.

Table 9 shows enrollments in residential DR programs in proportion to the overall customer base, as well as net changes in enrollments during the period. Again, the utilities report on “participants” differently in the summary tables. BGE uses the number of customers enrolled, SMECO uses the number of active devices (a much larger number), and the PHI utilities left “participants” blank. Therefore, this report reflects “participants” using the number of

<sup>34</sup> In utility summary tables, “Reported Coincident Peak Demand Reduction” has different meanings when applied to energy efficiency programs vs demand programs. For energy efficiency it refers to actual demand reduction, for DR programs it refers to *potential* demand reduction.

enrolled customers as reported in the mini-table. Pepco has the greatest share of customers enrolled in DR (57%) and SMECO the least (23%).

Table 9. Customer enrollments as a portion of total customers and change in enrollments, in the second half of 2023.

	Residential Customers (EIA)	Customer Enrollments at the end of Period	% of Customers Participating in DR	Net Change in Enrollments During Period	
<b>BGE (Peak Rewards)</b>	1,155,397	297,839	26%	(7,981)	-0.7%
<b>BGE (Connected Rewards)</b>		40,042	3%	10,830	0.9%
<b>BGE (Total)</b>		337,881	29%	2,849	0.2%
<b>PEPCO</b>	520,204	298,986	57%	1,475	0.3%
<b>DPL</b>	177,697	65,448	37%	1,695	1.0%
<b>SMECO</b>	149,170	34,253	23%	109	0.1%

BGE has a portion of its customers enrolled in its legacy Peak Rewards program. Enrollment in its newer Connected Rewards program is continuing to grow but did not outpace unenrollment in Peak Rewards during this period. BGE will need to significantly increase new enrollments and/or conversions to execute a full transition in a timely fashion. Apart from BGE, enrollments at the other utilities increased only marginally during the period; DPL’s 1% increase was the greatest.

Only BGE reported separately on BYOD vs non-BYOD savings, with the latter constituting most of the participants and savings.

## Challenges ahead

The utilities have substantial numbers of customers enrolled in their DR programs, although they have plenty of room to grow. The larger challenge is to mobilize more demand under the programs, especially by expanding their use through the entire year. As demand peaks shift toward winter with electrified heating, utilities will need to mobilize different program strategies and likely will need to enroll more devices than thermostats.

# EmPOWER Work Groups

## Limited Income Work Group

DHCD did not convene the Limited Income Work Group (LIWG) in the second half of 2023. However, the group has met once in early 2024 to discuss implementation issues for the 2024-2026 cycle. One focus of this meeting was the potential for the EmPOWER utilities to begin offering higher incentives to moderate-income households, which would require utilities to use some kind of income eligibility criteria for the first time—something DHCD does for all participation in its programs. The utility proposal for this is not sufficiently developed or clear.

## Midstream Work Group

The Midstream Work Group did not meet in the second half of 2023. In December 2023, Order No. 90957 directed the Work Group to file a status report on midstream and downstream compatibility by April 15, 2024.<sup>35</sup> As of April 7, the Work Group had not convened. Work Group members were queried for information or perspectives on this topic for the first time on April 3, 2024. OPC provided initial information on April 11; we do not anticipate an opportunity to fully consider the comments of others before the status report is due.

## Evaluation Advisory Group (EAG)

The Evaluation Advisory Group continues to meet in a productive fashion to address evaluation, measurement, and verification questions, ideally through consensus. We appreciate the efficient facilitation of EAG meetings (e.g. clear agendas, detailed notes) by the team led by Joe Loper.

One issue assigned to the EAG is assessment of savings and costs of conservation voltage reduction (CVR). A report on this topic is due to the Commission on August 1, 2024. A subgroup of EAG has begun meeting to gather data and exchange information and perspectives on this topic.

## Cost Recovery Work Group

The Cost Recovery Work Group was not directed to meet in the second half of 2023. In December 2023, Order No. 90957 directed the Work Group “to determine if there is an improved method for balancing the shift to an expensing model with the rising program costs and increased surcharges”.<sup>36</sup> The Commission directed the Work Group to file a status report by April 15, 2023. Work Group members were queried for information or

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<sup>35</sup> Maryland Public Service Commission, Order 90957, p. 88.

<sup>36</sup> Maryland Public Service Commission, Order 90957, p. 90.

perspectives on this topic for the first time on April 3, 2024, and the Work Group convened on April 10. OPC proposed that the utilities model multiple scenarios for surcharge mitigation. As of the drafting of the instant comments, OPC understands that the utilities will respond to OPC's proposals by April 17, and the Work Group will meet again on April 18.