PAULA M. CARMODY
PEOPLE'S COUNSEL

WILLIAM F. FIELDS
DEPUTY PEOPLE'S COUNSEL

STATE OF MARYLAND

OFFICE OF PEOPLE'S COUNSEL
6 Saint Paul Street, Suite 2102
Baltimore, Maryland 21202
(410) 767-8150 (800) 207-4055
FAX (410) 333-3616
WWW.OPC.MARYLAND.GOV

ASSISTANT PEOPLE'S COUNSEL

GARY L. ALEXANDER
JOSEPH G. CLEAVER
JACOB M. OUSLANDER
ANNA K. RYON
PATRICK E. O'LAUGHLIN
PHILIP H. SHEEHAN, JR.
FREDERICK H. HOOVER

October 15, 2020

Via E-Filing
Andrew Johnston, Executive Secretary
Maryland Public Service Commission
6 St. Paul Street, 16th Floor
Baltimore, Maryland 21202

Re: EmPOWER Maryland 2021-2023 Plans
Case No. 9648

Dear Mr. Johnston:

E-filed herewith are the comments of the Office of People's Counsel ("OPC") in the above-referenced case.

Introduction

The attached Report provides the Maryland Public Service Commission ("Commission") with analysis and recommendations on the 2021-2023 EmPOWER Plans filed by the Potomac Edison Company ("PE"), Baltimore Gas and Electric Company ("BGE"), Delmarva Power & Light Company ("DPL"), Potomac Electric Power Company ("Pepco"), Southern Maryland Electric Cooperative, Inc. ("SMECO"), and Washington Gas & Light Company ("WGL") (jointly referred to as the "EmPOWER Utilities") and the Department of Housing and Community Development ("DHCD"). In addition to specific recommendations for each EmPOWER Utility and DHCD program, OPC's consultant, VEIC, also provides a number of overall recommendations and priorities. OPC has worked with VEIC throughout this process and adopts all of the recommendations contained in this Report.

The EmPOWER programs have been in place since 2008 and have delivered cost-effective energy efficiency measures resulting in energy savings and economic benefits. Overall, Maryland is a leader in energy efficiency and in 2019 was ranked #7 on the American Council for Energy-Efficient Economy state scorecard, also earning recognition as the most improved state.

Continuing these valuable and effective programs through the 2021-2023 program cycles will deliver continuing cost-effective benefits.

As filed, the 2021-2023 plans suggest significant cost-effective energy efficiency resources remain available in Maryland. The plans as filed represent the culmination of the multi-year ramp-up toward the 2% savings goals, with all utilities forecasting to meet or exceed that goal in the 2021-2023 period. At the same time, the EmPOWER Utilities are no longer proposing increasing savings over the last cycle and in many cases are forecasting fewer savings, in the residential sector particularly.

The energy efficiency landscape is also shifting rapidly, in part due to the successful efforts of policy makers and efficiency programs in transforming markets and rapidly deploying cost-effective energy efficient technologies. Recognizing that transformation, the new energy challenges that lie ahead, and the fact that this is the last program cycle for which the EmPOWER program is authorized with the specific a specific energy savings goal of 2%, it is important for EmPOWER to evolve at the program and portfolio level to continue delivering cost-effective savings in the future.

Recommendations:

In order to support the continued success of the EmPOWER programs, OPC makes the following overall recommendations to the Commission in adopting the 2018-2020 Plans:

- **Review EmPOWER Portfolio Composition and Ensure a Balanced Approach**
  The Commission should carefully consider the overall balance of savings across the EmPOWER portfolio to ensure that residential customers are making up an appropriate share of savings and effort. At the same time, the EmPOWER Utilities must continue to find new ways of achieving greater non-lighting savings in the residential sector.

- **Adopt a Comprehensive Strategy to Enhance Equity and Reduce Energy Burdens**
  As Maryland consumers adapt to unprecedented levels of economic and public health uncertainty, due to the pandemic and Maryland's continuing State of Emergency, it is more essential than ever that EmPOWER utilities adopt a comprehensive approach to equity and energy burdens. We recommend a new effort to address equity in a more comprehensive way, by better defining target populations and measuring disparate impacts.

- **Develop a New Goal Framework to Position EmPOWER to Evolve Along with Policies, Markets, and Technologies**
  With EmPOWER entering its final cycle for which the 2% gross annual savings goal applies, it is essential to begin the process of developing new goals that can inform the evolution of energy efficiency initiatives in Maryland. Our state is now unique among ACEEE's "top ten" states in lacking multi-dimensional energy efficiency-related performance goals. We recommend a new structured process to

develop new goals and revisit cost-effectiveness testing to make sure EmPOWER is positioned to deliver value in future years. Any discussion of utility performance incentives should flow out of a larger conversation of long-term goals, not the other way around.

- **Focus on Market Transformation Strategies That Deliver Maximum Long-Term Value for Consumers**
  EmPOWER should include strategies to both acquire significant near-term savings and to help transform markets for energy-efficient equipment and services. Market transformation requires longer-term planning and a more active approach to market evaluation and response; however, it can ultimately increase savings and/or lower the cost of savings. We recommend special effort to transform markets in the areas of midstream delivery, lighting, codes and standards, and greater use of financing.

- **Build on Early EmPOWER Leadership with Smart Thermostats to Establish a Comprehensive Approach to Connected, Grid-Integrated Homes**
  EmPOWER utilities were early leaders in promoting smart thermostats, resulting in high penetrations of these devices. Smart thermostats and other connected devices sit at the crossroads of traditional energy efficiency improvements, behavioral strategies, and demand response. Connected homes will be a key component of maturing demand management capabilities, and a more comprehensive and integrated approach should be a priority for EmPOWER in 2021-2023.

- **Re-establish Consistency and Enhance Coordination Across EmPOWER Utilities and with DHCD**
  One of the strengths of EmPOWER Maryland is the level of consistency and coordination across multiple utilities delivering programs. Maintaining that consistency over years of program evolution takes sustained effort. We observed some reduction in consistency across core programs in the last cycle and in filed plans and recommend that EmPOWER utilities renew their focus on consistency and coordination. Consistent, transparent reporting is one area of need, as is a a more coherent and transparent framework for pilot programs across utilities and over time.

While OPC is an enthusiastic supporter of the EmPOWER Maryland program, we continue to share the Commission's concern about the cost to ratepayers of carrying large unamortized balances from previous years of EmPOWER spending. The cost of paying for these balances at the current high rates of return earned by utility shareholders is unnecessarily burdensome. As we have noted elsewhere, it would provide a substantial and immediate benefit to ratepayers to lower the rate of return earned for this debt, which is extremely low risk. Although not addressed in these comments, OPC recommends the Commission reduce the utilities' return on these regulatory assets, as more specifically laid out in OPC's comments included in the August Cost Recovery Work Group report.

OPC is confident in the program's ability to provide cost-effective, positive benefits to both residential participants and residential customers as a whole. With the 2018 - 2020 cycle over 80% complete, all utilities are exceeding their residential program savings forecasts, and BGE, Pepco, Delmarva, and SMECO are exceeding their overall savings forecasts and the 2% savings goal. Looking ahead to 2021-2023, EmPOWER can and should play an important role in helping utility customers and the state of Maryland not only weather current storms but emerge more resilient.

A copy of this letter and the VEIC Report have been provided to all parties of record. If you have any questions, please do not hesitate to contact me.

Sincerely,

/electronic signature/
Philip H. Sheehan, Jr.
Assistant People's Counsel

PHS/bl
Enclosure
cc: All Parties of Record

EmPOWER Maryland
2021-2023 Plans Comments

Prepared for:

Maryland Office of People's Counsel

October 15, 2020

Table of Contents

List of Figures

List of Tables

Introduction

VEIC has been retained by the Maryland Office of People's Counsel (OPC) to provide expert review and comment on the proposed 2021-2023 EmPOWER Maryland plans filed by the utilities and the Department of Housing and Community Development (DHCD). Prior to this task, VEIC assisted the OPC with review and comments on the EmPOWER Maryland Utilities' annual and semi-annual reports from 2010-2020, and the proposed three-year plans from 2012-2020. VEIC has also participated in a number of stakeholder meetings, Work Groups, and discussions on program design, delivery, and cost effectiveness.

VEIC's comments focus on the ratepayer-funded residential energy efficiency and demand response services and programs offered by the five major electric utility companies – the Potomac Edison Company (Potomac Edison), Baltimore Gas and Electric Company (BGE), Delmarva Power & Light Company (DPL or Delmarva), Potomac Electric Power Company (Pepco), and the Southern Maryland Electric Cooperative, Inc. (SMECO) (jointly referred to as the "EmPOWER Electric Utilities") - one gas utility, Washington Gas Light Co. (jointly referred to as "EmPOWER Utilities"), and DHCD.

EmPOWER – Current Status and Proposed Plans

Background

Working together since 2008, Maryland's utilities, energy efficiency businesses, Maryland Energy Administration (MEA), and other stakeholders have successfully designed and implemented EmPOWER Maryland programs. These programs have provided cost-effective energy efficiency services and savings to Maryland residential consumers and businesses.

VEIC has previously noted that the EmPOWER Maryland programs have improved their portfolio savings rates over time. The proposed savings for the next three-year cycle generally represent more of a continuation of current savings levels. Overall residential sector-level savings have been robustly cost-effective, and the filed 2021-2023 plans suggest significant cost-effective energy efficiency resources remain available. The development and implementation of the 2021-2023 EmPOWER Maryland plans therefore are an opportunity that strongly aligns economic, business, consumer, and environmental objectives.

KEY DEFINITIONS

The following are key terms used throughout the report:

- Annual Savings: Refers to one year of energy savings for measures installed during the reporting period. In other jurisdictions, this is often referred to as "first-year savings".
- Lifecycle Savings: Refers to the total savings of an individual measure or group of measures for their expected lifetime. For example, if an ENERGY STAR appliance installed today has an expected lifetime of 10 years, the lifecycle savings is the total electric savings that appliance should produce over that 10 years. In other jurisdictions, this is often referred to as "lifetime savings."
- Cost per kwh savings: Refers to the average cost, for a program or overall portfolio, to achieve one kilowatt-hour (kwh) of savings. Cost per kwh can be calculated based on annual or, more commonly in this report, lifecycle savings. Cost per therm savings means the same thing for a unit of natural gas savings.
- Forecast: Refers to proposed savings and spending for the years 2021-2023 from EmPOWER utilities and DHCD. Because actual results for the full 2020 are not yet available, savings and spending for 2020 are based on approved EmPOWER plans – they may be also be referred to as "predicted" savings and "budgeted" spending.

Progress to Date – EmPOWER Success

Maryland legislation codifies a 2% gross annual electricity savings target through the 2021-2023 program cycle.[1] Commission Order 88402 established electric savings targets for each EmPOWER electric utility for the 2018-2020 period, which for most utilities included a ramp-up to 2%, relative to a baseline of 2016 weather-normalized gross retail sales.[2] Only Potomac Edison did not have a 2% goal by 2020. All utilities will be subject to this goal throughout 2021-2023.

Table 1: 2018-2020 EmPOWER Maryland Annual Energy Efficiency Targets as % of 2016 Baseline

	2018	2019	2020
Potomac Edison	1.37%	1.57%	1.77%
BGE	**2.00%**	**2.00%**	**2.00%**
Pepco	1.92%	**2.00%**	**2.00%**
Delmarva	1.87%	**2.00%**	**2.00%**
SMECO	**2.00%**	**2.00%**	**2.00%**

Five-sixths of the way through the 2018-2020 cycle, the EmPOWER utilities are on track to exceed their savings goals, in some cases substantially, while spending less than budgeted. (While WGL

[1] Acts 2017, Ch. 14 (Senate Bill 184) at mgaleg.maryland.gov.
[2] MD Public Service Commission, Order No. 88402, September 26, 2017.

is slightly behind goal, the second half of the year is typically a stronger performing period than the first half. For a more detailed assessment of performance in the current cycle, please see the separate VEIC comments on EmPOWER Semi-Annual Reports.)

Maryland receives significant benefits from efficiency programs that provide savings at a lower cost than avoided supply. For the EmPOWER 2021-2023 plans as filed, the total sum of the net ratepayer benefits (amount by which benefits exceed costs) is $510 million in present value.[3] Maryland ratepayers, the Maryland economy, and Maryland's environment all benefit when programs are designed and delivered to provide efficiency at a lower cost than avoided energy supply. When all societal benefits and costs are including according to Commission rules, the net benefit from the 2021-2023 plan exceeds $1.16 billion.

BGE reports in its 2021-2023 plan that its average residential customer bill is down nearly 25% since EmPOWER's inception. While some of this reduction is due to changes in electricity generation supply costs, average residential energy use is down 14%, which is primarily a result of greater energy efficiency. (The other utilities did not report on this useful statistic but are likely to show roughly similar results.) Those energy efficiency savings contribute to the fact that the average electric bill for BGE is much lower today, and those savings will persist regardless of future changes in supply costs. This is an impressive testament to the tangible customer benefits of sustained energy efficiency efforts.

Due in large part to the EmPOWER Maryland efforts, over the last cycle Maryland rose on the American Council for an Energy-Efficient Economy (ACEEE) scorecard from #10 in previous years to #7 in 2019 (based on 2018 data), earning their "Most Improved" designation.[4]

Proposed Utility Plans for 2021-2023

EMPOWER ELECTRIC PROGRAMS

All of the electric utilities except SMECO propose to achieve or exceed the 2% goal in each of the following three years. SMECO proposes to meet the 2% goal by achieving 1.8% savings in 2021 and 2022 and 2.4% in 2023, with the increase based on a near tripling of commercial savings in the third year. That aside, the utilities forecast relatively steady savings over the coming cycle.

Except for Potomac Edison, which had the steepest increase in savings goals during the 2018-2020 cycle, the utilities are proposing savings levels below what they achieved in 2019, as shown in Figure 1 below. BGE and Pepco are proposing savings *well below* 2019 levels. Looking at non-behavioral savings, in 2023, BGE proposes to achieve only two-thirds of the savings it achieved in

[3] Respective 2021-2023 Plans Table ES-4, Portfolio total resource cost (all ratepayers) present value of net benefits.
[4] *2019 State Energy Efficiency Scorecard*. ACEEE. October, 2019. p. 7. https://www.aceee.org/research-report/u1908

2019, below 2017 levels. (Total residential savings would still be above 2017 levels.) The residential portfolio remains highly cost-effective, indicating that significant savings opportunities remain.

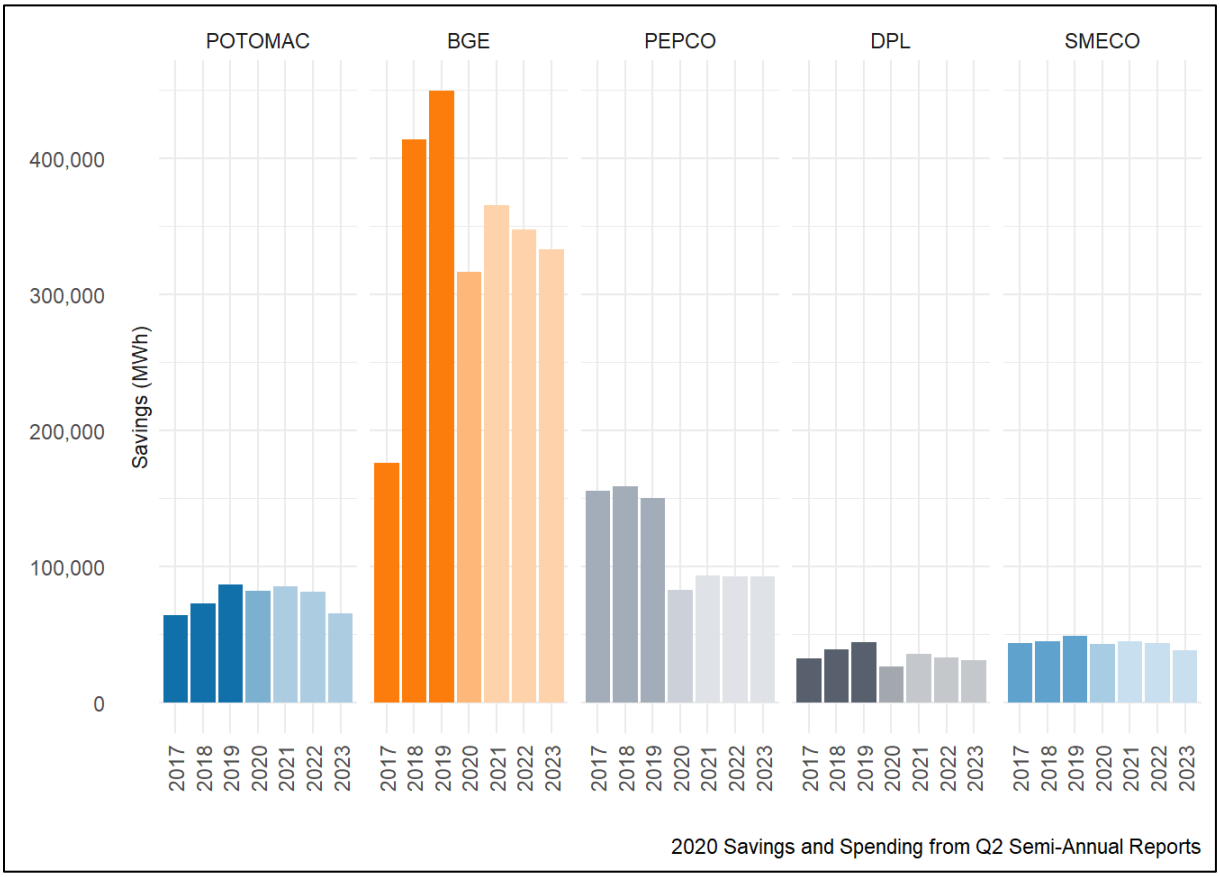

Figure 1: Residential Programs Annualized Savings By Utility as Reported (2017-2019) and Forecast (2020-2021)

As shown in Figure 2 below, Potomac Edison and SMECO are proposing notably higher spending in the next cycle, compared to 2018-2020, and the other utilities are proposing similar (or only slightly higher) spending. Putting the savings and spending together, Figure 3 below shows the cost of lifecycle savings for each utility in the past and upcoming program period. As in other leading jurisdictions, the cost of savings is increasing as savings opportunities evolve. The cost of savings forecast by SMECO—roughly double in the next period—is noteworthy and potentially a concern. If the difference reflects a more rapid transition out of lighting markets that are quickly becoming transformed, it is possible that SMECO's costs are more reflective of the cost of true additional savings and the other utilities numbers are distorted by inclusion of cheaper lighting savings that are not resulting from program activities.

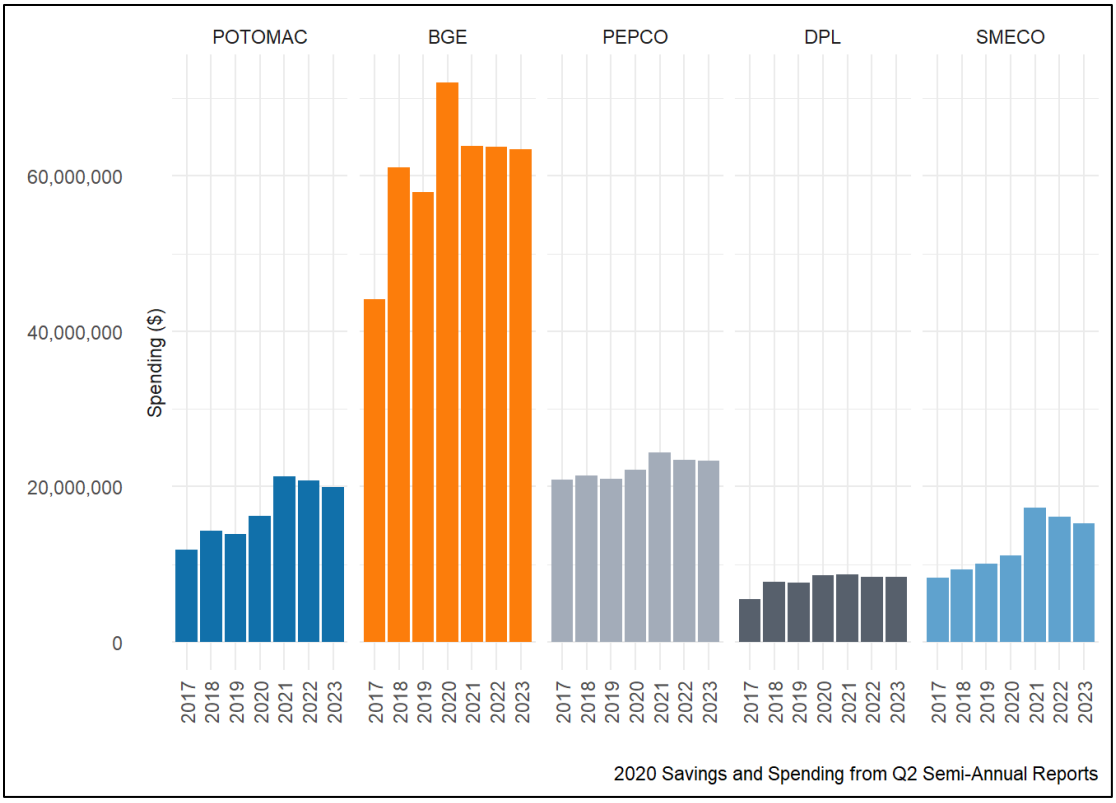

Figure 2: Residential Programs Spending By Utility as Reported (2017-2019) and Forecast (2020-2021)

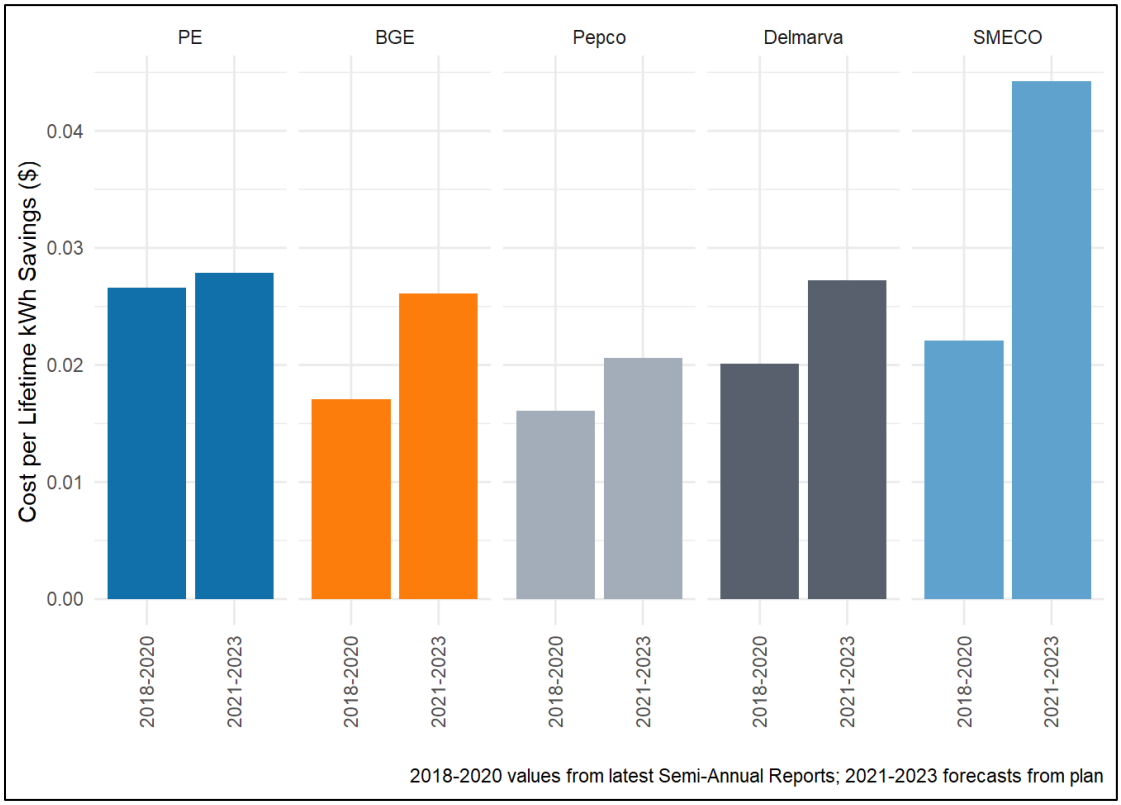

Figure 3: Overall Cost of Residential Savings By Utility as Reported (2017-2019) and Forecast (2020-2021)

Although the bulk of these comments are aimed at the residential sector, VEIC examined the level of residential savings within each utility's full portfolio. Looking to the composition of savings by sector in Figure 4 below, it is noteworthy that some utilities propose to achieve significant savings from Conservation Voltage Reduction (CVR), while Potomac Edison and SMECO will not rely on it in the next period. CVR involves upgrades made on the utility side of the meter and is not paid for using EmPOWER funds. Neither BGE nor Pepco would achieve the 2% savings goal, represented by the dashed line in the figure, without counting CVR savings. BGE forecasts non-CVR savings of around 1.75% and Pepco fall just short of 2% without CVR.

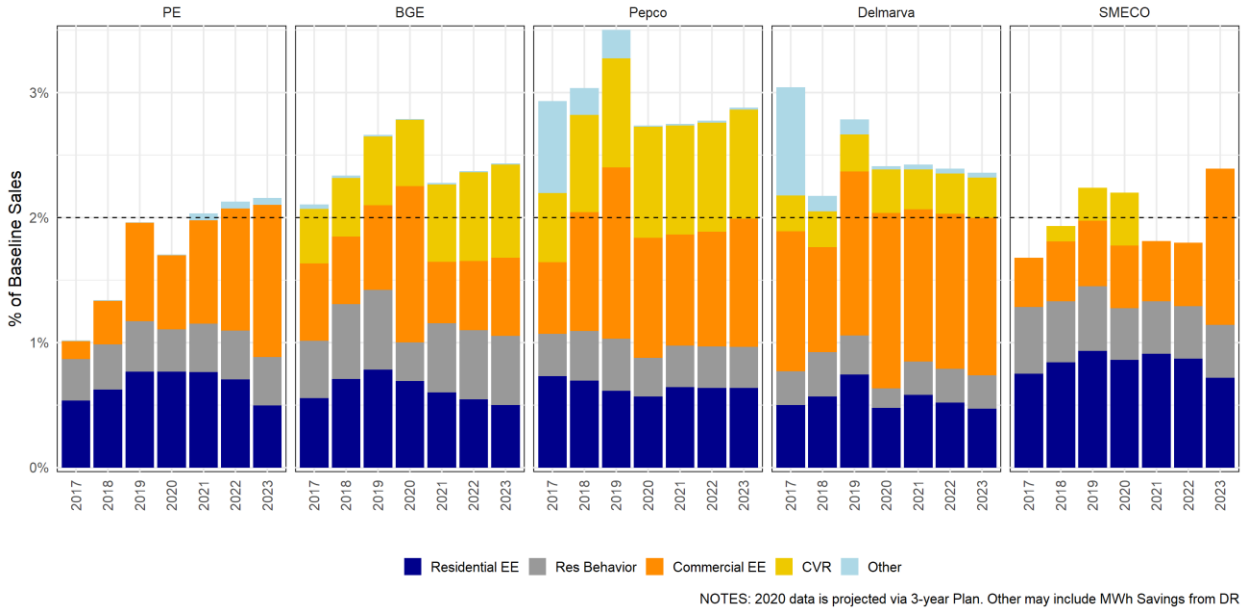

Figure 4: EmPOWER Yearly Energy Savings by Program as a Share of Baseline Sales

The core objective of the EmPOWER programs is to achieve cost-effective savings behind-the-meter. As such, we recommend that the Commission consider whether it is appropriate to approve plans that rely so heavily on CVR savings to achieve the 2% minimum statutory savings goal. There is a risk that overreliance on CVR could displace efforts needed to capture energy efficiency savings in Maryland homes and businesses – savings which result in direct customer benefit in ways that CVR does not. The plans proposed by DPL, Potomac Edison and SMECO—and the plan from Pepco to a considerable degree—demonstrate that the 2% savings goal can be achieved in the next cycle without reliance on CVR savings.

Furthermore, if CVR is included in EmPOWER portfolio savings, we encourage the Commission to consider carefully whether CVR savings should be counted as first-year savings year after year in cases where minimal additional expenditures are made on an annual basis. We are aware this is a complex, ongoing discussion at the Measurement & Verification Work Group, but as these figures show, it has significant implications for the entire portfolio.

All the EmPOWER electric utilities are also proposing to achieve declining savings from non-behavioral residential programs over the coming cycle, both in absolute terms (as shown in Figure 4 above) and as a proportion of total savings (as shown in Figure 5 below). Residential behavioral savings are not forecast to change dramatically.

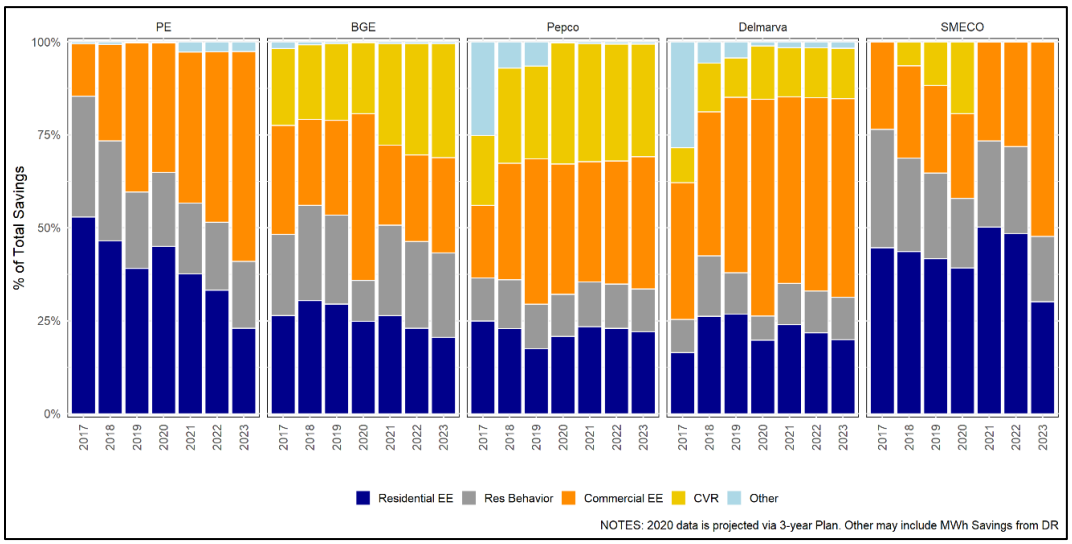

Figure 5: EmPOWER Energy Savings by Program Year as a Percent of Total Savings

As of 2018, residential load in Maryland is 45% of total load, although this varies considerably by utility, as seen in Table 2 below.[5] For SMECO and DPL, the proportion of savings from the residential sector are proposed at levels significantly below the proportions of electricity use from the residential sector. Potomac Edison's residential savings are roughly on par with residential load for the upcoming cycle as a whole, although by 2023 they would decline well below that. BGE, with the lowest proportion of load from the residential sector, is the only utility that proposes residential savings disproportionally greater than load.

Table 2: Residential Proportion of 2021-2023 Savings Compared to Residential Proportion of Load

	Residential Proportion of Load[6]	Residential Proportion of Forecasted (Non-CVR) Savings[7] 2021-2023	
		Annual	Lifecycle
Pepco	40%	40%	42%

[5] EIA "Sales to Ultimate Customers (Megawatt-hours) by State by Sector by Provider, 1990-2018" and "Sales to Ultimate Customer, 2018"
[6] The proportion of electricity sales to the residential sector in Maryland has increased slightly over time, by about 1% since 2010. According to utility filings in PC53, residential sales in Q2 of 2020 were up 4-10%, presumably due to COVID-19, while C&I sales were down 9-15% across the utilities. While it may be unlikely for this level of change to continue throughout the cycle, it is reasonable to expect the proportion of residential sales will be at least somewhat higher in the coming cycle than in the last.
[7] For purposes of comparing sectoral distribution, CVR savings are excluded because they provide savings at the distribution level, affecting or benefiting both residential and non-residential customers.

BGE	43%	67%	54%
Potomac Edison	47%	51%[8]	40%
DPL	52%	39%	33%
SMECO	63%	56%	52%

For SMECO, Potomac Edison and especially DPL, this raises concerns about whether sufficient efforts and resources will be devoted in the coming cycle to achieving savings in the residential sector.

Three of the four electric utilities that offer residential peak demand reduction are forecasting flat levels of new demand savings in 2021-2023 compared to the current cycle. BGE forecasts increased demand reduction savings (and moderately increased spending) from its new Connected Rewards program.

The EmPOWER utilities will continue to offer comprehensive residential programming that includes both low-cost, mass-market programs (e.g., Behavior, Lighting) and more comprehensive, deeper-saving opportunities (e.g., HPwES, HVAC). In 2021-2023, the bulk of savings will continue to come from Lighting and Behavior programs. The Home Retrofit program will take the highest share of program spending.

Although the 2021-2023 plans are generally a continuation of existing initiatives, all of the five electric utilities are proposing some new residential programs and or measures in 2021-2023.

- Each utility is proposing a somewhat different approach to which lighting measures they will add or remove when, and which channels they will emphasize;
- Various updates to midstream and downstream appliances measures will also leave each utility with a slightly different mix;
- Pepco & DPL plan to introduce the Shift model to accelerate uptake of ENERGY STAR appliances;
- Most utilities are consolidating QHEC, HPwES, and HVAC offerings under a "Home Retrofit" umbrella program and increasing cross-promotion of QHEC, appliance recycling, and other program offerings;
- Potomac Edison will expand its QHEC offering to multifamily homes, and Pepco, DPL and Potomac Edison will continue or introduce virtual audits or QHEC visits;
- Pepco, DPL and BGE plan enhanced HPwES incentives for limited-income households;
- All utilities are proposing to offer a HVAC Tune-up program;

[8] By 2023, Potomac Edison would achieve 42% and 29% of annual and lifetime savings from the residential sector.

- Each utility is proposing important enhancements to residential new construction, including 100% LED lighting requirements, a new Zero Energy Ready tier, and new measures such as pre-wiring for electric vehicle charging;
- DHCD is proposing a wide array of program enhancements in response to extensive stakeholder engagement;
- BGE and Pepco are introducing a school-based program similar to those offered by other utilities;
- All utilities are expanding features of their behavior-based Home Energy Report (HER) programs, using advancing features from their primary vendor, Oracle/Opower;
- SMECO is planning to offer HERs using in-house capacity, and work with manufacturers directly to support smart thermostat optimization instead of working with the Connected Rewards platform; SMECO is also the only utility planning to promote its Smart Home pilot to a full program at the outset of the next program period; and
- SMECO and BGE will pilot and expand their "bring your own device" (BYOD) demand response efforts and BGE will include controllable battery storage.

Annualized savings and total spending by program area, totaled across all electric utilities, are shown in Figure 6 below. (In this report, savings in each program area are primarily reported lifetime savings, however in this instance annualized savings are shown to better incorporate behavioral programs with only annual savings.) Continuing trends from the 2021-2023 cycle, Behavioral and Energy Efficiency Products programs (primarily Lighting in this case) account for most of the savings, and Home Retrofits and Optimization, along with Products, account for most of the expenditures.

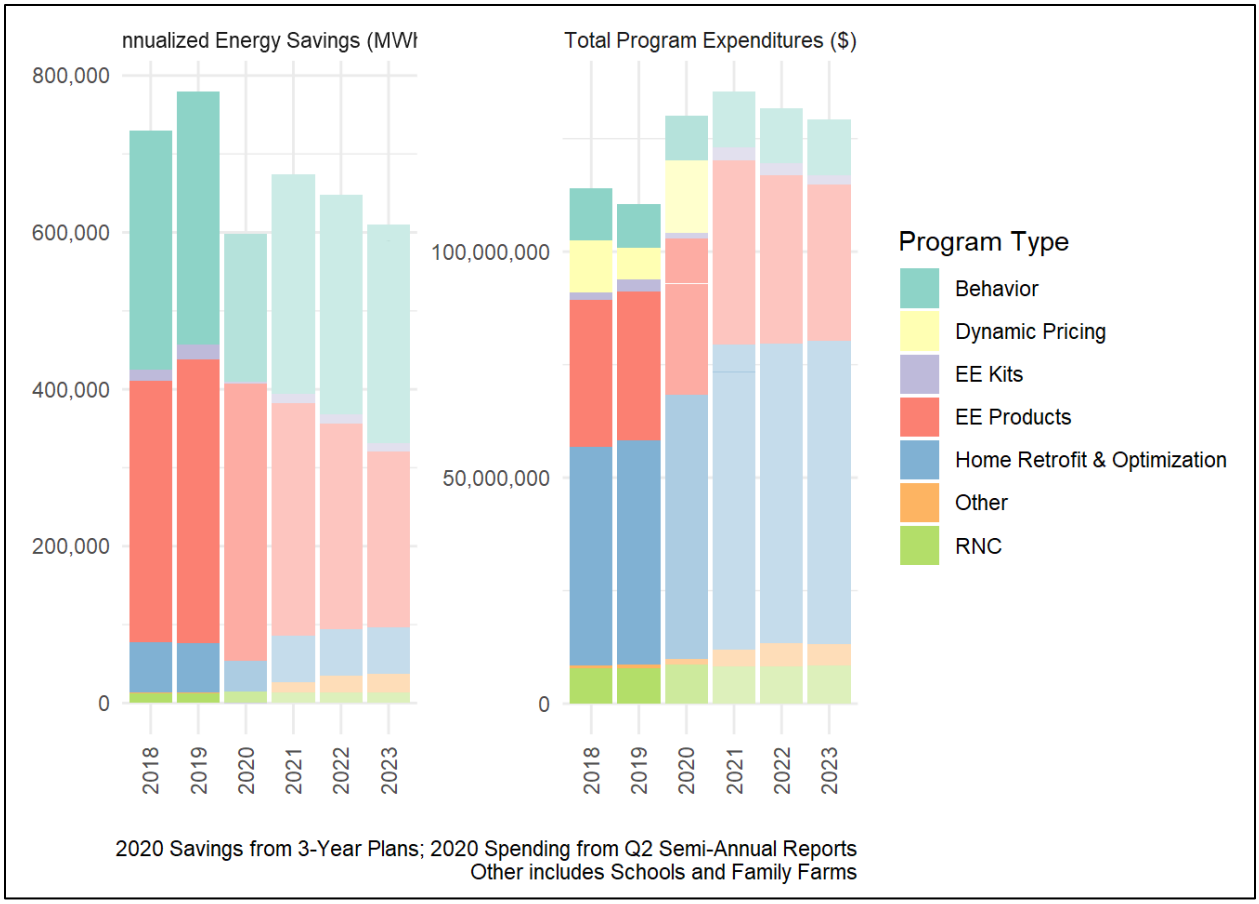

Figure 6: Residential Program Electric Savings and Spending By Program Type, as Reported (2017-2019), Projected (2020), and Forecast (2021-2023)

EMPOWER GAS PROGRAMS

EmPOWER natural gas efficiency programs were expanded over the course of the 2018-2020 cycle, especially for Washington Gas. Adding to its longstanding incentive program for HVAC equipment and some gas appliances, WGL is now providing incentive dollars to coordinated Home Retrofit and Residential New Construction programs in accordance with Commission Order 89404. WGL will also be continuing the Behavior program it ran throughout the previous cycle.

Washington Gas' 2021-2023 plans propose to roughly double their savings relative to 2018-2019, whereas BGE proposes a steady level of therm savings compared to 2018-2019, as shown in Figure 7 below.

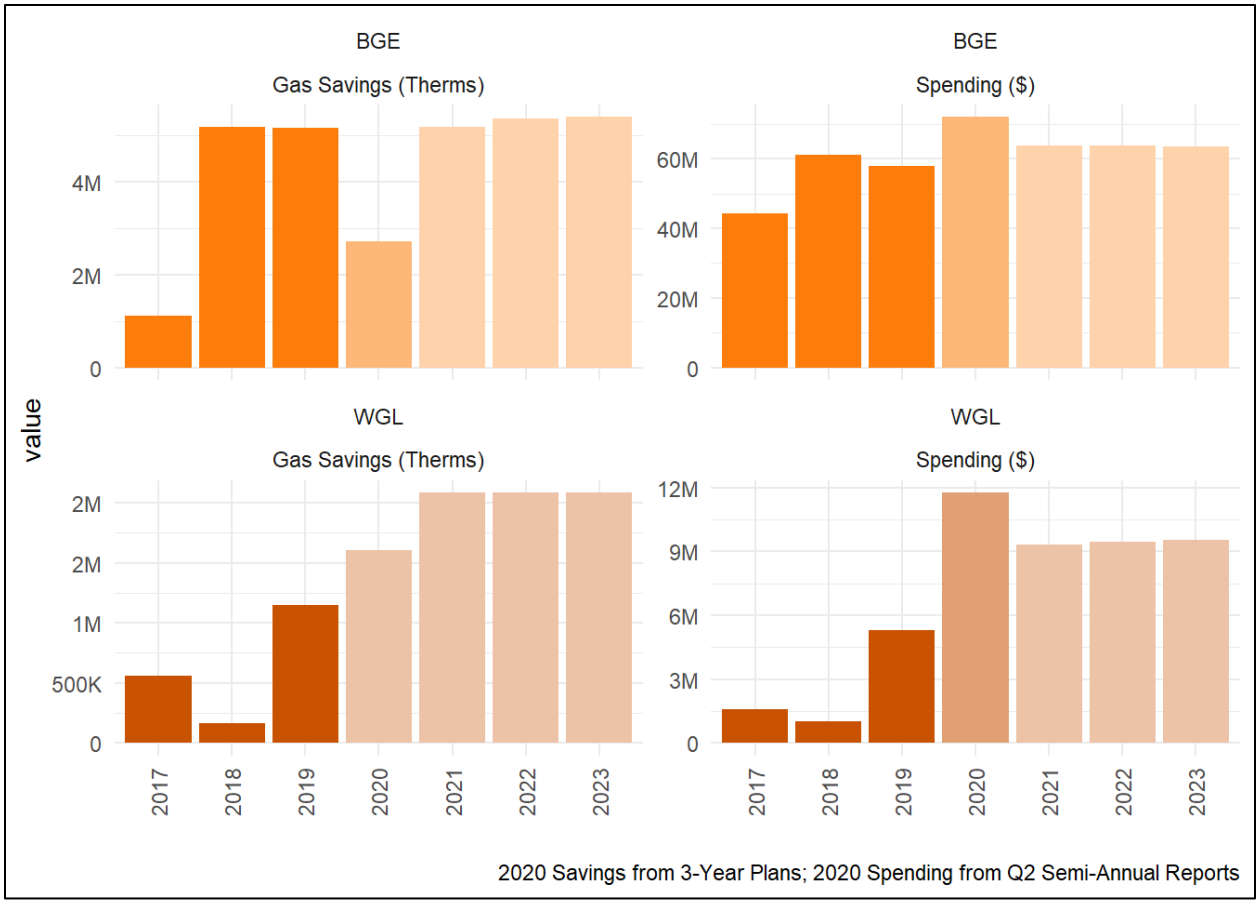

Figure 7: Washington Gas & BGE Residential Programs Annualized Savings and Spending as Reported (2017-2019) and Forecast (2020-2023)

As Washington Gas proposes to increase the savings generated from its residential programs in 2021-2023, so too does its spending increase. BGE proposes level funding along with level savings. It is noteworthy that WGL proposes to approximately triple spending on limited-income programs compared to the 2018-2020 cycle, an increase from $4.3 million to $13.5 million.

WGL will continue most of its programs in a similar way as in the previous cycle, including recent coordination with the electric utilities on the retrofit and new construction programs. It plans to add new measures for its "Existing Homes" rebate program, including combination space and water heating units, and add HVAC "tune-up" measures. Along with several electric utilities, WGL proposes a Low-Moderate Income Locational Demand Management pilot, and will introduce a device-based demand response pilot similar to those operated by electric utilities.

Overall Recommendations

This section contains some broad, thematic recommendations that reflect higher-order priorities for the coming EmPOWER cycle.

Adopt a Comprehensive Strategy to Enhance Equity and Reduce Energy Burdens

As Maryland consumers adapt to unprecedented levels of economic and public health uncertainty, due to the pandemic and Maryland's continuing State of Emergency, it is more essential than ever that EmPOWER utilities adopt a comprehensive approach to equity. While the Total Resource and Societal cost tests measure whether EmPOWER programs provide net benefits to Maryland ratepayers and to society as a whole, an equity perspective focuses on whether the *distribution* of those benefits is fair and to what extent benefits are shared among disadvantaged or vulnerable populations.

Equity can be defined in many ways and VEIC recommends taking a holistic approach. We have previously recommended a savings goal of 1% of annual limited income energy usage. While this single metric would likely have a positive influence on equity outcomes, we believe it is time for EmPOWER to develop and employ a more comprehensive approach to equity. In a national review of equity measurement practices in the clean energy industry, VEIC identified three key dimensions of equity that should be considered in energy efficiency program design, implementation, and evaluation:

- Defining target populations,
- Determining disparate impacts of programs, and
- Including representative voices in program design and delivery.[9]

DEFINING TARGET POPULATIONS: ENERGY BURDEN

In 2018, OPC commissioned APPRISE to characterize the Maryland low-income market. Its findings identified several dimensions across which needs and impacts can be differentiated, including income, demographics (such as age and race/ethnicity), housing type and ownership status, heating fuel type, and energy affordability. It found, for example, that while renters comprise 60% of the low-income population in Maryland, only 29% of LI weatherization program participants were renters.[10]

[9] Equity Measurement in the Clean Energy Industry: Program Design with Equity at the Forefront. Lauren Wentz, Elizabeth Palchak, Robert Stephenson and Emily Levin. VEIC. 2018. P. 2.
[10] APPRISE. P. iii.

Energy burden can be a particularly useful metric to evaluate whether EmPOWER programming is reaching the households with the greatest need. Energy burden is the proportion of household income spent on energy bills. Many Maryland households experience some of the highest energy burdens in the country. According to a new report on energy burdens from ACEEE, the national median energy burden is 3%. Energy burden of 6% has long been considered high and 10% is considered severe.[11] ACEEE found in the Baltimore metro area, *half* of low-income households spend more than 10% of their income on energy and a quarter of low-income households spend more than 21% of their income on energy.[12] (At least 20% of Maryland households meet DHCD definitions of low-income.[13]) Those are the highest energy burden percentages of any large metro area in the United States. Overall, 23% of Baltimore area households experience high energy burdens.

High energy burdens result from many factors, including those outside the direct influence of EmPOWER. The APPRISE report found high energy burden is driven in some cases by income, and in others by energy use.[14] Regardless, it is a fundamental indicator of energy equity and an appropriate metric for utilities to track and use in designing equity strategies.

Once target populations are better defined, programs can be designed to enhance equity. For example, later in this report VEIC recommends that EmPOWER utilities evaluate potential disparities in access to efficient LED lighting in their service territories by retail store type, pricing, and stocking to focus programs on equitably serving all customers.

DETERMINING DISPARATE IMPACTS, PROPORTION OF SPENDING AND SAVINGS FOR LIMITED INCOME HOUSEHOLDS

Equity impacts can be assessed by measuring the share of impacts for a target population compared to the total population, and/or by comparing program outcomes for a targeted group compared to other groups. Efficiency program administrators such as Energy Trust of Oregon and Efficiency Vermont use these approaches to assess equity impacts.

The proportion of residential spending directed toward limited income households is a basic metric that can serve as a starting place for a more complete evaluation of equity. VEIC conducted an initial analysis of electric utility spending, using DHCD's proposed 2021-2023 budget for each utility as a proportion of total residential spending, as shown in the table below. This is compared to the estimated proportion of households that qualify as low income.

[11] How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden across the United States. Ariel Drehobl, Lauren Ross, and Roxana Ayala. ACEEE. September 2020. P. ii.
[12] ACEEE 2020. P. 17.
[13] Maryland Low-Income Market Characterization Report. APPRISE for OPC. 2018. P. ii.
[14] Maryland Low-Income Market Characterization Report. APPRISE for OPC. 2018. P. iv.

Table 3: Proportion of 2021-2023 Spending for Limited Income Programs Compared to Proportion of Households that are Limited Income Households

	% of Spending on Limited Income[15]	% of Households Estimated to be Limited Income[16]
Potomac Edison	12.5%[17]	18%
BGE	17%	19%
Pepco	24.5%	25%
DPL	27.5%	30.5%
SMECO	7.5%	16%
Statewide	17.5%	21%

Under the proposed plans, there would be significantly less limited income spending in Potomac Edison and especially SMECO service territories than would be dictated by the proportion of households that are low income. There would be less severe but notable underspending for BGE and DPL, as well as Maryland as a whole. As an initial matter, this suggests that limited income ratepayers may be cross-subsidizing other households through EmPOWER. Limited as this initial analysis is, it supports the need for a comprehensive evaluation of equity of program inputs as well as outcomes.

INCLUDING REPRESENTATIVE VOICES IN PROGRAM DESIGN AND DELIVERY

Like measurement and evaluation in other aspects of energy efficiency programs, it is important to consider equity from an impact and *process* perspective. The EmPOWER utilities all described stakeholder engagement in the development of their 2021-2023 plans. However, the stakeholders described are almost entirely composed of energy efficiency industry participants, such as contractors and retailers. Engagement with consumer and community groups, including those representing populations that might be targeted from an equity perspective, was lacking. Furthermore, it is important to engage these stakeholders early in designing programs and strategies, and on an ongoing basis to determine if they are working. Advisory boards are one way that many efficiency program administrators incorporate input from target populations.

[15] Percentage of spending on limited income is calculated by dividing the proposed DHCD budgets per utility in Table ES-3E by the total of DHCD budgets and non-DHCD residential budgets for each utility in Tables ES-3D. DHCD proposed budgets are based primarily on the census distribution of low income households.

[16] This is calculated as the number of households having income <175% of federal poverty level as a proportion to the number of residential utility accounts.

[17] Potomac Edison was the only utility to include Limited Income allocations for DHCD within its residential spending in Table ES-3D, so this amount was removed from the total to avoid double counting. Potomac Edison also included a higher amount of limited income spending than was proposed by DHCD under the agency's new proposed allocation formula.

ENHANCING EQUITY: LOOKING AHEAD

Although all the EmPOWER utilities included some new program strategies to improve limited income outcomes in their 2021-2023 plans, Pepco and DPL stood out with several strong proposals, including:

- Enhanced incentives for low-moderate income (LMI) households under Home Performance with ENERGY STAR (along with BGE, although all lack detail);
- A new Community Energy Coach who will use existing LMI and community networks to increase awareness and participation;[18]
- An LMI-based Locational DSM pilot (along with BGE & WGL); and
- A diverse energy efficiency business initiative designed to increase the diversity of energy efficiency companies and contractors serving customers.

These strategies are commendable. They would be improved if they fit within a larger context that defined equity indicators that could be tracked over time. We recommend that the Limited Income Work Group develop a common framework by October 2021 that EmPOWER utilities can to use to define target populations and measure equity impacts in a coordinated fashion. Potential metrics might include:

- Proportion of limited-income program spending and energy savings compared with the limited-income share of the population;
- EmPOWER program activity in targeted communities experiencing high energy burden; and
- Strategies used to engage diverse communities in program design, implementation, and oversight.

Develop a New Goal Framework to Position EmPOWER to Evolve Along with Policies, Markets, and Technologies

The success of the 2% electricity savings goal illustrates the power of well-defined, ambitious yet achievable goals to drive utility performance. Now, with EmPOWER entering its final cycle for which the 2% gross annual savings goal applies, it is essential to begin the process of developing new goals that can inform the evolution of energy efficiency initiatives in Maryland.

As noted above, Maryland has achieved nationally leading results as EmPOWER programs have ramped up over the past decade. Maryland is now unique among ACEEE's top ten states in lacking formal multi-dimensional performance goals or metrics. In order to ensure that Maryland

[18] SMECO noted in its plan that it was considering this tactic as well.

ratepayers—and the overall economy and environment—continue to benefit from public expenditures, utilities must be focused on the outcomes that matter. As energy policies, technologies, and markets rapidly evolve, this can no longer be achieved with a single metric focused on kWh savings.

The purpose of goals or metrics is to send messages that drive utility decision-making. Those decisions will not be efficient, and risk stranded costs or other sub-optimal outcomes, if they do not send the right signals. Maryland legislative and administrative policy calls for an evolution that includes more clean energy and fewer greenhouse gases. The most recent update to the Maryland Greenhouse Gas Reduction Act call for a 40% emission reduction by 2030, and the Clean Energy Jobs Act increases the Renewable Portfolio Standard to 50% by 2030. Prudent utility planning should include this context, especially since many energy-related investments have long lifetimes. For example, a new home built in 2021 will easily last though in 2050 and beyond. Using ratepayer funds to affect the energy performance of the home will have maximum benefits if the home does not require a retrofit in 10 years to accommodate an electric vehicle or heat pump. Establishing a set of key goals for EmPOWER programs that align with Maryland's clean energy policies will support the utilities in designing better programs that optimize long-term outcomes.

In September of this year, a Buildings work group chaired by Maryland Secretary of the Environment Ben Grumbles submitted a report to the Maryland Climate Change Commission. The report identifies energy efficiency as a priority, and the first of its four goals is to "Adapt EmPOWER for Beneficial Electrification." The report states, "Although EmPOWER's original focus on reducing electricity consumption and peak demand made sense when enacted and served the State well for more than a decade, it is time to adapt EmPOWER to align with the State's many energy related goals, including its GGRA emissions reduction goals."[19] (The fourth goal is to prioritize benefits to underserved and low-income consumers and households, which lends support for a comprehensive focus on equity.)

In its plan, BGE recommended initiating a new goal-setting stakeholder process, with a focus on identifying multiple performance goals. VEIC strongly supports this recommendation and generally agrees with the goal areas that BGE suggests. We specifically suggest that the Commission should charge a new Goal-Setting Work Group with identifying 4-6 new performance metrics for EmPOWER to align the efficiency program activities with the state's highest-priority policy outcomes. To maximize the chances for a consensus outcome, we recommend that the Commission retain independent assistance to facilitate and provide expertise in that process, and be prepared to make a clear ruling on its own should consensus prove elusive. Given the complexity of the task, a goal-setting stakeholder process will probably require at least 12 months,

[19] Decarbonizing Buildings in Maryland: Buildings Subgroup Report to the Mitigation Work Group of the Maryland Climate Change Commission. September 21, 2020. P. 23. https://mde.maryland.gov/programs/Air/ClimateChange/MCCC/MWG/Decarbonizing%20Buildings%20in%20Maryland.pdf

and the process should start in 2021 so that the Commission can adopt a new goal framework for EmPOWER in time to inform planning for the next cycle (e.g., by the end of 2022).

We also join BGE in recommending a related stakeholder process to consider cost-effectiveness tests. The last time Maryland addressed this topic was 2015. In the coming year or two, Maryland would benefit from a fresh look at how other jurisdictions are making progress to quantify and include benefits that are clearly present but may been challenging to implement in the past. The best-practice approach is to use the National Standards Practice Manual (NSPM) to align cost-effectiveness test with state policy goals and priorities, while ensuring symmetrical treatment of costs and benefits.[20] States such as New Hampshire and Rhode Island have applied NSPM methods to develop updated, state-specific cost-effectiveness tests, known respectively as the Granite State Test and the Rhode Island Test. It may be appropriate to sequence goal setting and cost-effectiveness discussions, in order to clarify the goals before modifying the cost-effectiveness framework accordingly. However, any changes to cost-effectiveness testing should ideally be determined before the utilities begin designing programs for the next cycle.

While specific performance metrics would be identified through the stakeholder process, looking across jurisdictions with broadly similar policy goals and market conditions as Maryland, we see several common themes that are informing updates to goal frameworks in other states[21].

PEAK DEMAND REDUCTION

Energy usage that coincides with either the regional transmission peak or local distribution peak is more expensive to supply and produces higher emissions of greenhouse gas and air pollutants. Therefore, energy efficiency and demand response programs that reduce coincident peak demand have particularly high value. The EmPOWER electric utilities already have well-developed smart grid and behavior programs, enabled by AMI infrastructure. However only BGE is forecasting an increase in peak demand savings in the coming cycle. Two options for measuring peak demand reduction include:

Peak demand savings in kW. One option is setting a target for cost-effective total peak demand savings from energy efficiency, DR, and customer-side CVR. This target should be set at a level that encourages proactive coordination of efficiency and DR strategies and aggressive investment in cost-effective efficiency measures that deliver peak demand savings.[22]

[20] 2020 National Standard Practices Manual – see https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/

[21] See Snapshot of Energy Efficiency Performance Incentives for Electric Utilities. ACEEE Topic Brief. December 2018. https://www.aceee.org/topic-brief/pims-121118

[22] We are aware of several utilities that have targets for peak demand reduction that can be achieved as a byproduct of implementing standard efficiency programs. In other words, if the utility meets the energy savings goal, they will also meet the demand savings goal. It is therefore important to set the demand reduction target at a level that encourages the utility to go beyond business-as-usual energy efficiency.

Verified DR resources as a percentage of peak load. Another option is a target for utilities to have controllable DR resources that are 5% or more of their peak load, and that these resources be available to meet constraints during both summer and winter peak periods. This type of target would ensure that the EmPOWER utilities maintain sufficient demand-side resources to support flexible and reliable grid operation. We recognize that there may be ongoing uncertainty about precisely how demand response savings are determined by the PJM Independent System Operator and this can be taken into consideration in establishing a demand reduction goal.

NATURAL GAS SAVINGS

In the past, the Commission has directed Work Groups to consider natural gas savings goals, but those groups have failed to reach consensus and the Commission did not implement a savings goal for 2018-2020. Reducing natural gas consumption will likely be a key part of Maryland's energy future and is a fiscally prudent strategy. Natural gas therm savings provide significant energy cost and emission benefits, and peak gas reductions also mitigate infrastructure costs that provide some of the greatest risks of stranded costs.

The increased coordination between Washington Gas and the electric utilities for the EmPOWER Home Retrofit and Residential New Construction programs is an important step toward a more holistic approach to reducing energy waste and costs. Appropriate savings goals could be another important step.

GREENHOUSE GAS SAVINGS

Several jurisdictions, including Massachusetts, New York, and Vermont, are incorporating state emission reduction policies into energy efficiency program goals and metrics. Maryland, with its similar emission policy framework and goals, should consider this as well. Different energy efficiency measures have different implications for greenhouse gas emissions. Providing the utilities with a clear framework for measuring and valuing emission reductions will help them optimize programs and ratepayer investments for long-term benefits.

ELECTRIFICATION

We also recommend that the utilities evaluate the impacts of electrification of buildings and vehicles, and consider how efficiency programs need to evolve to best address these emerging opportunities. As prices of renewable energy technologies continue to drop and become comparable to, or even less expensive, than conventional energy sources, building electrification will increasingly become a key strategy to maximize the value of renewable energy supplies for the electric grid and electric ratepayers. Through EmPOWER, the utilities have an important role to play in ensuring that electrification activities are integrated with energy efficiency and demand response and appropriately targeted to buildings and customers.

COST-EFFECTIVENESS AND NET BENEFITS

Several jurisdictions, including Massachusetts, New Hampshire, and New York, establish goals or performance metrics related to achieving a target net consumer benefit. In Massachusetts, utilities are rewarded in part based on a "value" formula which is based on the net benefits from energy efficiency, passive and active demand reduction. This is an example of how cost-effectiveness tests and performance goals can intersect.

We believe that a "multifactor" goal framework that defines several key goals for EmPOWER would best reflect the fact that there are multiple outcomes that must be balanced. For example, a gross kilowatt-hour savings goal, especially if it the central focus in any goal scheme, could be an impediment to beneficial electrification strategies that may increase system-level efficiency or reduce greenhouse gas emissions, but increase kwh consumption. Likewise, providing an electrification or greenhouse gas goal without providing a peak demand reduction goal could miss opportunities to reduce electricity infrastructure costs.

The August 2020 Cost-Recovery Work Group report contains recommendations from some parties—there was no consensus and OPC did not support these recommendations—for Performance Incentive Mechanisms that would link utility earnings to different outcome metrics. VEIC believes Maryland should undertake a deliberative approach to goal-setting and performance incentives. We suggest first developing an updated goal framework for EmPOWER for 2024-2026 and beyond, before determining if and how best to link utility performance incentives to these goals.

Focus on Market Transformation Strategies That Deliver Maximum Long-Term Value for Consumers

Like all leading energy efficiency programs, EmPOWER should include strategies to both acquire significant near-term savings and to help transform markets for energy-efficient equipment and services. Market transformation requires longer-term planning and a more active approach to market evaluation and response; however, it can ultimately increase savings and/or lower the cost of savings.

Market transformation can be accelerated through strategies such as moving the point of intervention upstream from the customer to equipment distributors, adopting energy efficiency codes and standards that affect all new products or buildings, or leveraging greater private investment. It also requires *exiting* markets when incentives are no longer having a significant impact on behavior. During the 2021-2023 period, EmPOWER utilities should take a more active approach to market transformation, including through market monitoring and program adjustments.

MIDSTREAM STRATEGIES

In the 2018-2020 cycle, the utilities took significant steps by introducing the Retail Products Platform for Energy Star appliances and using midstream incentive for many pieces of HVAC equipment. Those early efforts show promise; however, the utilities will need to take more active approaches to engaging contractors, suppliers, and retailers to reach the scale of impact other jurisdictions have achieved. VEIC strongly recommends that the EmPOWER utilities deepen their efforts in midstream strategies especially for hot water heating and HVAC equipment such as air-source heat pumps. Detailed recommendations can be found in the program area sections below.

LIGHTING

Even more than when VEIC recognized this trend at the start of the 2018-2020 cycle, lighting markets are transforming rapidly. Federal standards (albeit subject to legal and regulatory uncertainty) and cost reductions have increasingly made LED technology the default for many uses. Because the EmPOWER savings goals are based on gross savings, there is some risk that the utilities could continue to claim savings for measures that have already become the default choice, for example by continuing to pay incentives for LED reflector bulbs sold at retail when the LEDs would have been stocked and purchased even in the absence of utility intervention. To mitigate against this risk, we recommend that the utilities carefully monitor the pace of market transformation by conducting regular market studies. Utility savings claims should be informed by the best available data and inputs from evaluators. We also recommend that the utilities continue to find cost-effective lighting savings by differentiating technology and customer markets. Program administrators already know that some specialty bulbs may lag behind general service lamps in market transformation, but there can also be significant differentiation by retail channel. In a study in the Northwest, LEDs made up 100% of bulbs in membership clubs (like Sams) but only 46% in mass merchant stores (like Dollar). By targeting the right lighting technologies through the right market channels – and exiting transformed markets in a timely way – utilities can continue to achieve lighting savings through the 2021-2023 cycle without overspending ratepayer dollars.

CODES & STANDARDS

As baselines rise for efficient products and equipment, reducing the opportunity for the utilities to claim savings, we also recommend that Maryland assess the opportunity to develop a more rigorous "program-to-code" approach to market transformation. Leading states and regions, notably California, New England and the Pacific Northwest, are considering the life cycle of programs to promote efficient products, starting with emerging technology, then moving through accelerated commercialization, and finally locking in the efficiency gains with updated building energy codes and appliance standards. In this way, incentive programs can help to commercialize emerging technologies by educating customers and engaging with the supply channel (most

effectively through midstream and upstream programs) to encourage the high-efficiency products to be stocked and sold.

New Hampshire may be the latest state in which utilities are playing a more formal role related to building codes. In the past, NH utilities have used ratepayer efficiency funds to help train code officials and others on building codes. For the 2021-2023 program cycle, the NH utilities are proposing an attribution methodology so that, at a minimum, code compliance activities will generate savings that can be counted toward regulatory goals.[23]

Pepco noted in its plan that it was "exploring participating in codes and standards review procedures." VEIC supports this proposal and encourages all EmPOWER utilities to work with others to identify roles they can play to advance and increase implementation of codes and standards. These roles can include:

- Provide savings attribution for EmPOWER program participation in development of updated federal codes and standards.
- Provide savings attribution for EmPOWER programs to develop updated state appliance standards.[24]
- Provide savings attribution for EmPOWER programs to develop and support communities in adopting stretch codes.
- Provide savings attribution for EmPOWER programs to support increased code compliance.
- Work towards standardized communication protocols and interoperability standards for connected devices, to ensure that the load management benefits can be fully realized.

Further information and recommendations can be found in the New Construction section below.

FINANCING

Financing is an important component of leveraging private investment to transform markets and increase energy efficiency savings. While financing is neither a panacea nor a replacement for energy efficiency incentives, mature energy efficiency programs incorporate financing alongside rebates and other tools. This is a deficit in Maryland that should be addressed in the coming cycle. Fundamentally, unleashing greater private investment can mitigate what otherwise might be unsustainable levels of public spending.

The COVID-19 pandemic and associated economic strain likely make financing more important than ever, because the ability to pay out of pocket is reduced for many households. At the same time, as many people find themselves spending more time at home, including working from home,

[23] 2021-2023 New Hampshire Statewide Energy Efficiency Plan. As filed September 1, 2020. P. 107. https://www.puc.nh.gov/Regulatory/Docketbk/2020/20-092/INITIAL%20FILING%20-%20PETITION/20-092_2020-09-01_NHUTILITIES_EE_PLAN.PDF

[24] ASAP, https://appliance-standards.org/states.

the savings from residential energy efficiency improvements increase. While these conditions may evolve, residential energy efficiency is likely to be more important than in the past for some time to come. Furthermore, many home efficiency upgrades, including weatherization and HVAC systems, are proven to improve indoor air quality. Yet comprehensive investments in thermal performance or HVAC systems may require a customer investment in the $2,000-$15,000 range.

Energy efficiency programs from utilities can help achieve two distinct but complementary objectives:

1. Increase the ability and motivation of customers who can qualify for traditional financing to *use* financing - to complete projects they do not otherwise feel they can pay for or to pursue larger energy efficiency investments with greater savings; and

2. Increase access to affordable financing for customers who would may not qualify for traditional financing opportunities.

Important progress on the first objective could be made without significant new program spending. As reported by the Finance Work group in 2019, HVAC equipment loans are available in Maryland and some installers market these loans on behalf of equipment suppliers. These loans are typically high cost, akin to credit card rates. However, there are other private financing providers offering energy efficiency loans or financing products in Maryland today at lower rates. The National Energy Investment Fund is one example that offers loans for HVAC or home improvement products, although loan volume in Maryland is very low. Companies such as Sealed offer performance-based financing where customers pay fixed utility bills and the company pays for upgrades based on expected savings (and takes the performance risk away from the customer). These and other financing providers are not typically able to provide financing to customers with poor credit or low income to debt ratios, but for other customers they can offer reasonable monthly payments for many efficiency improvements.

These financing offerings are underutilized because they are not actively promoted to EmPOWER program participants, so the financing providers do not have easy access to engaged customers and contractor networks. The EmPOWER utilities could provide access to both with minimal program investment through better-coordinated marketing efforts. The utilities should engage actively with private sector lenders and financing providers to make sure EmPOWER Maryland customers and contractors have easy-to-use information about financing options. We know that national energy efficiency financing organizations determine which jurisdictions to enter and invest in based on the level of support or engagement they get from program administrators.

For example, BeSMART loans are low-interest loans offered by DHCD for limited income customers that meet credit score and debt ratio requirements. In 2019, DHCD closed only *eight* BeSMART loans from EmPOWER utility referrals (all of which were from BGE). Although it is

possible that other barriers exist for BeSMART loans, these results strongly suggest that more could be done to integrate information about financing into existing EmPOWER program activities and materials.

These activities could include:

- Making all customers aware of financing, on multiple utility communication channels, including listing and promoting third-party financing options on program websites;
- Including financing in the contractor training and sales process;
- Cooperative marketing and promotion in partnership with financing providers; and
- Integrating financing offers into the contractor sales process and incentive calculators.

Program administrators, policymakers and regulators across leading jurisdictions are also actively developing strategies to increase access to financing for those households and circumstances for which traditional financing is not effective. Arguably the most promising effort is tariff-based financing, sometimes called "inclusive financing" because it can significantly broaden the households that benefit, including renters. As noted in the recent Financing Work Group report, tariff-based financing is currently used in many states. In this approach, utilities use the existing mechanism of establishing a tariff to recover costs over time, in this case, the cost of energy efficiency investments tied to a specific meter.

Inclusive financing has several key characteristics that make it attractive to customers and utilities:[25]

- Projects are screened to require predicted savings in excess of the tariff making them generally cash-flow positive from day one;
- Like other utility tariffs, the charge is tied to the meter, which makes it possible for renters to participate;
- Utilities earn money on the cost of efficiency upgrades at their cost of capital, just as they do for building a substation;
- Convenient on-bill repayment means customers don't have to pay an additional bill;
- Eligibility is typically based on bill payment history, not exclusive or complex income or debt criteria; and
- Establishing and charging a tariff to customers is not a new utility operation and need not be a complex or expensive undertaking.

To address a common refrain heard from utilities who lack experience with on-bill financing, utilities are not banks. But tariff-based financing is not lending. Utilities exist in large part to make investments in energy-related capital, the costs of which are recovered in tariffs and amortized over time. This ability can be leveraged to provide benefits to more households. As noted in the

[25] See What is inclusive financing for energy efficiency, and why are some of the largest states in the country calling for it now? ACEEE Paper. 2018.

equity discussion above, renters make up a significant portion of limited-income households in Maryland and are not nearly as well-served by EmPOWER offerings as homeowners.

Another strategy for increasing access to financing is to establish a loan loss reserve fund. These reserve funds encourage private lenders to put money into unfamiliar markets or products (such as residential energy efficiency lending) by absorbing risk of loss (which is actually very low). This allows lenders to lower interest rates and/or relax underwriting criteria. The cost of a loan loss reserve can be quite low. Efficiency Vermont's loan loss reserve, for example, requires deposits of only 2% of the lending capital. A loan loss reserve can be set up in partnership with a single lender or multiple lenders, and can also leverage the expertise of energy efficiency lenders such as NEIF.

Neither a loan loss reserve nor inclusive financing will reach their potential unless financing offerings are better integrated into programs. We recommend that the Commission require EmPOWER utilities to take concrete steps to increase the use of financing, while recognizing a phased approach is necessary. In approving three-year plans, the Commission should require utilities to use strategies to both connect motivated customers with private lenders—which can happen immediately—and expand access to financing. We specifically suggest that the utilities should be required to develop a financing pilot focused on expanding access, such as a loan loss reserve or on-bill tariff pilot, for implementation during the 2021-2023 cycle. Pepco proposed a pilot entitled Alternative Incentive Delivery which included financing options as a possible strategy. We urge Pepco and other utilities to pursue this further.

Build on Early EmPOWER Leadership with Smart Thermostats to Establish a Comprehensive Approach to Connected, Grid-Integrated Homes

EmPOWER utilities were early leaders in promoting smart thermostats, resulting in high penetrations of these devices. Smart thermostats offer significant benefits to individual consumers through bill savings and to the entire utility system through demand management and resource flexibility. As the electricity and natural gas utility systems transition to cleaner resources with different performance characteristics—and electrification increases—integrated demand management will be critical to containing costs. Connected homes will be a key component of maturing demand management capabilities, and a more comprehensive and integrated approach should be a priority for EmPOWER in 2021-2023.

Smart thermostats and other connected devices sit at the crossroads of traditional energy efficiency improvements, behavioral strategies, and demand response. Like other HVAC measures, smart thermostats have an installation cost and offer some immediate energy efficiency savings. However, significant savings opportunities require ongoing program efforts (e.g. optimization, or

providing data for Home Energy Reports), and they can be a linchpin for active demand response savings. These multifaceted savings opportunities can create large benefits, but also require new coordination strategies—between programs and across utilities—to address the added complexity.

The EmPOWER utilities use multiple channels, in inconsistent ways, to incentivize smart thermostats. They may be provided as part of QHEC visits—or not—or available through the Energy STAR Retail Products Platform—or not. They are generally discounted using downstream incentives through some retailers and are part of the comprehensive retrofit measures offered through HPwES and HVAC programs. Smart thermostats are also promoted, at least indirectly, through demand response programs that rely on their use. The lack of consistency stems from the multiple opportunities for innovation. The next program period should support innovation while significantly increasing consistency based on shared results.

The multiple channels for smart thermostat delivery and customer engagement also mean that data is not reported uniformly, which inhibits utilities, evaluators and others from discerning which strategies are delivering the best value.

Smart devices and connected homes are part of a much larger transformation to a data-driven utility system. Data is a powerful tool for utilities and, in the right forms, can give customers more control over their usage or enable them to participate in a growing marketplace for energy services. Consumer protection is essential for these to occur in a responsible way. Customers must be educated about their data, including who has access to what data, what benefits accrue to them (directly or indirectly) through the use of personal or anonymous data, and how they can make decisions about their data.

In the next program period, we recommend that utilities establish a roadmap for advancing smart thermostats and connected homes in an integrated home, including:

- How smart thermostat/device, behavioral programs and demand response programs will work together;
- A plan for integrating new devices or measures given constant technology development;
- Strategies for information-sharing across utilities and a coordinated approach to piloting and designing full programs;
- Clear and uniform tracking and reporting for how smart devices are incentivized and managed across program channels;
- A strategy for device and data platform interoperability that does not unduly curb market competition; and
- Details for managing consumer protection without curtailing the benefits of data analytics.

Re-establish Consistency and Enhance Coordination Across EmPOWER Utilities and DHCD

One of the strengths of EmPOWER Maryland is the level of consistency and coordination across multiple utilities delivering programs. Maintaining that consistency over years of program evolution takes sustained effort. We observed some reduction in consistency across core programs in the last cycle and recommend that EmPOWER utilities renew this focus in the upcoming cycle. At the same time, we support providing utilities with a reasonable degree of flexibility to respond to changing market conditions, as well as the ability to test new and innovative approaches through pilots.

CORE PROGRAMS

VEIC has long advocated that statewide consistency is critically important to program success, because it reduces customer and contractor confusion and allows for economies of scale in program delivery. The need for consistency is increased as energy technologies and markets evolve rapidly. In most cases, there is an inherent cost to contractors, retailers or other efficiency providers having to deal with different program requirements and measure eligibility. Those costs may be borne directly as greater time and effort needed to educate and engage program allies, or indirectly through non-participation or missed opportunities.

The need for consistency is highest in core EmPOWER programs, recognizing that pilots and other special initiatives will vary and contribute to innovation. In the upcoming cycle, there are examples of new efforts to foster coordination and consistency across utilities. For example, residential new construction customers across utilities are also now able to submit applications through a common ENERGY STAR New Homes online platform. Midstream incentives for HVAC are also reasonably aligned.

In other areas, there is inconsistency. This is especially true for lighting and appliance measures. In just one example, BGE is offering downstream rebates for air purifiers, dehumidifiers, pool pumps, and heat pump water heaters, yet Potomac Edison is only offering a downstream rebate on pool pumps. Proposed restructuring of Home Retrofit programs and subprograms is also an area of greater inconsistency, with implications for customers and contractors. For example, some EmPOWER utilities seem to be offering direct installation of smart thermostats at no cost to the customer during the QHEC visit, while smart thermostats may require a co-pay under the HPwES program. The Residential New Construction program would also benefit from greater coordination. The utilities are introducing several positive program enhancements, but very inconsistently. Given that home construction businesses are very likely to work across utility jurisdictions, a significant degree of consistency is important.

One essential area of coordination is between EmPOWER utilities and DHCD. There has been marked improvement in the last couple of years with increased collaboration, data sharing, and cross-promotion of programming to limited income customers. However, as both the utilities and DHCD seek to reach more limited income people through their programming, and with some of that programming starting to look similar to each other (e.g., DHCD's proposed addition of energy efficiency kits and overlap in measures between limited income QHEC offered by utilities and Tier 1/Baseline Efficiency programming offered by DHCD) improved collaboration and data sharing will take on increased importance. DHCD and utilities should strive to offer complementary programs that are thoughtfully designed to increase participation and savings from limited income customers, while avoiding overlapping or duplicative offerings.

VEIC also recommends additional effort in the area of consistent reporting. Reporting is an essential function that allows utilities, regulators, and other stakeholders to monitor performance and make comparisons across years and jurisdictions. In the HVAC program section, we outline how common performance metrics for the midstream program could help better identify gaps and opportunities. Smart thermostat reporting is also very inconsistent, hindering effective analysis of the measure's impact. The utilities are introducing new measures in the Residential New Construction program that will need to be tracked clearly and consistently. We recommend consistent reporting be revisited by a Work Group, with a focus on measures and program areas that have evolved over the last program cycle.

PILOTS AND INNOVATION

Pilots and innovation are an important part of EmPOWER, and this will be especially true as we consider new goals and metrics for success. EmPOWER utilities are proposing a wide variety of pilots and minor program enhancements for the coming cycle. The number of smart or connected device pilots alone is impressive. These create opportunities for innovation and learning. However, VEIC strongly recommends that the EmPOWER utilities do more to create a more coherent and coordinated "innovation pipeline." Even as the utilities pursue their individual pilots, they should understand how related pilots fit together and avoid needlessly duplicative efforts. The utilities should have a common understanding of how EmPOWER pilots advance strategic priorities over time. Extensive piloting around smart and connected devices is very appropriate, given the importance of smart grid platforms; however the utilities could do more to articulate how their EmPOWER-funded pilots work together in this single framework.

Furthermore, each pilot should mature through a common pathway that includes consultative design, implementation, shared results, and either completion or incorporation into a full-scale program. When a pilot returns measurable results that show it is ready to scale up to a full program, all utilities should consider how they can incorporate those findings, or articulate why they will not.

PROGRAM FLEXIBILITY

To enable the utilities to respond dynamically to changing market conditions, we support providing appropriate flexibility to make program adjustments without requiring formal Commission approval. This includes which modifying measure lists and incentive levels (up to a maximum) as markets are transformed, which can happen rapidly. Bundling closely connected initiatives as subprograms also gives utilities the flexibility to adjust and reallocate resources to respond to market conditions or adapt when different tactics perform better or worse than expected.

Summary of Overall Recommendations

Review EmPOWER Portfolio Composition and Ensure a Balanced Approach

Carefully consider carefully whether it is appropriate for utilities, particularly BGE, to rely so heavily on CVR savings to achieve the 2% minimum statutory savings goal.

If CVR is included in EmPOWER portfolio savings, consider whether CVR savings should be counted as first-year savings year after year in cases where minimal additional expenditures are made on an annual basis.

Accelerate strategies to ramp up savings from non-behavioral residential programs during the 2021-2023 period, particularly non-lighting savings such as HVAC midstream and Home Retrofit programs.

Consider requiring electric utilities, particularly Delmarva and SMECO, to achieve residential savings in closer proportion to residential share of electricity load.

Adopt a Comprehensive Strategy to Enhance Equity and Reduce Energy Burdens

Direct the Limited Income Work Group to develop a comprehensive approach to measuring and enhancing equity.

Define target populations using multiple factors, including energy burden.

Identify and evaluate any disparate programs impacts for target populations using input metrics (such as proportional program spending) and outcome metrics (such as energy savings).

Design and implement specific strategies to reduce inequities and include representative voices is program design and delivery.

Develop a New Goal Framework to Position EmPOWER to Evolve Along with Policies, Markets, and Technologies

Initiate a Goal-Setting work group or proceeding and stakeholder process with a clear objective, third-party expertise and/or facilitation, and a timetable that concludes by fall 2022.

- Develop a set of 4-6 goals for EmPOWER (or its successor) to use in plans for 2024-2026, exploring how multiple goals work together to maximize value and advance Maryland policies.
- Work collaboratively with any other Work Groups or regulatory proceedings that may consider utility performance incentives to ensure compatibility and consistency with goals.
- Direct the Measurement & Verification Work Group and Goal-Setting stakeholders to collaborate on recommended changes to Maryland cost-effectiveness test (including consideration of the National Standards Practice Manual guidelines and best practices), ensuring any test is consistent with new goals and state policy.

Focus on Market Transformation Strategies That Deliver Maximum Long-Term Value for Consumers

- Direct the utilities to be more active and ambitious in the use of midstream strategies, especially for heat pump water heaters and air source heat pumps.
- Put greater emphasis on supply chain engagement to improve results of midstream strategies, including extending and deepening relationships with distributors.
- Require utilities to more closely monitor and evaluate market trends, differentiating by types of lighting and retail markets, and adjusting savings claims and strategies as necessary to capture
- Direct utilities to work with financing providers to immediately integrate financing options into programs, focusing on customer and contractor awareness, and to pilot or otherwise develop strategies to increase access to financing.
- Develop a code and standards savings attribution strategy to accelerate market transformation in new buildings (and potentially appliances).

Build on Early EmPOWER Leadership with Smart Thermostats to Establish a Comprehensive Approach to Connected, Grid-Integrated Homes

- Direct utilities to create a smart/connected homes roadmap that describes how utilities will work together over a multi-year period to advance and more thoroughly integrate smart devices.
- Require utilities to establish consistent, transparent methods for tracking and reporting smart thermostat measures that will be used across programs and delivery channels.

A new Connected Devices Work Group and the Behavior Work group should explore, and utilities should implement, new ways to integrate behavioral and device-based energy efficiency and demand response strategies, as well as cross-utilization of data.

Re-establish Consistency and Enhance Coordination Across EmPOWER Utilities and DHCD

Direct the utilities to increase consistency among core programs.

Require utilities to establish more consistent and transparent reporting methods, possibly through a Data Work Group.

Develop a more coherent and transparent framework for pilots, through an "innovation pipeline" that is coordinated across utilities to scale up successful innovations in a methodological way.

Summary of Program Recommendations

VEIC has reviewed the utilities' program plans in detail and developed a number of specific recommendations, which are summarized below.

Lighting Program Recommendations

- Require utilities to examine and reduce disparities in access to efficient LED lighting across customers, retailers and Maryland communities
- Require utilities to accelerate the elimination of standard LED and reflector incentives for mass market retailers
- Utilize targeted marketing of LED products to Maryland lighting consumers
- Increase diversity, flexibility and resiliency in program plans to accommodate potential rapid federal or state action on lighting standards

Appliance & Recycling Program Recommendations

- Revisit the April 2019 Commission order for removal of soundbars, dehumidifiers and air purifiers in the RPP program
- Allow flexibility to quickly respond to market impacts of COVID-19, midstream measure changes and ENERGY STAR specification updates
- Develop a more consistent, coordinated and aggressive heat pump water heater strategy to increase engagement with participating midstream retailers and HVAC and plumbing distributors
- Evaluators should conduct an evaluation of consumer electronics measures - including advanced power strips – to assess the energy burden in MD households and impact of EmPOWER programs
- Establish annual participation levels to achieve an Annual Harvest Rate (AHR) greater than 1.25%
- Track and report on rate of appliance pickup by referral channel

Residential Retrofit Program Recommendations

- The Commission should review the various utility proposals for Home Retrofit programs and subprograms and direct the utilities to align them consistently to the extent feasible
- Direct EmPOWER utilities to implement all low and no-cost strategies to increase the use of financing and employ pilots that expand access to financing
- Direct all EmPOWER utilities to offer HPwES incentives of $3-6 per lifetime natural gas MMBtu, consistent with the Phase II Coordinated Program

- The HPwES Work Group should convene to review the various QHEC, HPwES, and HEIP offerings, with the goal of identifying the most successful practices, determining changes needed to position the Home Retrofit offering for future success, and aligning each utility's programs with a consistent, best-practice approach.
- Utilities should provide additional details on their plans to offer enhanced HPwES incentives for LMI customers

HVAC Program Recommendations

- Ask the utilities to justify addition of the HVAC Tune-up offering, given the significant opportunity to achieve improved HVAC savings results through the midstream program.
- The Midstream Work Group should develop a common set of metrics and performance targets for the midstream program, on which the utilities should report consistently.
- Direct Washington Gas to report HVAC program savings and set corresponding HVAC program savings goals.
- The Midstream Work Group should explore alternative approaches to midstream delivery to drive increased uptake, participation and savings
- Utilities should consider program enhancements that align with other program areas and goals, such as limited-income and connected devices

Residential New Construction Program Recommendations

- Require a full-scale program certification tier beyond ENERGY STAR for New Homes
- Direct electric utilities to expand electrification incentives
- Develop code savings attribution
- Require consistent offerings and incentive structures
- Update plans for multifamily offering
- Pursue opportunities for occupant-related savings

Limited Income Program Recommendations

- Approve DHCD's 2021-2023 EmPOWER plan as filed
- DHCD should address potential areas of confusion with its proposed higher income guidelines.
- The Limited Income Work Group should continue discussing goals, using a broad equity framework and focusing on which metrics best measure the success of the programs at meeting those goals.

Behavior Program Recommendations

- Require updated, consistent set of reporting metrics that include participant counts and control group size by delivery channel, for behavior programs.
- Set clear definitions for annual, cycle-to-date, and program-to-date energy savings, spending, and participant metrics for behavior programs as they are reported in semi-annual filings.
- The Behavior Work Group should actively share best practices as new behavior-based programming is deployed during the program cycle
- Report more detail from vendors on the status of behavior programs
- Integrate and utilize datasets beyond AMI for behavior programs, such as smart thermostat telemetry and smart/connected home pilots

Smart Thermostat & Connected Homes Recommendations

- Require all utilities to offer thermostat optimization programs.
- Require utilities to provide a clear plan for how Smart Home pilots will be concluded and advanced as full programs as appropriate.
- Require utilities to provide consistent reporting on the adoption and deployment of thermostats (and eventually, connected devices) across the portfolio to ensure accurate assessment of impacts and savings
- Require utilities to provide consistent reporting on the adoption and deployment of thermostats (and eventually, connected devices) across the portfolio to ensure accurate assessment of impacts and savings
- A Connected Device Work Group should be formed to share ongoing insights, challenges, and lessons learned from the various Smart Home pilots, emerging programs, and market developments underway
- Utilities should connect behavior-based programming that uses smart meter data to connected thermostat telemetry when conducting remote audits and analytics.
- All EmPOWER utilities should adopt a consistent use of ESRPP for smart thermostats to reflect the intent of the Commission order, while working to integrate smart thermostat user information into optimization, demand response and other programs.

Demand Response Program Recommendations

- Direct Potomac Edison to offer Demand Response EmPOWER programs along with the other electric utilities

- Require BGE, Pepco and DPL to describe in more detail why the cost of demand reduction savings are forecast to increase so substantially
- Investigate the prevalence of broadband internet connectivity across the state and consider the interrelationship of access to broadband and DR programs.
- For utilities that do not yet offer behavioral DR programs, prioritize plans that bring these tools and services online, and for all utilities, ensure that households without broadband are priority targets for behavioral DR programs.
- Utilities should look for ways to test and integrate DR program marketing tactics to further optimize performance of programs.

Schools Program Recommendations

- Pepco and Delmarva should report back to the Commission on why their Schools programs have such vastly different savings forecasts per participant when they follow the same basic program design.
- SMECO should report on the impacts of the $25 coupon for student families to the online store and the measures provided to schools based on the "school audit" element of its curriculum
- SMECO should report on how much of its Schools Program budget is associated with supporting C&I direct install measures in schools rather than the residential measures included in school kits.
- Given the ongoing COVID-19 pandemic, we recommend all utilities offering Schools programs consider ways to make their programs accessible to remote learners

Other Program Recommendations

- DHCD and the utilities should coordinate on their kit offerings to avoid duplicate kit mailings to limited income households.
- DHCD should analyze the percent of direct mailings to its various referral lists are returned for the wrong address or because the applicant has moved before it implements a broad kit mailing.
- The Commission should order Washington Gas to provide the same level of detail on EE kits and other sub-programs as the EmPOWER electric utilities.
- The commission should require the utilities participating in the LMI location-based DSM pilot to track in detail the types of measures installed to assess their relative cost-effectiveness
- Delmarva should provide a detailed report on the Efficiency for Affordable Housing Program to share lessons applicable to the multifamily sector across the state

Program-Specific Observations and Recommendations

This section presents VEIC's recommendations to improve the performance of each of the residential programs. The proposed programs represent, to a large degree, a continuation of the current suite of programs. Our comments focus on high-level program recommendations and observations that generally apply across utilities, while noting differences between the utilities where they exist.

At the end of each program section are recommendations. Recognizing that implementing many recommendations will take contributions from multiple entities—and many utility actions may need to begin with a clear Commission order—an icon indicates the entity that VEIC believes should play the lead initiation action:

By order of the **Public Service Commission** (including in the order approving EmPOWER plans)

Through direct implementation by **EmPOWER Utilities or DHCD**

For collaborative development by a new or existing **Work Group** (in many cases through Commission order)

Lighting

The EmPOWER utilities have been partnering with retailers and manufacturers in buy-down and markdown promotions since the inception of the EmPOWER program in 2009. Some of these utility lighting programs predate the EmPOWER program, such as BGE's lighting program, which was first implemented in 2008. Through this program, the utilities provide incentives to retailers and manufacturers to provide instant discounts at retail partner store locations as an incentive for customers to purchase energy-efficient lighting products. During 2017, EmPOWER utility lighting programs phased out promotions of compact fluorescent lamps (CFLs), focusing on ENERGY STAR light-emitting diodes (LEDs) and fixtures. The EmPOWER utilities have continued to achieve savings targets and maintain the success of their lighting programs primarily due to the emergence of lower cost ENERGY STAR LED lamps, and by reinvigorating their lighting programs with the addition of new existing lighting partner retail locations, and other partners, such as hardware and grocery stores, pop up retailers, and food banks.

In addition to changing technology and markets, changes in federal lighting standards, legal challenges and individual state legislative action have served as the backdrop for lighting programs over the last several years. They will likely have a significant impact on EmPOWER utilities in the 2021-2023 triennial cycle.

OVERVIEW OF UTILITY THREE-YEAR LIGHTING PLANS

Proposed Savings, Participation, and Spending

Although all five utilities are forecasting lower and decreasing annual savings during the next program cycle, all utilities are proposing increases or similar lighting budgets for 2021-2023 compared to 2020. The following figures illustrate the reported savings and costs of the utilities' lighting programs in 2017 thru 2019 and projected and forecasted costs and savings in 2020 and the 2021-2023 program cycle.

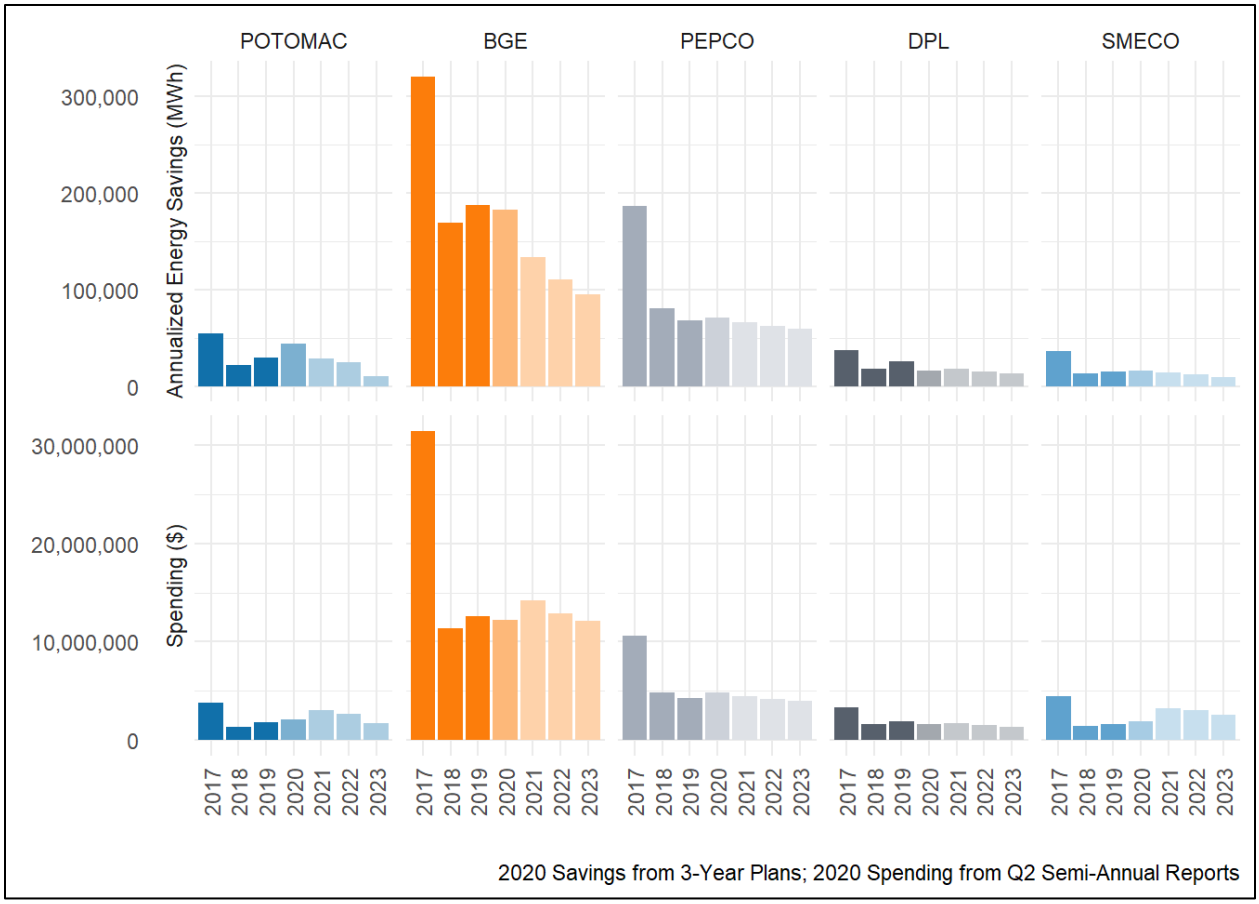

Figure 8: Lighting Savings and Spending by Year as Reported (2017-2019), Projected (2020), and Forecast (2021-2023)

All utilities project at least modest increases in the cost of achieving these savings in the next program cycle. There is a sharp difference between SMECO and the rest of the utilities in the forecasted lifecycle cost of lighting savings in the 2021-2023 plans compared to the reported lifecycle cost of lighting savings in the current 2018-2020 period. The increases in lifecycle costs is likely largely attributed to the pivot away from reflectors and diminishing lifecycle savings, but we are unclear the full reasons for a more than doubling of costs.

The Maryland Technical Resource Manual updates approved in 2020 include a long measure life for LED lights. However, the combination of lighting standards and market conditions make it likely than any inefficient bulb replaced within a few years would be replaced with an LED even absent the program. For this reason, several jurisdictions are using an effective measure life for residential LEDs of 2-4 years, not counting savings for later years when the measure would be no different from the baseline. Although this would not affect gross annual savings, it does affect lifetime savings and overall cost-effectiveness. We support an effective measure life of no more than four years for standard LEDs in general market segments and believe two may be appropriate based on market assessments.

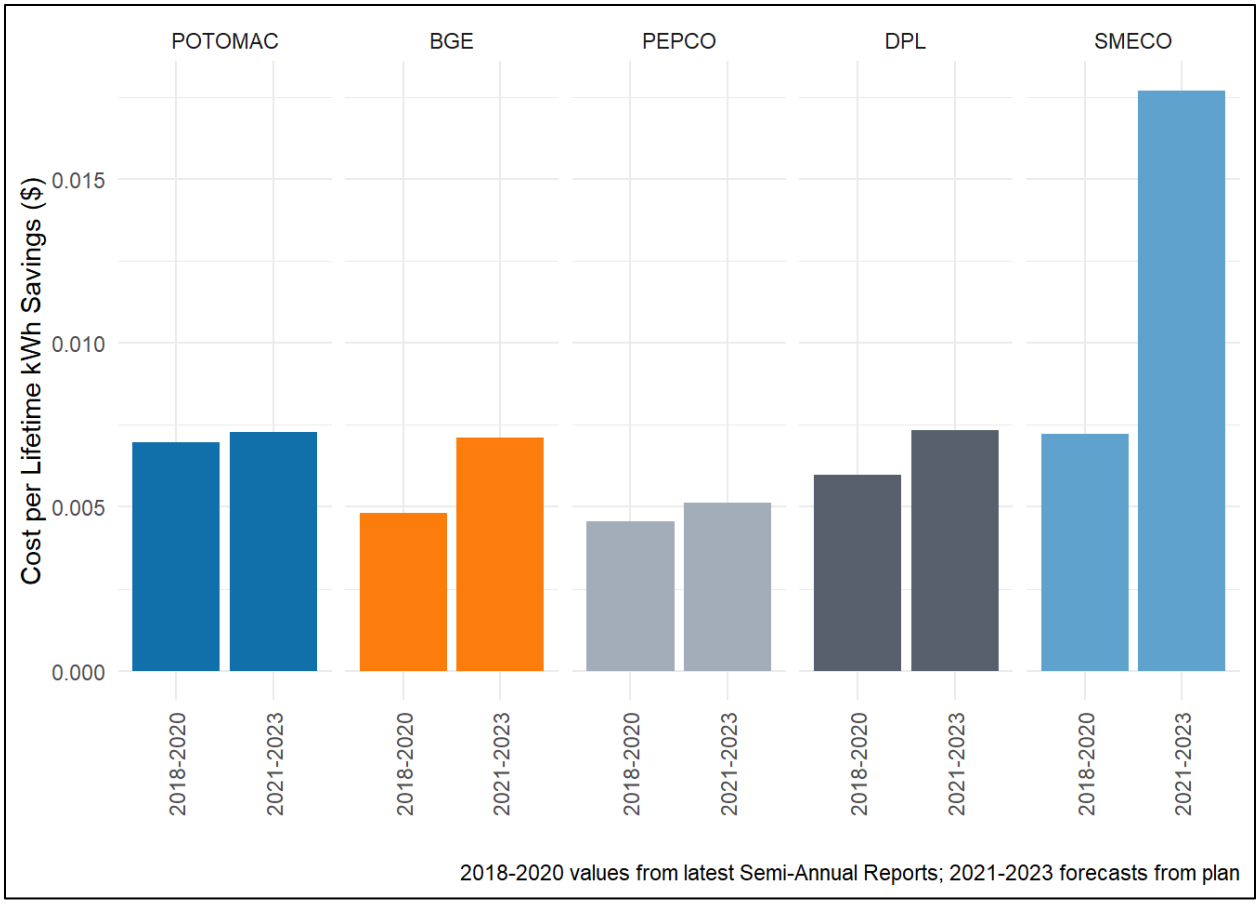

Figure 9: Lighting Programs Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Changes from Current Programs

EmPOWER lighting programs in the 2021-2023 plans are quite variable across the utilities.

- BGE is planning "aggressive incentives…to frontload savings" in 2021; elimination of incentives for standard LEDS from high market share retailers (e.g. membership clubs) in 2022); and anticipated removal of standard LEDs from additional retailers and targeting primarily limited income customers in 2023.
- SMECO is planning an expansion of smart lighting products and new partnerships in the Foodbank program.
- Delmarva, Potomac Edison and Pepco are planning to remove reflectors during the program cycle with the exception of targeting limited income customers. The utilities are exploring the addition of new lighting measures to diversify the program.

All EmPOWER MD utilities except BGE will be offering occupancy sensor controls in their list of eligible residential lighting measures. Table 4 illustrates the lighting measures that each utility is offering through its retail lighting program. The table does not include proposed additions of

LED holiday lights and desk/table lamps. Only Potomac Edison is planning to offer rebates on ceiling fans.

Table 4: Lighting Measures Offered by Utility, 2021-2023

Measure	BGE	Delmarva	Pepco	Potomac Edison	SMECO
LEDs	X	X	X	X	X
Fixtures	X	X	X	X	X
Ceiling Fans				X	
Occupancy Sensors		X	X	X	X

ANALYSIS & BEST PRACTICES

In the 2018-2020 triennial period EmPOWER Electric Utilities planned for reduced per-unit lighting savings and participation to reflect a market transition aligned with federal minimum standards requiring efficacy of general service lamps (GSLs) to achieve performance currently met by LEDs. These most common lamps used in residential homes were to meet a January 2020 backstop provision established in the 2007 EISA legislation—a category expanded in 2017 through DOE rulemaking, broadening the definition of GSLs. However, the most recent DOE rulemaking issued in September 2019[26] invalidates the 2017 changes to the definition of GSLs, as well as making the case that the 43 lumen per watt (lpw) backstop provision for 2020 has not been triggered. This rulemaking went into effect October 7, 2019 and was countered by legal challenges and individual state legislation.[27] It continues to raise uncertainty in the lighting market and requires active dialogue among the EmPOWER electric utilities to coordinate actions to sustain the success of the programs to date, while balancing the appropriate use of ratepayer funds.

Given the speed with which the residential lighting market is transforming and the growing uncertainty with federal standards, it will be important for utilities to strengthen engagement with state agencies, retail partners, along with any regional or national consumer market research to inform future program strategies. The rapid pace of customer adoption and increased sales in Maryland and nationwide, coupled with potential increases in federal or state lighting standards increases the likelihood of diminished lighting savings attribution: lower net to gross factors, lifetime savings and cost-effectiveness for lighting programs during the 2021-2023 program period.

In a recent market assessment by NEMA, high efficiency standard A-line lamps – LEDs and CFLs - have continued to achieve approximately 75% of total lamp sales over the last year. Overall, replacement lamps sales have decreased recently year to year, likely a direct result of higher

[26] https://www.regulations.gov/document?D=EERE-2018-BT-STD-0010-0450

[27] Several states including California, Colorado, Nevada and Vermont enacted state standards for GSLs and as of January 2020 all GSLs sold in those states must meet the 43 lpw standard – including standard, reflectors and 3-way bulbs among others. See https://appliance-standards.org/product/general-service-lamps

efficiency lamps with longer lifetimes installed in higher number of commercial and residential sockets.

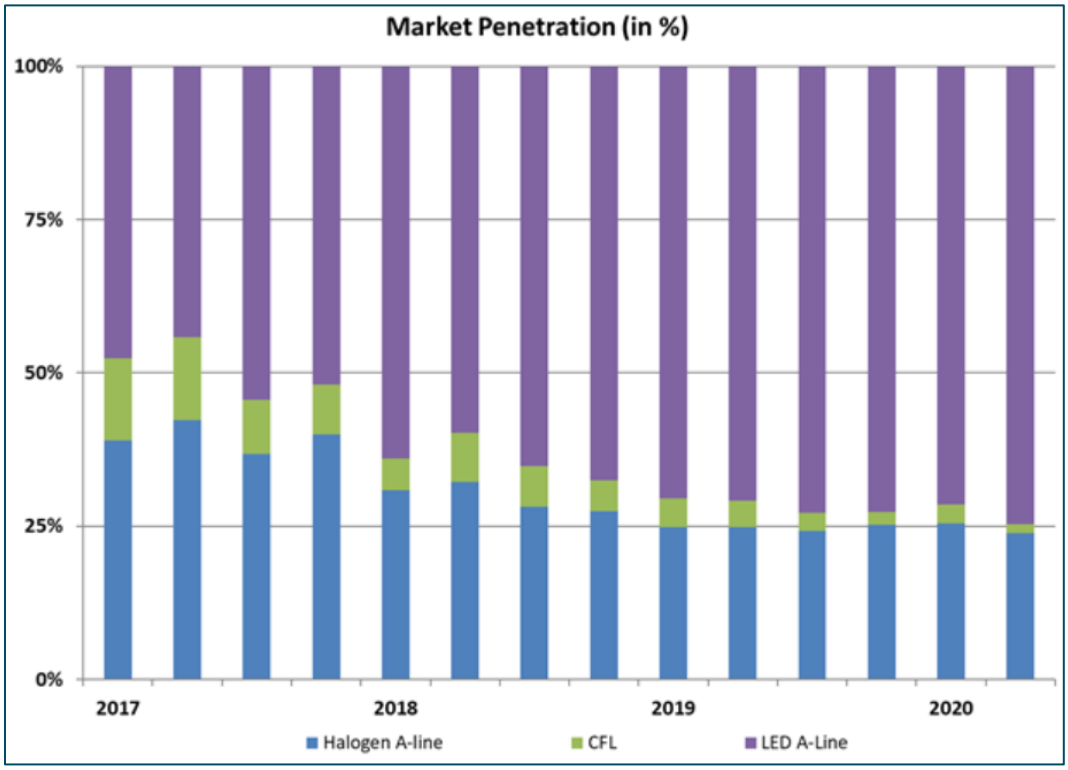

Figure 10: National A-Line Sales Market Penetration of Halogen, CFL and LEDs[28]

LED market share has increased across all bulb types with reflectors and general-purpose LEDs achieving approximately 70% market share in the Northwest in 2019.[29] Other specialty bulb types including globe, decorative and three-way had lower market shares closer to 50%.

[28] Soucy, L. NEMA (2020, September 11) Retrieved from https://www.nema.org/analytics/indices/view/led-a-line-lamp-shipments-decrease-in-fourth-quarter-2019-compared-to-third-quarter-2019-and-the-previous-year
[29] NEEA 2019 Residential Lighting Market Analysis, June 2020.

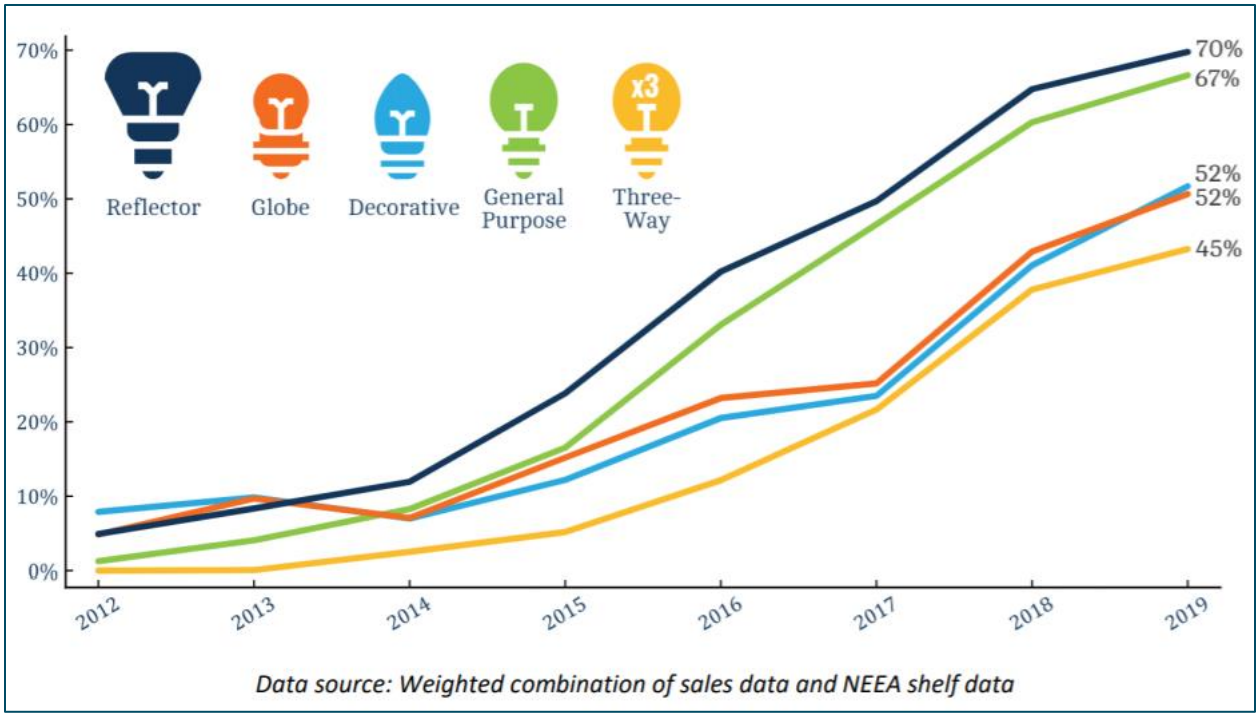

Figure 11: Northwest LED technology market shares by application, 2012-2019

However, the Northwest study confirms other recent evaluations in Massachusetts and other states, that the LED market share is not uniform across all retailers. In the Northwest, membership clubs (e.g. Costco) had 100% LED market share, compared to "Do It Yourself (DIY) hardware" (e.g. big box home improvement) and small hardware with approximately 70%. A lagging group was grocery, Dollar and mass merchant stores, at 46%. As the majority of reported EmPOWER utilities lighting program participation in Q2 2020 is through DIY and mass merchant stores, a deep assessment of program and retailer strategy, as well as program focus on lower market share bulb types and retailers, is warranted.

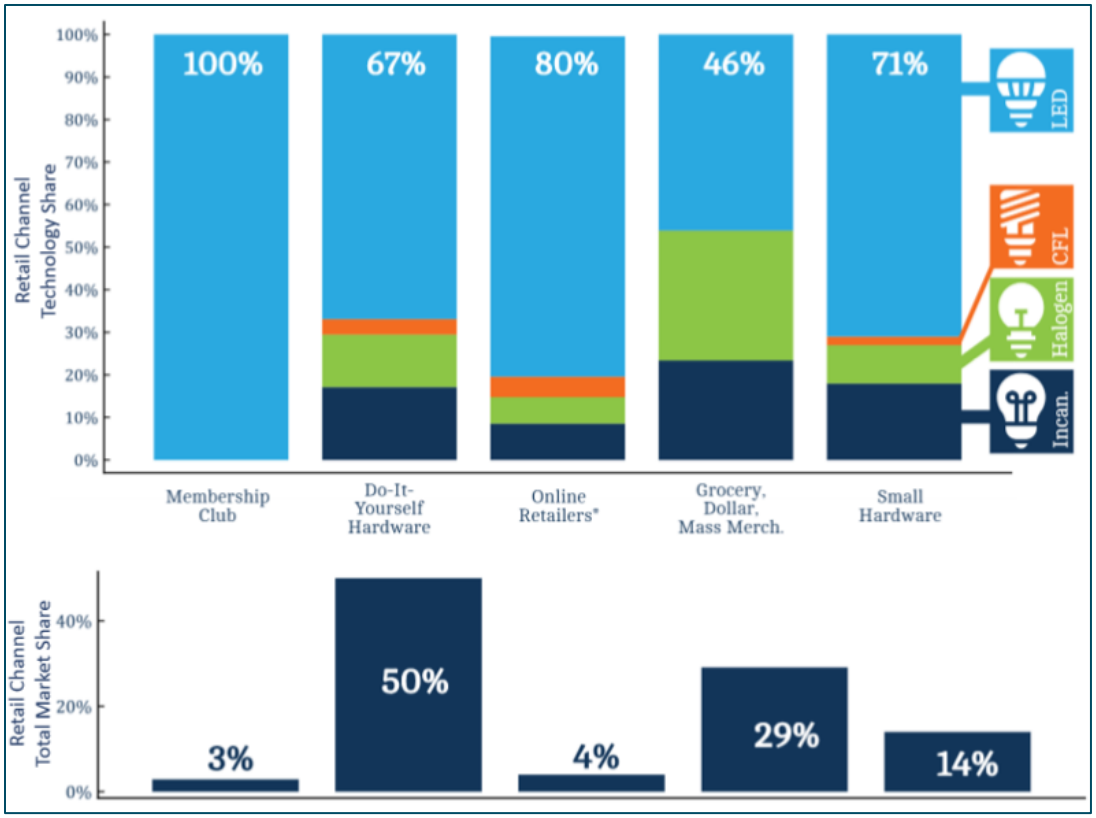

Figure 12: Northwest retail channel LED technology market share and total market share (2019)

A 2019 lighting market study in Massachusetts[30] highlights the risk for program freeridership, with marginal difference in market share of standard and reflector bulbs between MA and states that don't have lighting programs. There is a notable increase in market share of specialty – candelabra and globe – bulbs in MA compared to non-program states. These findings and other evaluations from Illinois and the Northwest stand at odds with the justification proposed in BGE's filing, which suggests that LEDs have under 50% market share and that there are "no known market factors that would drive an increased rate of market shift in the future."

Responding to changing lighting market conditions does not simply mean exiting markets. It does require more sophisticated and targeted approaches to capture savings. One example of a cost control mechanism is to adopt a minimum retail price for LEDs, as well as a maximum percentage of regular retail pricing for incentives.[31] EmPOWER utilities should utilize the competitive process of the lighting discount program to identify proposals and partnerships with manufacturer and retailers to achieve identified metrics of EmPOWER program success. This ensures that the rebates paid by the EmPOWER program are limited to ensuring that products get to an appropriate price

[30] http://ma-eeac.org/wordpress/wp-content/uploads/MA19R06-E-LtgSalesDataAnalysisReport_FINAL_2019.10.29.pdf
[31] Jenna Pugliese, Efficiency Vermont program manager, September 2017.
http://www.vermontbusinessregistry.com/bidAttachments/20504/2017%20EVT%20ES%20Retail%20Lighting%20Program.pdf

point, and that as the retail price drops for a product, the rebate necessary to reach that desired price point also is reduced.

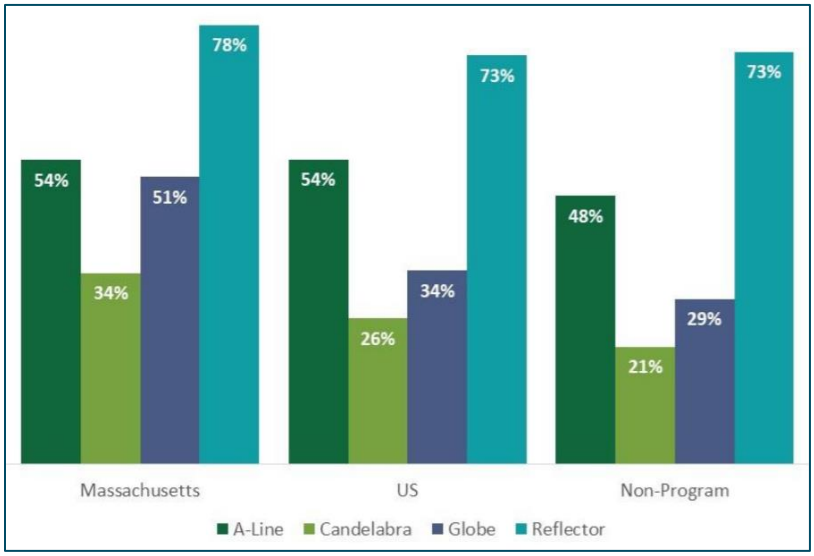

Figure 13: 2018 LED market share by bulb shape in Massachusetts, nationally and in non-program states

Another study in an urban Michigan county[32] highlighted the disparity of access to efficient lighting based on the location and presence of different retailer types. The study found that "(1) energy-efficient bulbs were less available in high-poverty areas and smaller stores; (2) energy-efficient bulbs were more expensive in high-poverty areas and smaller stores; (3) upgrade costs from incandescent and halogen lamps (IHLs) to CFLs or LEDs were higher in high poverty areas; and (4) both poverty and store type were significant predictors of LED availability, while store type was the most significant predictor of LED price variability." It is important to evaluate whether these conditions exist in Maryland—whether in urban or rural areas—and take steps to mitigate them.

[32] "An incandescent truth: Disparities in energy-efficient lighting availability and prices in an urban US county". Reames, Reiner and Stacey, 2018. Applied Energy.

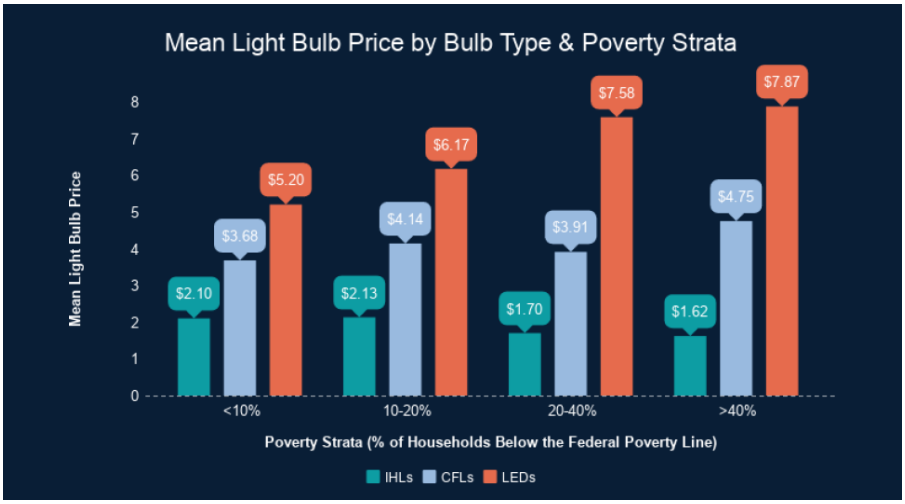

Figure 14: Pricing of light bulbs by type and poverty level in an urban Michigan county.

LIGHTING PROGRAM RECOMMENDATIONS

Require utilities to examine and reduce disparities in access to efficient LED lighting across customers, retailers and Maryland communities

EmPOWER utilities should evaluate the effectiveness of its planned lighting programs to ensure equitable access to efficient lighting, including stocking, pricing and retail store type. Any barriers to implementing equitable lighting programs (e.g. program cost-effectiveness, evaluations, etc.) should be identified and addressed.

Require utilities to accelerate the elimination of standard LED and reflector incentives for mass market retailers

EmPOWER utilities should plan for an accelerated transition away from incentives for standard and reflector LEDs through mass market retailers and increase focus on targeting lower market share LED bulb types and underserved customers and retailer types. Recent evaluations highlighted earlier do not support program plans as filed.

Utilize targeted marketing of LED products to Maryland lighting consumers

Although LED pricing has dropped in comparison with halogens and the diversity of manufacturers and products have expanded significantly, convincing customers and retailers to adopt a wholesale shift to LEDs will require significant and innovative utility program intervention during the program period.

Historically, many lighting application types were ill suited for available LED products, but improved LED designs have expanded opportunities in decorative and specialty lighting products for targeting marketing and incentives to drive customer adoption. Due to lower market share,

of non-standard LEDs, decoratives and specialty bulbs remain as a high impact opportunity to drive retail sales and increase socket saturation in Maryland homes and businesses.

Increase diversity, flexibility and resiliency in program plans to accommodate potential rapid federal or state action on lighting standards.

To date lighting has represented the most cost-effective EmPOWER program, but this may change during the 2021-2023 program period if the TRM uses best practices. EmPOWER Maryland utilities should increase diversity, flexibility and resiliency in program plans to accommodate a potential acceleration of federal or state lighting standards that could significantly impact program cost-effectiveness and savings. Other states in the regionally and nationally are adjusting program plans for the 2021-2023 period to reflect recent lighting program evaluations.[33] We recommend utility evaluations are aimed at careful examination of the pace of change in market saturation of LED lighting.

EmPOWER utilities should identify proposals and partnerships with manufacturer and retailers that ensures rebates result in an appropriate price point as retail prices change. As such, EmPOWER MD utilities should verify that the maximum incentive levels included in program filings reflect the most recent program participation and market pricing data.

[33] Draft R1615 Light Emitting Diode Net-to-Gross Evaluation, April 2017. https://www.energizect.com/sites/default/files/R1615_LED_Net-To-Gross%20Evaluation%20Report_Review%20Draft_04.16.17.pdf

Appliances

The EmPOWER 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, and smart thermostats. The program also provides rebates on qualified advanced power strips.

In 2018 the EmPOWER Electric Utilities launched the ENERGY STAR Retail Products Platform Program (ESRPP) and in 2019 the Commission issued Order No. 88964 directing the EmPOWER Electric Utilities to include the full suite of ESRPP products within their respective appliance programs. In 2018, the Utilities also launched a midstream heat pump water heater initiative offering incentives through participating distributors and retailers.

OVERVIEW OF UTILITY THREE-YEAR APPLIANCES PLANS

Proposed Savings, Participation, and Spending

Three of the five utilities are forecasting an increase in annualized savings from the program in 2021-2023. BGE and SMECO are forecasting a reduction in appliance program savings. For the three utilities forecasting an increase in savings, there is a corresponding increase in spending as well in the triennial period, but BGE is budgeting for an increase in spending and a decrease in savings. It is not clear why there is a difference in BGE's appliance program, as the EmPOWER programs coordinate RPP and generally other appliance incentives. The figures below show the annualized energy savings and total program expenditures of the 2021-2023 plans compared to reported savings expenditures for past years and forecasts for 2020.

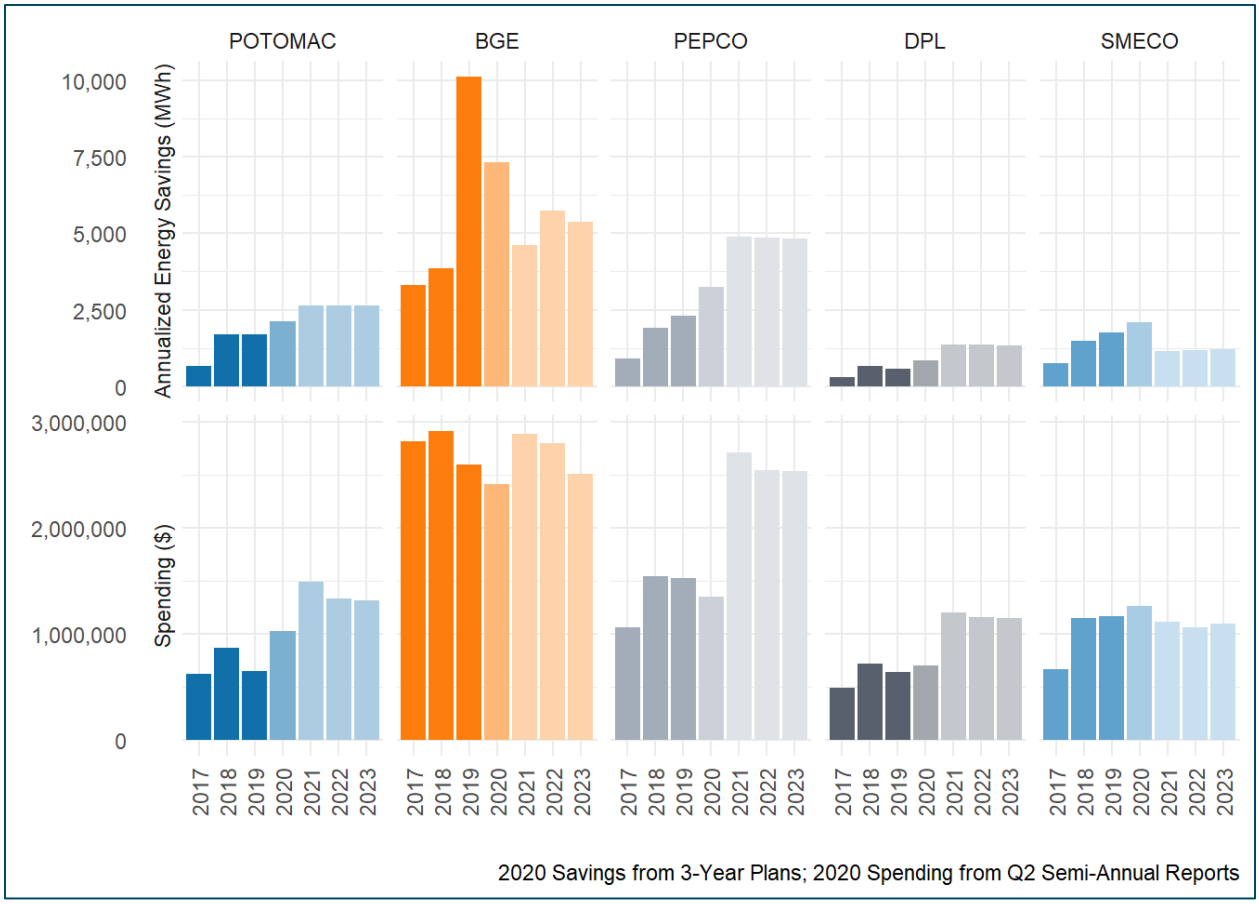

Figure 15: Appliance Rebate Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

Three of the five electric utilities expect to see the cost per lifetime savings of their appliance programs to decrease in 2021-2023 compared to reported costs in 2018 thru 2020. Potomac Edison and SMECO are forecasting an increase in the cost of lifetime savings, as seen in Figure 16 below. However, it is important to note that Potomac Edison has the most comprehensive appliance program including a diverse set of measures and program delivery channels (e.g. downstream and midstream), yet maintains one of the lowest cost of lifetime savings across EmPOWER programs. It is unclear why SMECO's costs would be rising significantly (and without increased savings) when costs at the other utilities are converging toward five c/kwh.

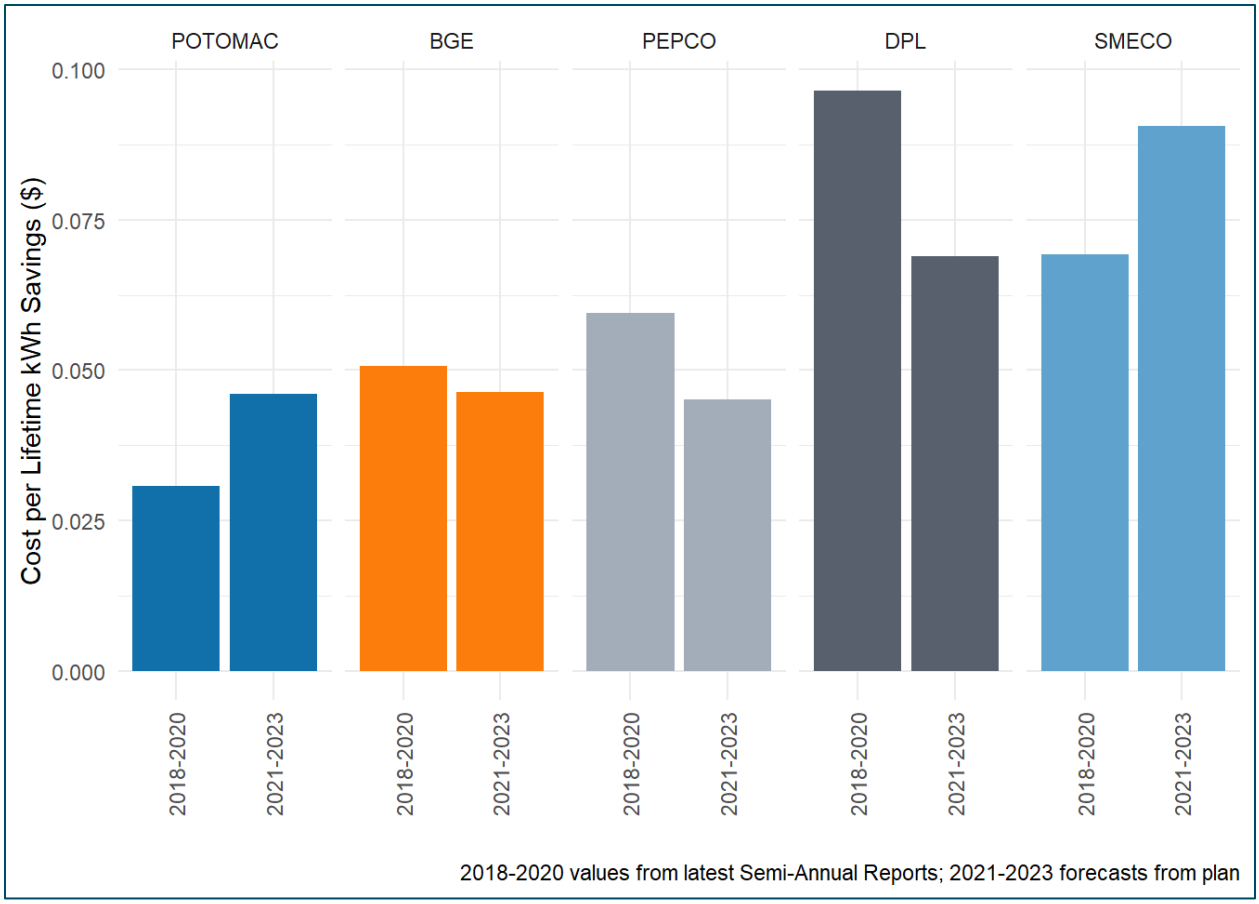

Figure 16: Appliance Rebate Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Changes from Current Programs

In 2018-2020 the EmPOWER utilities implemented a significant new midstream program delivery approach through the ENERGY STAR Retail Products Platform (RPP). The RPP provides incentives to retailer to increase the stocking and sale of eligible measures. The incentive levels are lower than downstream customer rebates, as they are targeted at addressing the retailer sales margin and not necessarily the actual incremental cost. During the 2018-2020 program, utilities increased RPP measure alignment to provide a coordinated EmPOWER program.

In April 2019, following a Commission order, dehumidifiers, air purifiers and soundbars were removed from the EmPOWER RPP program. Recent increases in specification requirements for these products as part of the national RPP product assortment should warrants a reassessment of the intent of the Commission order on future EmPOWER RPP product assortments for the 2021-2023 program period. All five of the utilities plan to offer downstream incentives for air purifiers and dehumidifiers and to a lesser degree soundbars.

In addition to the midstream RPP measures, the utilities will be offering a diverse mix of appliance measures in the 2021-2023 program cycle (including downstream incentives), although measures are not the same for every utility.

Table 5 lists the measures planned for the upcoming program cycle for each utility.

Table 5: Appliance Rebate Measures by Incentive Delivery Channel, 2021-2023

	Measure	BGE	Delmarva	Pepco	Potomac Edison	SMECO
Appliance Recycling	Freezer	X	X	X	X	X
	Refrigerator	X	X	X	X	X
	Room Air Conditioner	X	X	X	X	X
	Dehumidifier	X	X	X	X	X
Downstream – Customer Rebate	ENERGY STAR Tier 2/3 Clothes Washer				X	X
	ENERGY STAR Tier 1 Clothes Washer		**TBD**	**TBD**	X	
	ENERGY STAR Tier 2/3 Refrigerator				X	X
	ENERGY STAR Tier 1 Refrigerator		**TBD**	**TBD**	X	
	ENERGY STAR Freezer				X	X
	ENERGY STAR Clothes Dryer				X	X
	ENERGY STAR Heat Pump Dryers					
	ENERGY STAR Room Air Purifiers	X	X	X	X	X
	ENERGY STAR Room A/C Tier 2			X	X	X
	ENERGY STAR Room A/C Tier 1		**TBD**	**TBD**	X	
	ENERGY STAR Dehumidifiers	X	X	X	X	X
	ENERGY STAR Heat Pump Water Heater (HPWH)	X	X	X	X	X
	ENERGY STAR Pool Pump (variable speed)	X	X	X	X	X
	Advanced Power Strips Tier 1	X	X	X		
	ENERGY STAR Smart Thermostats	X	X	X		X
	ENERGY STAR Dishwasher				X	
	ENERGY STAR Water Cooler				X	
	ENERGY STAR EV Charger				X	
Midstream – Instant Customer Rebate 1	ENERGY STAR Smart Thermostats				X	X
	ENERGY STAR Soundbars		X	X	X	
	ENERGY STAR Monitors, Computers, Imaging, Advanced Power Strips, TVs and Smart Home Devices				X	
	ENERGY STAR Dehumidifiers	X				
	ENERGY STAR Air Purifiers	X				
	ENERGY STAR HPWH	X			X	X
	ENERGY STAR Pool Pump (variable speed)				X	X
Midstream Retail Products Platform	ENERGY STAR CEE Tier 2/3 Clothes Washer	X	X	X	X	
	ENERGY STAR CEE Tier 2/3 Refrigerator	X	X	X	X	
	ENERGY STAR Freezer	X	X	X	X	
	ENERGY STAR Clothes Dryer Tier 1	X	X	X	X	
	ENERGY STAR Clothes Dryer Tier 2					
	ENERGY STAR Room A/C Tier 2	X	X		X	
Midstream – Instant Distributor/Contractor Rebate *	ENERGY STAR HPWH				X	X
	ENERGY STAR Pool Pump (variable speed)				X	X
Online Store – Instant Customer Rebate	Lighting, Advanced Power Strip, Low Flow Water Devices, Air Purifiers, Dehumidifiers, Smart Home Devices					X

X - Measure for 2021-2023

*** Not all EmPOWER utilities specifically identified their midstream distributor/contractor program in filings**

Due to a lack of consistency in filed program plans reporting of measures in specific incentive delivery channels (e.g. downstream, midstream, and midstream type), there are likely gaps in the table above. For example, all of the EmPOWER utilities are offering midstream heat pump water heater promotions with partnering distributors, but not all specifically identify midstream promotions and whether the promotions are with retailers, distributors or both.

Delmarva specifically plans to introduce new targeted enhanced incentives, program strategies and engagement for low and moderate income (LMI) customers. Although other utilities include planned increases in focus on targeting underserved customers, there is a general lack of specificity and consistency across EmPOWER utility plans. All EmPOWER utilities should develop enhanced appliance program plans targeting support for underserved customers and communities.

Delmarva Targeted Low and Moderate Income Appliance Initiatives
• Enhanced incentives in the Home Performance with ENERGY STAR® (HPwES) program for LMI customers. • A Shift Model, providing an efficient model priced to match the price point of entry model for certain appliance. • A community energy efficiency coach to provide direct outreach with LMI customers to help identify savings opportunities. • A pilot providing enhanced incentives to customers that reside in areas which face both load congestion and income constraints.

ANALYSIS & BEST PRACTICES

Heap pump water heaters represent one of the highest residential energy savings opportunities for the EmPOWER utilities, as well as a bridge for future electrification strategies. The table below outlines the energy savings potential for different types of housing units in Maryland and based on the percentage of electric resistance water heaters (ERWH).

Table 6: Maryland HPWH Anual Energy Savings Potential Based on Building Type and ERWH Saturation[34]

Housing Units	2020 GDS Forecast	% ERWH Saturation	ERWH Units	Avg. Annual ERWH Replaced	Potential Annual Energy Savings (MWh)
Single Family, detached	1,239,338	38.07%	471,816	36,294	46,710
Single Family, attached	509,691	33.59%	171,205	13,170	16,949

[34] Maryland HPWH savings potential estimate is based on electric water heater saturation documented in the 2012 Natural Gas Fuel Switching Potential in Maryland and the average savings and measure life of HPWH in Maryland.

Multifamily	44,544	40.06%	17,844	1,373	1,767
Mobile Homes	583,147	88.49%	516,027	39,694	51,087
Total	2,376,720	39.85%	947,123	72,856	93,765

Despite the introduction of downstream and midstream incentives for heat pump water heaters, the EmPOWER utilities are not keeping pace with leading states, but merely trending with the national average. In 2019, HPWH participation was 1,258 through downstream and midstream retailer and distributor channels and despite anticipated improvement the 2020 performance is trending lower.[35] Based on reported 2017 electric water heater sales volumes, this is less than 2% of annual sales. That is the national average and stands in stark contrast to other leading state programs – notably Vermont[36] and Maine at 60%[37] of water heater market share.

Below are some of the key program strategies adopted by leading states:

- Leading EE programs provide robust consumer education platforms to promote HPWH, for example
  - Efficiency Maine provides education and a savings calculator: https://www.efficiencymaine.com/at-home/water-heating-cost-comparison/
  - NEEA hosts a separate interactive website to inform consumers about HPWH: https://hotwatersolutionsnw.org/is-it-right-for-you
- States with high HPWH deployment have a trained workforce. Installers in Vermont and Maine can install a HPWH on the same timeline as a standard water heater.
- Leading states include HPWH in their income eligible programs.
  - Efficiency Maine offers a Low-Income Direct Install program for HPWH: https://www.efficiencymaine.com/docs/FY19-Annual-Report_final.pdf
  - Efficiency Vermont offers HPWH as an add-on to the state's weatherization program: https://www.efficiencyvermont.com/free-products

The volume and diversity of consumer electronics products in US households is a growing energy burden in US households. However, it is unclear if the retailer midstream strategies are achieving the desired outcome of increasing the performance, stocking and purchase of higher efficiency products. Advanced power strips remained as a significant portion of BGE's appliance program savings (9%) – and also captured in other EmPOWER programs as kits or direct install measures – yet lack a robust evaluation supporting the persistence of the energy savings. Additionally,

[35] COVID-19 is cited in 2020 EmPOWER biannual filings as impacting participation in midstream and downstream incentive programs.
[36] D+R International, Mystery Shopping for Water Heaters: Market Mechanics Revealed, 2019 ENERGY STAR Products Partner Meeting, 2019, https://www.energystar.gov/sites/default/files/asset/document/2019.09.11%20Booher%20ESPPM%20HPWH%20Market%20Mechanics%20Revealed_Final%20%28002%29.pdf
[37] Andy Meyer, Presentation at the 2019 ENERGY STAR Partner Meeting. September, 2019.

Potomac Edison maintains a consumer electronics program outside of RPP for select ENERGY STAR TV's and monitors.

APPLIANCE PROGRAM RECOMMENDATIONS

Revisit the April 2019 Commission order for removal of soundbars, dehumidifiers and air purifiers in the RPP program.

As the EmPOWER RPP program has proven to deliver a higher volume of appliance participation at the higher performance ENERGY STAR tiers, we recommend that all EmPOWER utilities embrace the April 2019 order to allow the adoption of the full suite of RPP measures – including dehumidifiers, air purifiers and soundbars – given updated specifications.

Table 7: 2020 ENERGY STAR Retail Products Platform Suite of Products

ESRPP 2017 Product Category	Tier	Eligibility Criteria - Specification[1]
Room Air Conditioners	basic	ENERGY STAR
Room Air Conditioners	advanced	2020 Most Efficient
Electric Clothes Dryers	basic	ENERGY STAR
Electric Clothes Dryers	advanced	2020 Most Efficient
Gas Clothes Dryers	basic	ENERGY STAR
Gas Clothes Dryers	advanced	2020 Most Efficient
Freezers	basic	ENERGY STAR
Freezers	advanced	2020 Most Efficient
Refrigerators	basic	ENERGY STAR
Refrigerators	advanced	2020 Most Efficient
Clothes Washers	basic	ENERGY STAR
Clothes Washers	advanced	2020 Most Efficient
Dehumidifiers	basic	ENERGY STAR
Dehumidifiers	advanced	2020 Most Efficient
Soundbars	advanced	ENERGY STAR + 50%
Trial/Optional Product – Smart Thermostats	basic	ENERGY STAR

[1] **Effective 4/1/2020 to 3/31/2021**

Allow flexibility to quickly respond to market impacts of COVID-19, midstream measure changes and ENERGY STAR specification updates

VEIC supports the utilities' request to continue having the flexibility to modify incentive levels and midstream product assortment within established limits. These limits include notice to the Commission, Staff, OPC and other stakeholders when budget changes will result in a 10% increase

or decrease from the filed budgets. We also recommend that the utilities have the ability to implement appropriate tier level changes in conjunction with ENERGY STAR specification changes and evaluation findings without having to file for permission for these changes with the Commission. Given the commitments to standardize rebate levels and eligibility tiers, and to collaborate with key stakeholders, we believe the utilities should have the flexibility to respond quickly to specification updates.

Develop a more consistent, coordinated and aggressive heat pump water heater strategy to increase engagement with participating midstream retailers and HVAC and plumbing distributors.

Although EmPOWER utilities have expanded their programs to include downstream and midstream incentives for ENERGY STAR heat pump water heaters, they lag significantly behind market share achieved in other leading state efficiency programs. We recommend that EmPOWER utilities evaluate other state and utility programs to identify innovative program strategies to accelerate participation in the 2021-2023 program period.

EmPOWER utilities should assess whether the midstream water heater program is better aligned with the HVAC midstream program or the existing appliance midstream program. We recommend that the EmPOWER utilities commission a workgroup with external industry stakeholders to support the development of a comprehensive HPWH strategy – including underserved customers and communities.

Evaluators should conduct an evaluation of consumer electronics measures - including advanced power strips – to assess the energy burden in MD households and impact of EmPOWER programs

The volume and diversity of consumer electronics products in US households is a growing energy burden in US households. However, it is unclear if the retailer midstream promotions are achieving the desired outcome of increasing the performance, stocking and purchase of higher efficiency products. Of specific note, advanced power strips are a significant portion of the appliance program – and other EmPOWER program – savings, yet lacks a robust evaluation supporting the persistence of the energy savings.

We recommend that EmPOWER utilities commission an evaluation of the market strategy and energy savings for the consumer electronics measures in the Appliance Program.

Appliance Recycling

The EmPOWER utilities appliance recycling program offers utility customers the opportunity to recycle several types of old inefficient appliances, and rewards the customer with a cash incentive for each appliance that is turned in and recycled. Recycling ensures that older less-efficient appliances are no longer in use in other areas of the customer's home. The program will support refrigerators, freezers, room air conditioners, and dehumidifiers in the 2021-2023 program cycle. In order for the utility to schedule a pick-up at the home, the utility customer must have at minimum a refrigerator or freezer to be recycled. When in combination with either of these appliances, they may also recycle room air conditioners and dehumidifiers. The appliances must be in working order in order to be accepted by the program, and for the customer to receive the incentive payment. The appliance recycling measures and the incentive for each are shown below in the table. Four of the five EmPOWER utilities are planning to offer periodic limited time offer (LTO) rebates for refrigerators and freezers up to $75, but the standard incentive will be $50. However, Potomac Edison plans to offer a higher maximum incentive of up to $100 for refrigerators/freezers and $35 for room air conditioners and dehumidifiers. Potomac Edison specifically identifies appliance recycling as an example of the need to not have standardization of EmPOWER incentives to allow flexibility to reflect unique aspects of specific utility markets. Some of the utilities are considering offering enhanced incentives for low income customers.

Table 8: Appliance Recycling Measures and 2021-2023 Incentives

Appliance Recycling Measure	EmPOWER Utility Incentive	Potomac Incentive
Refrigerator /Freezer	Up to $75	Up to $100
Room A/C / Dehumidifier	$25	$35

OVERVIEW OF UTILITY THREE-YEAR APPLIANCE RECYLING PLANS

Proposed Savings, Participation, and Spending

All five utilities plan for increased savings and spending compared to their current 2020 budget forecasts, but annualized savings from their appliance recycling programs in the 2021-2023 program cycle are forecasted to be lower than 2017 thru 2019. However, all utilities are forecasting a similar or increase in expenditures in the next program cycle.

The figures below illustrate these comparisons in annualized energy savings and total expenditures for each utility's appliance recycling program.

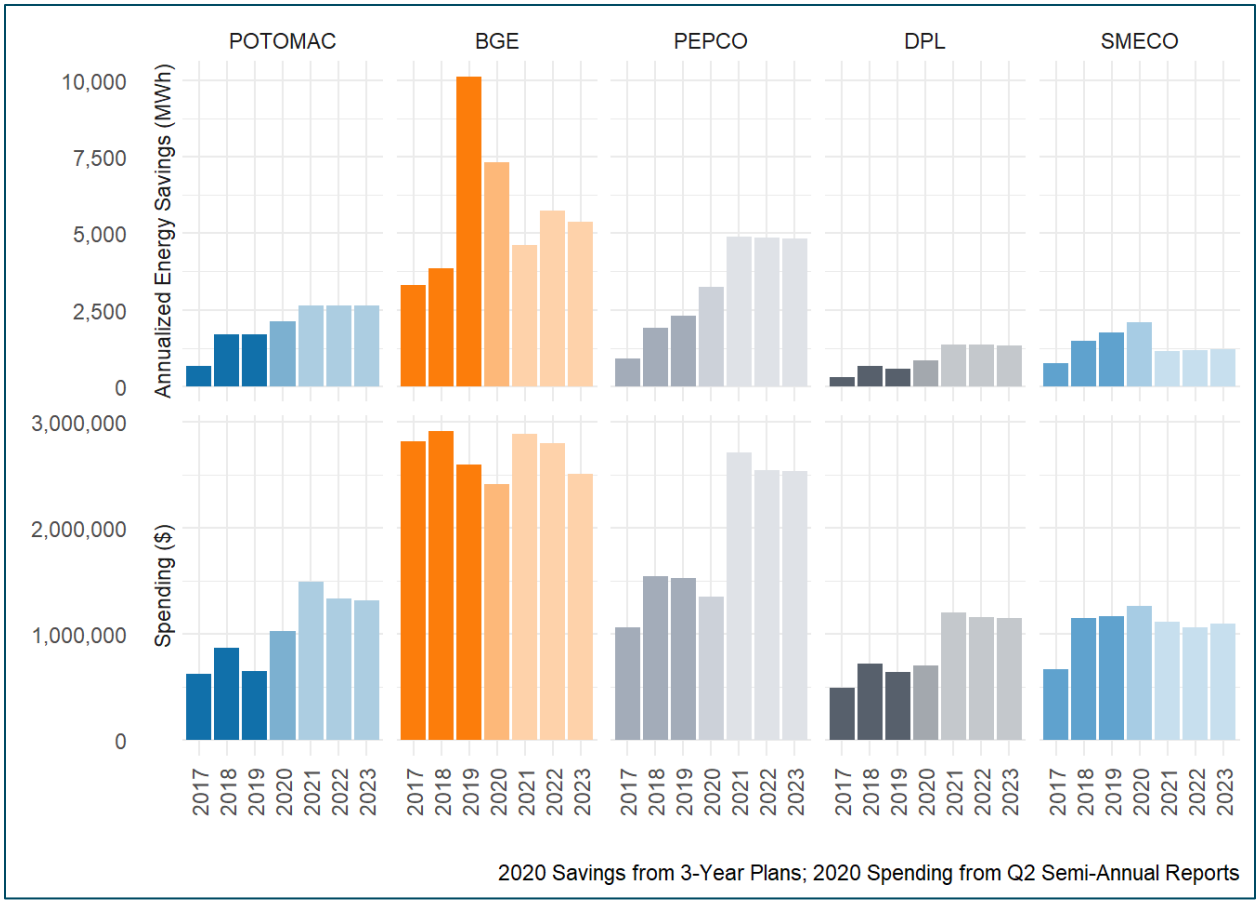

Figure 17: Appliance Recycling Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

Figure 18 below shows the lifecycle cost of the utilities' appliance recycling programs. Three of the five EmPOWER utilities forecast lifecycle costs converging around 5 cents/kwh in the next program cycle. DPL costs are higher but forecast to decrease in compared to 2018-2020. SMECO is an outlier with high and increasing costs and the utility should properly justify differences in performance. Costs may be impacted by ongoing impacts of COVID-19 on operations and participation rates in the next program cycle, which is discussed further below relative to each utility's Annual Harvest Rates.

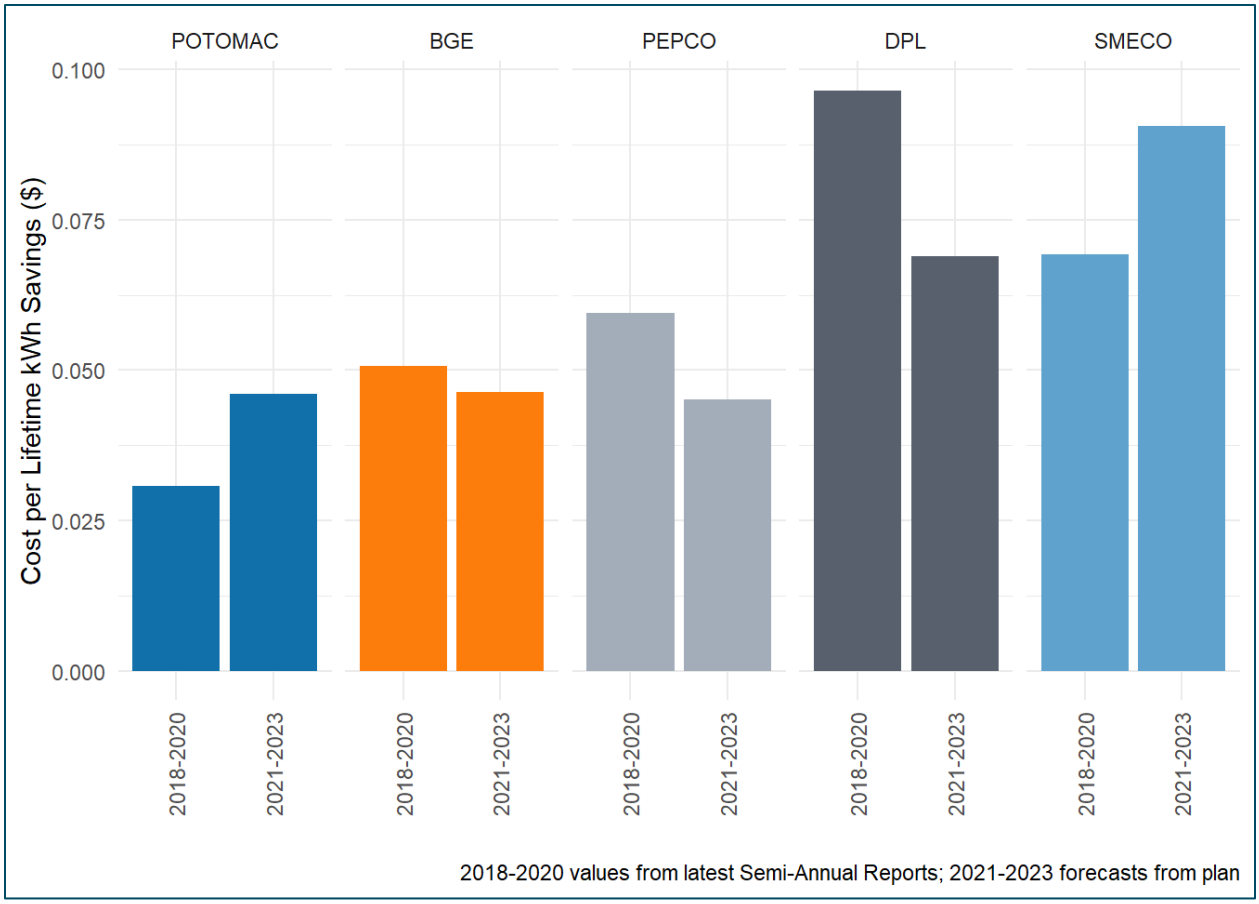

Figure 18: Appliance Recycling Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Changes from Current Programs

The program has three primary collection mechanisms, which will continue in the 2021-2023 program cycle:

- **Reservation**: Utility customers may make a reservation to have a qualifying appliance picked up at their home by the program vendor. The appliances to be picked up must be accessible to a pick-up crew, and must still be in working order.
- **In-store scheduling:** The utilities have expanded the program to include in-store scheduling of an appliance pickup when purchasing a new appliance at an EmPOWER appliance store partner.
- **Turn-in event:** The EmPOWER utilities have sponsored periodic events at centralized drop-off locations where customers can turn in smaller inefficient working appliances such as dehumidifiers and room air conditioners.

In the 2021-2023 program period, EmPOWER MD utilities will offer the opportunity to schedule a Quick Home Energy Check Up (QHEC) during appliance recycling pickups to streamline the customer engagement for energy savings.

Also in the next period, some EmPOWER utilities are proposing the potential addition of water heater recycling pickups. As there is no separate identification of water heaters as a recycling measure and documentation of energy savings—most households do not keep old water heaters in operation—this should not proceed without evaluation and commission support.

ANALYSIS & BEST PRACTICES

All five of the utilities have had appliance recycling programs operating for more than a decade, and recently have developed more consistent program incentives and strategies. Program participation is based upon a forecast of Annual Harvest Rate (AHR) or the percentage of the residential customer base that participates in a program each year. Mature programs typically operate with an AHR in the range of 1 to 1.25% and EmPOWER utilities are generally in that range. Potomac Edison is an outlier forecasting an AHR greater than 4% for the 2021-2023 period in the program filings. The utilities' calculated or targeted AHRs for 2021 – 2023 are shown below:

Table 9: Utility Annual Harvest Rates

Utility	# of Households[38]	2021-2023 Annualized Recycling	2018-2020 Annual Harvest Rate (Annualized)
BGE	872,327	15,206	1.7%
Delmarva	151,571	1,368	0.9%*
Pepco	412,592	5,140	1.2%*
SMECO	143,065	1,650	1.1%
Potomac Edison	208,167	9,011	4.3%*

* All rates are calculated by historical number of households and is not accurate to 2020 residential customers

Potomac Edison's participation forecasts, and resulting AHRs for the 2021-2023 program cycle, although significantly higher than the other EmPOWER utilities, is in line with participation in the 2018-2020 cycle. However, significant impacts from COVID-19 have reduced participation in 2020 and should be accounted for appropriately in 2021 plans.

The utilities recently enabled in-store scheduling of an appliance pickup when purchasing a new appliance at an EmPOWER appliance store partner. This makes it easier to convince the customer to part with their old appliance, as it provides free pickup at the time that their new appliance is delivered, and the consumer may combine the incentive payment with the rebate for an energy-

[38] Energy Information Administration, https://www.eia.gov/electricity/data/eia861m/xls/f826netmetering2017.xlsx

efficient new appliance that qualifies for a rebate from the EmPOWER appliance program in their purchase decision.

APPLIANCE RECYCLING PROGRAM RECOMMENDATIONS

Establish annual participation levels to achieve an Annual Harvest Rate (AHR) greater than 1.25%

All utilities should target an AHR of 1.25%. Potomac Edison should share program tactics that have enabled it to reach significantly higher recycling rates.

Track and report on rate of appliance pickup by referral channel

As the program evolves, including with the introduction of in-store scheduling, it is be important to track and then evaluate the most impactful and cost-effective channels and partnerships for appliance recycling.

Home Retrofit

In previous cycles, most EmPOWER utilities offered Residential Retrofit programs that combined both the Quick Home Energy Check-Up (QHEC) and Home Performance with ENERGY STAR (HPwES) programs. Quick Home Energy Check-Up (QHEC) has been a core EmPOWER program since its inception in 2008. QHEC provides a no-cost energy walk-through and visual assessment by a certified professional, combined with direct installation of measures (e.g., LEDs, faucet aerators, and smart power strips) and recommendations for future improvements. HPwES offers energy audits and upgrades, using a "whole house" approach to improve energy efficiency, comfort, and indoor air quality. In the 2018-2020 cycle, the EmPOWER utilities introduced a performance-based incentive (PBI) structure that encouraged customers and contractors to pursue deeper energy savings.

For the 2021-2023 cycle, the utilities are proposing a variety of different program structures to serve the residential retrofit market:

- BGE proposes distinct programs for QHEC, HPwES, Residential HVAC, and Smart Thermostats and Optimization.
- Pepco and Delmarva propose to group several subprograms together under a "Home Optimization and Home Retrofit" program, including QHEC, HPwES, Residential HVAC, and School Program with Take-Home Kits.
- Potomac Edison similarly proposes combining the following subprograms under a "Home Retrofit" program: QHEC, HPwES, School Education, Energy Efficiency Kits, and HVAC.
- SMECO proposes a "Home Retrofit" program that consists of multiple subprograms, including a continuation of the Home Energy Improvement Program (HEIP), as well as Residential HVAC, Thermostat Optimization, and My Energy Target subprograms.
- Washington Gas proposes extending the coordinated framework established in the current cycle into the 2021-2023 cycle. This framework consists of the cost-sharing and gas therm savings accrual method for HPwES, QHEC, and HEIP, as well as the inclusion of gas equipment measures in HPwES and HEIP.

To maintain consistency and enable comparison across utilities, we focus our review in this section on the QHEC and HPwES subprograms, along with SMECO's HEIP. Plans for the HVAC, Schools, Efficiency Kits, and Thermostat Optimization subprograms are reviewed separately.

PROPOSED SAVINGS, PARTICIPATION, AND SPENDING

QHEC

Four of the EmPOWER electric utilities plan to offer the QHEC subprogram in 2021-2023; SMECO is offering the HEIP instead and is reviewed separately, below. After a dip in savings in 2020 due to the Covid-19 program shutdown, all four utilities plan to deliver annualized QHEC savings in the 2021-2023 cycle in a similar range to the 2017-2019 period, significantly higher than 2020 but lower than the peak level of savings achieved in 2018. The four utilities are all forecasting an increase in QHEC spending for the triennial period. The figures below show the annualized energy savings and total program expenditures of the 2021-2023 plans compared to forecasted savings and expenditures in 2020 and reported results from 2017-2019.

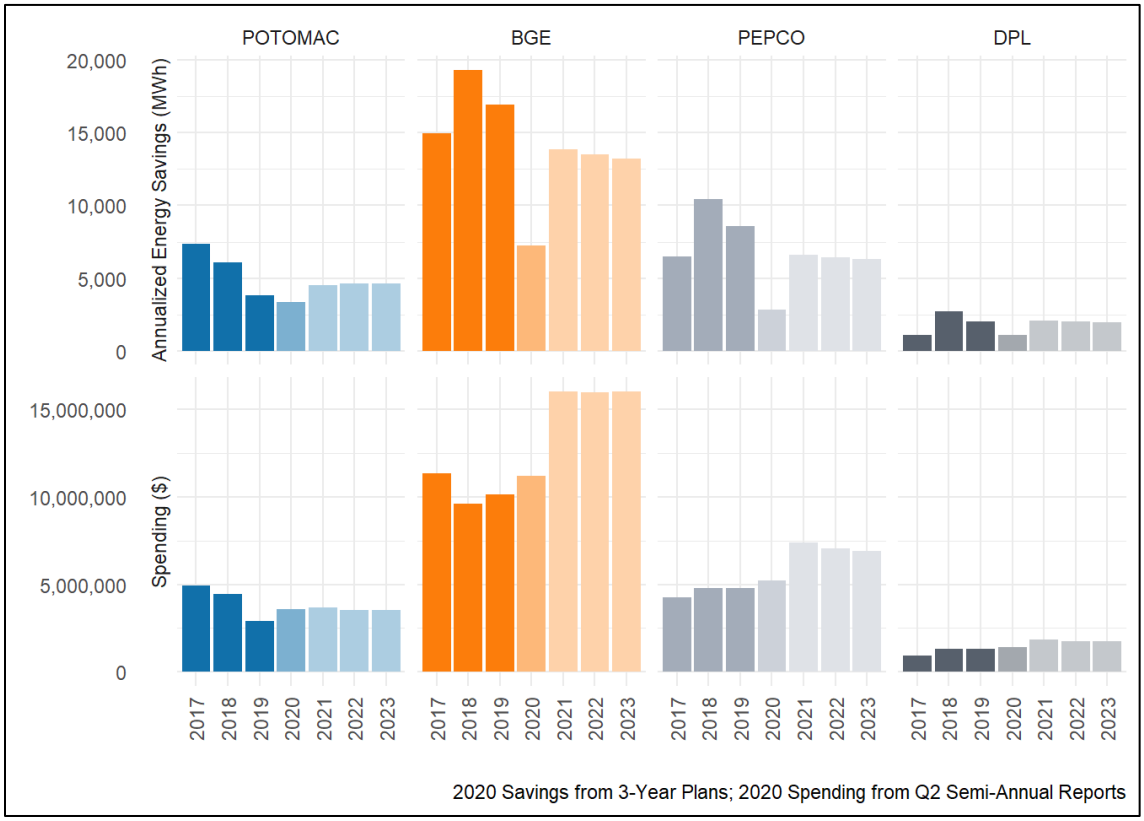

Figure 19: QHEC Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

All the electric utilities except Potomac Edison expect to see the cost per lifetime savings of their QHEC programs increase in 2021-2023 compared to reported costs in 2018-2020. The reason for this increase is unclear, but it may be due to an increased emphasis on delivering smart thermostats – a more expensive measure – through the QHEC channel.

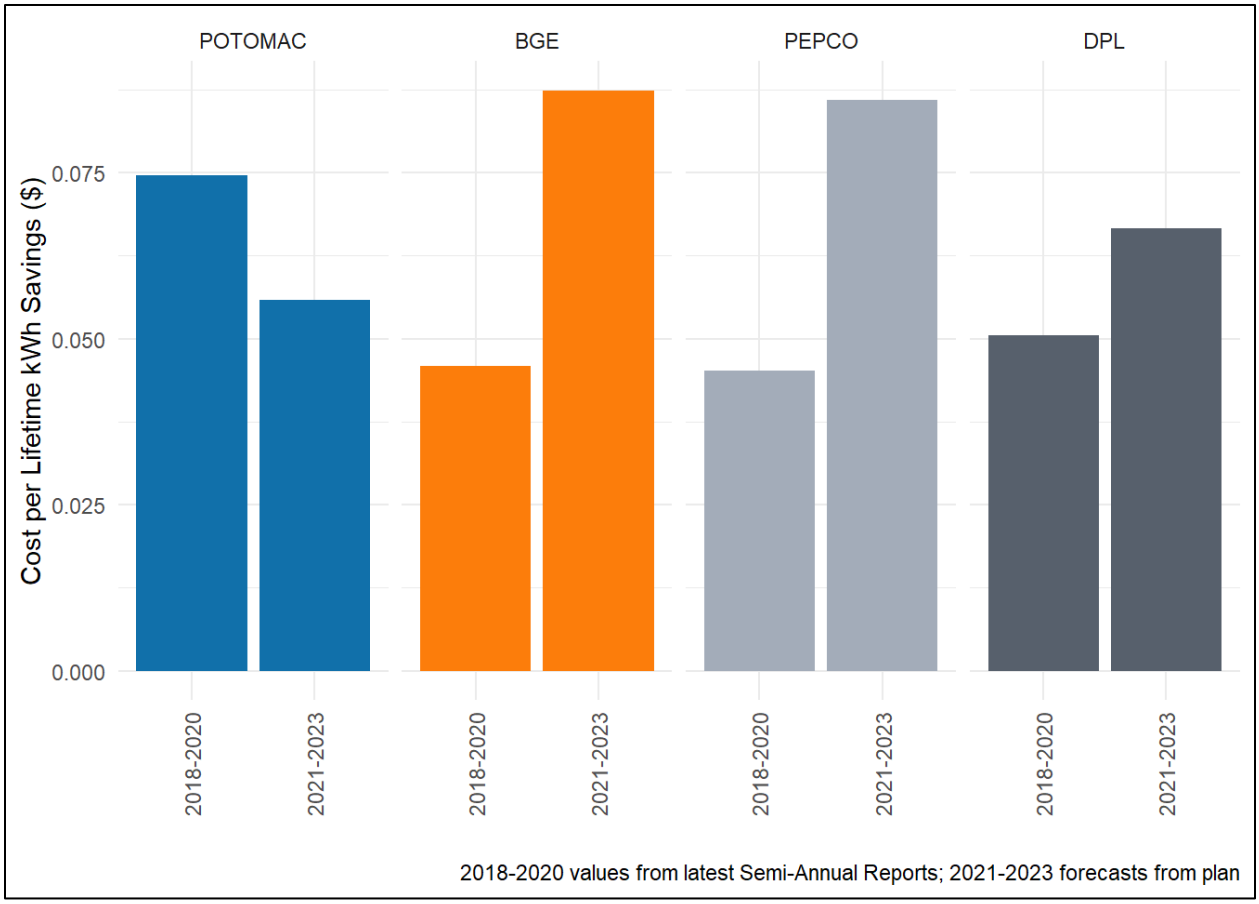

Figure 20: QHEC Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

HPwES

Four of the EmPOWER electric utilities plan to offer the HPwES subprogram in 2021-2023; SMECO is offering the HEIP instead and is reviewed separately, below. After a dip in savings in 2020 due to the Covid-19 program shutdown, all four utilities plan to deliver annualized HPwES savings in the 2021-2023 cycle in a similar range to the 2017-2019 period, significantly higher than 2020 but lower than the peak level of savings achieved in 2018. BGE, Pepco, and Delmarva are forecasting an increase in HPwES spending for the triennial period, while Potomac Edison plans to hold spending fairly steady. The figures below show the annualized energy savings and total program expenditures of the 2021-2023 plans compared to forecasted savings and expenditures in 2020 and reported results from 2017-2019.

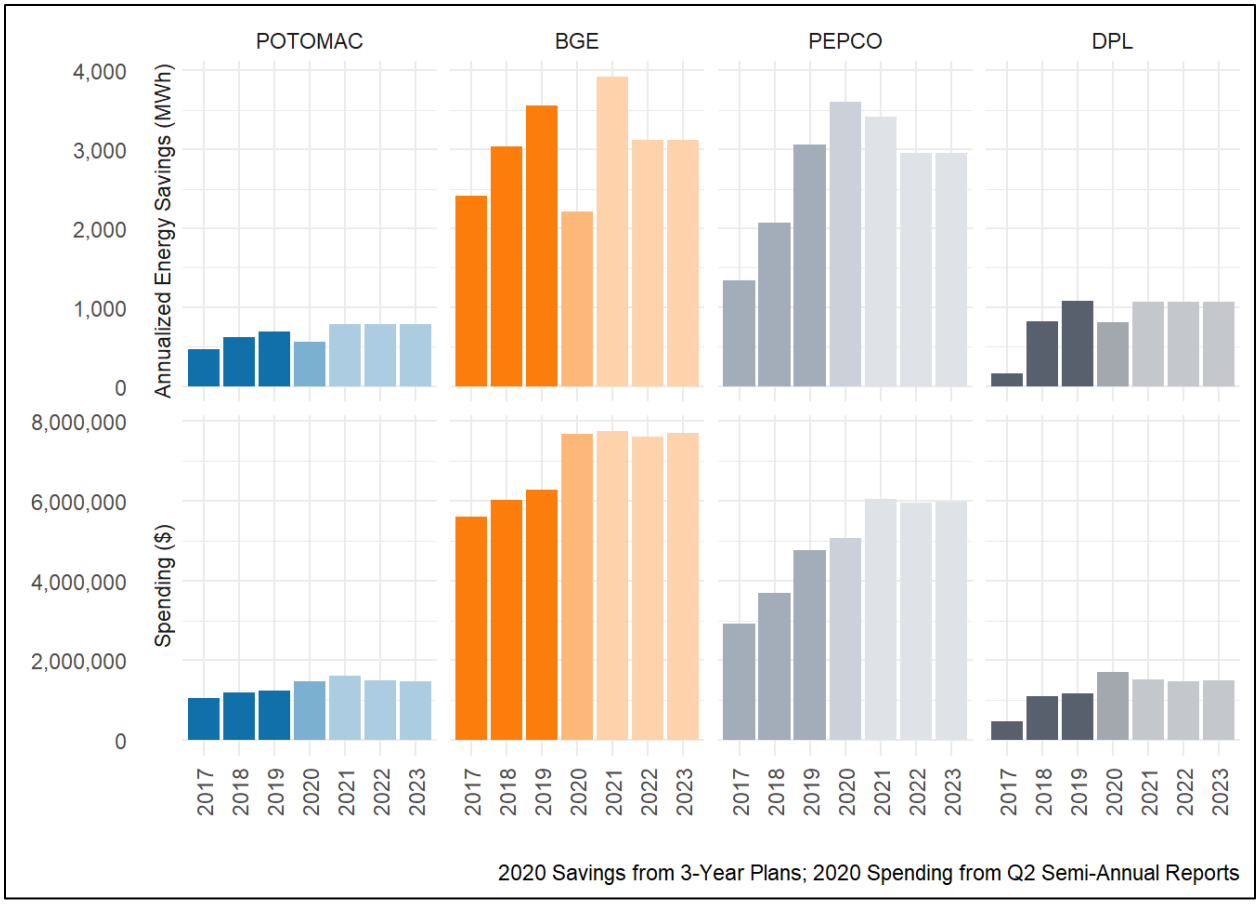

Figure 21: HPwES Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

BGE and Pepco expect to see the cost per lifetime savings of their HPwES programs increase significantly in 2021-2023 compared to reported costs in 2018-2020, while Delmarva and Potomac Edison plan to hold costs fairly steady. The increase in costs per lifetime kWh for BGE and Pepco is surprising, as we would have expected the performance-based incentives (PBI) introduced during the 2018-2020 cycle to drive deeper savings per unit of spending.

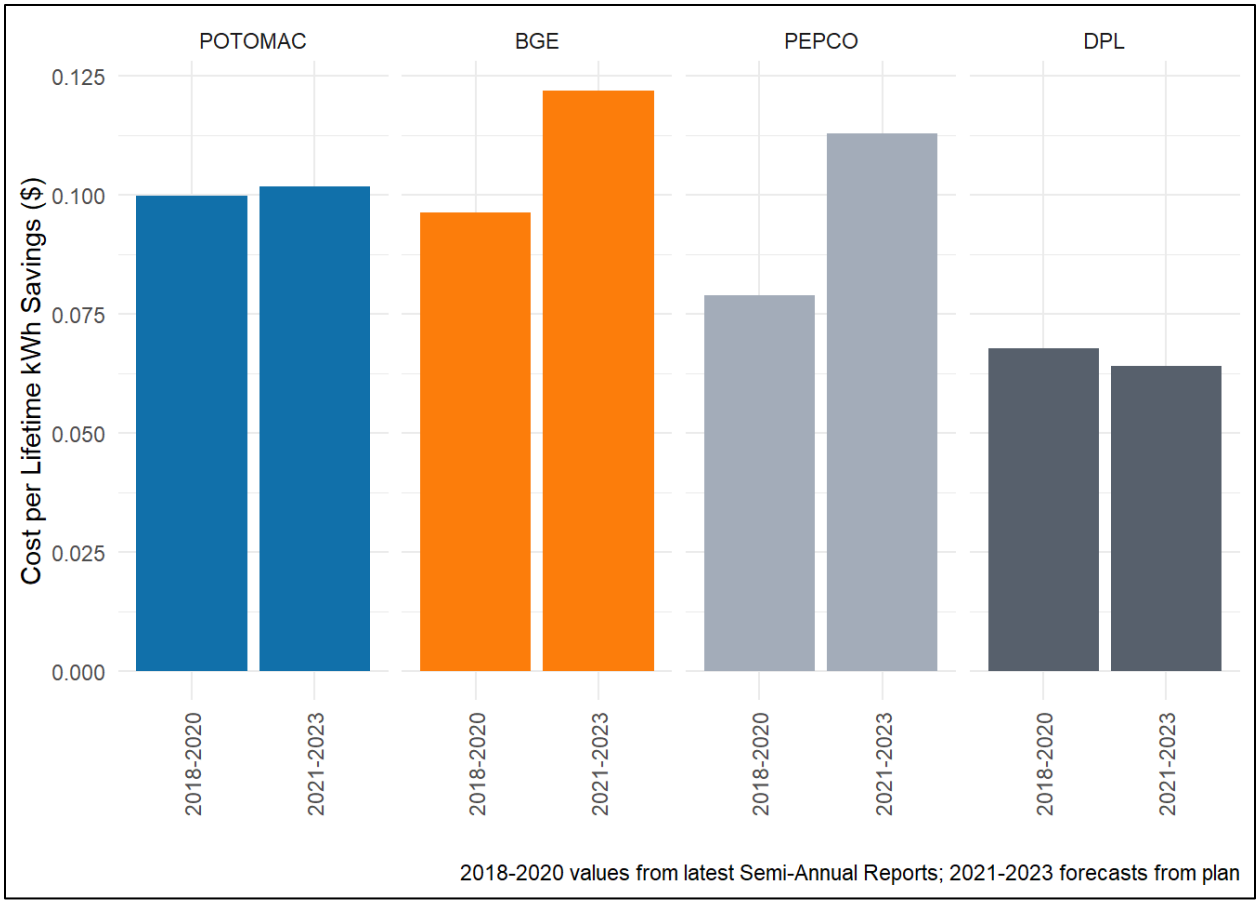

Figure 22: HPwES Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

HEIP

SMECO plans to increase both HEIP savings and spending during the 2021-2023 cycle. Notably, unlike the other four utilities, SMECO was able to increase savings in 2020 despite the impact of the Covid-19 program shutdown. The figures below show the annualized energy savings and total program expenditures of the 2021-2023 plan compared to forecasted savings and expenditures in 2020 and reported results from 2018-2019 (the HEIP program begin in 2018).

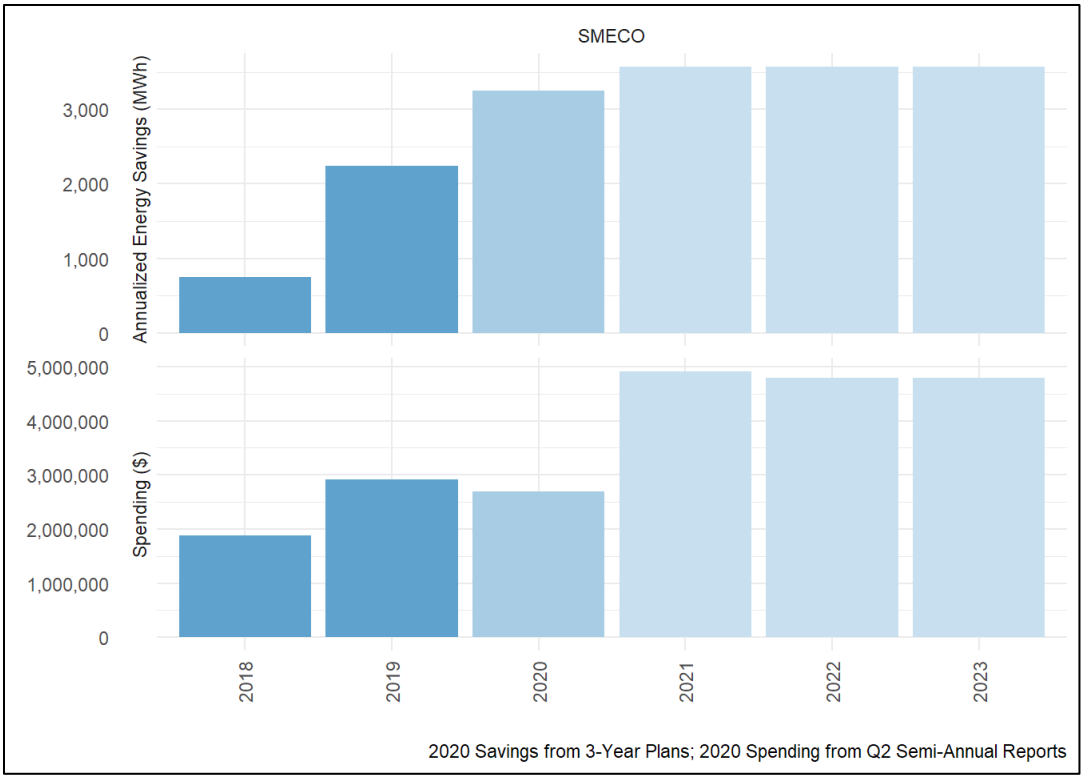

Figure 23: HEIP Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

SMECO plans to slightly increase the cost per lifetime savings for HEIP in 2021-2023 compared to reported costs in 2018-2020.

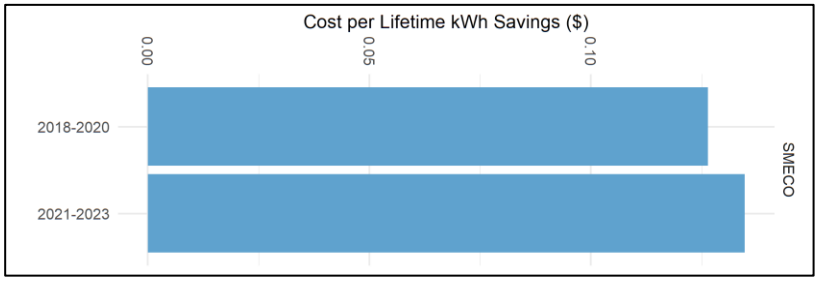

Figure 24: HEIP Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

CHANGES FROM CURRENT PROGRAMS

QHEC

While the QHEC subprogram has served thousands of customers already, significant potential remains. For example, BGE notes that its program has served approximately 17% of the 1 million BGE residential single-family customers to date.

Overall, the EmPOWER utilities are proposing relatively minor changes to the QHEC offering during the 2021-2023 cycle. They will continue offering no-cost measure installation of in both

single-family and multifamily homes. BGE notes that its focus will shift away from the multifamily market since many customers have already been served. On the other hand, Potomac Edison plans to expand its QHEC offering to multifamily, after previously focusing on single-family homes. BGE also plans to shift focus towards underserved customers, but does not provide detail on these plans or describe how underserved customers will be targeted.

The EmPOWER utilities plan to offer the same suite of core measures for direct installation: LEDs, faucet aerators, low-flow showerheads, pipe insulation, and advanced power strips. In addition, several utilities are increasing emphasis on smart thermostats through the QHEC channel. However, the plans are not entirely clear or consistent in terms of whether smart thermostats will be directly installed by QHEC contractors or whether the utility will cover the full cost of the measure. For example, BGE plans to pilot direct installation of smart thermostats through QHEC contractors, while Pepco and Delmarva plan to offer smart thermostats, but it isn't clear whether they will be directly installed or self-installed with access to a rebate. In addition, BGE is the only utility that plans to explore delivering new measures, such as smart dryer controls and home energy monitors, through the QHEC channel.

Several utilities offered virtual QHECs during the program shut-down due to the Covid-19 pandemic in spring 2020. Pepco and Delmarva noted that they plan to continue this offering, while Potomac Edison plans to start offering an on-line audit as an entry-level option for customers. BGE and SMECO do not mention virtual QHEC offerings, although BGE elsewhere discusses "using analytics to provide a "Virtual Energy Diagnostic"—whereby customers' thermostat data is analyzed to identify possible inefficiencies in the home" (pg. 72). BGE, Pepco, and Delmarva also noted that they will consider offering "return QHEC services dependent on qualifying factors such as time since initial visit, awareness of new measure offerings, and smart thermostat virtual audit results" (BGE plan, pg. 53).

VEIC has long emphasized the importance of using QHEC to identify customers who are strong candidates for other EmPOWER offerings, such as appliance and HVAC upgrades and HPwES. The overhead cost of having a contractor make any in-person visit to a home is significant, yet there are few more powerful communication channels than face-to-face with a professional. Maximizing that opportunity is therefore critical. BGE plans to send recommended next steps to customers directly from its QHEC mobile tool, while Pepco and Delmarva plan to offer HVAC Tune-Ups at the same time as QHEC appointments. These utilities also plan to cross-promote QHEC to appliance rebate and recycling customers.

With the residential lighting market rapidly transitioning to LEDs, the EmPOWER utilities also plan to update their savings methodology for LEDs installed during QHEC site visits. They plan to document the bulb type and wattage of the bulb being removed and use the actual bulb as the baseline for calculating savings.

HPwES

With the exception of SMECO, the EmPOWER utilities plan to continue the HPwES offering with very few changes. During the 2018-2020 cycle, the utilities transitioned to a performance-based incentive (PBI) model, which has proven successful at driving deeper energy savings. According to Pepco, "as a result of using the PBI framework, the HPwES Program has seen an 89% increase in energy savings per job and an 53% increase in customer incentives per job from the start of the cycle heading into 2020. By the end of 2019, the program saw a 42% increase in total number of jobs compared to 2017 when the PBI was not in place, illustrating the positive impact this enhancement has had on the program" (Pepco 2021-2023 Plan, pg. 34).

In Order No. 88964, the Commission approved WGL's proposed Residential Natural Gas-Electric Coordinated Program, which consisted of a two-phase approach for coordination of the HPwES and QHEC programs with Pepco, BGE, and Potomac Edison and the HEIP with SMECO. Phase II of the Coordinated Program took effect in 2020, adding gas-saving measures to the PBI framework through the lead utility. The Phase II proposal also included a change to the PBI structure of $1 to $3 per lifetime per MMBtu natural gas savings to a measure-specific incentive of $3 to $6 per lifetime MMBtu. This change was intended to increase natural gas incentives to a higher level than WGL's prescriptive incentives for gas space and water heating equipment, while also bringing the gas incentives closer to fuel neutrality.[39] Previously the Electric and Natural Gas Coordination Work Group had noted: "In an effort to be responsive to the Commission directive for the Work Group to propose a fuel neutral incentive structure, the Work Group notes that the Commission could implement the incentive structure based on the EPA's source-site fuel ratios, which would be as follows:

- $12 to $20 per lifetime electric MMBtu
- $4 to $7 per lifetime natural gas MMBtu"[40]

Based on these Work Group filings, VEIC had understood that PBI incentives in the HPwES program would continue at the level of $12-20 per lifetime electric MMBtu, and $3-6 per lifetime natural gas MMBtu during the 2021-2023 cycle. Most of the utilities' three-year plans did not include planned HPwES incentives on a per MMBtu basis. However, BGE's plan says that "the HPwES Program will institute a flexible range of incentives spanning from $12 to $20 per lifetime electric MMBtu, and $1 to $3 per lifetime natural gas MMBtu." If other utilities also plan to offer HPwES incentives of $1-3 rather than $3-6 per lifetime natural gas MMBtu, it would appear that the incentives do not align with a fuel-neutral approach or with the Phase II Coordinated Program.

[39] Home Performance with Energy Star Performance Based Incentive, Electric and Natural Gas Coordination Work Group, October 1, 2019.
[40] Fuel Neutral Incentive Structure, Electric and Natural Gas Coordination Work Group, April 1, 2019

BGE notes that its HPwES messaging will include available financing to generate customer awareness and education, but does not provide details on financing options. BGE, Pepco, and Delmarva also mentioned program enhancements to better serve low and moderate-income (LMI) customers. BGE will "explore opportunities to enhance the program awareness of limited income customers through targeted access to Energy Coach services and/or financial assistance" (pg. 15), and these three utilities also noted plans to offer enhanced HPwES incentives for LMI customers. However, the plans did not provide details on potential incentive offers or discuss how LMI customers would be identified and targeted in coordination with DHCD.

HEIP

During the 2018-2020 cycle, SMECO consolidated the QHEC and HPwES offerings into a single Home Energy Improvement Program (HEIP). According to the utility, "due to SMECO's unique service territory, the HPwES program proved to be expensive to operate and did not result in significant energy savings. With the introduction of the HEIP program, members were able to get a more substantial audit, direct install measures, and guidance through completing a whole house job all in a 'one-stop shop'" (SMECO 2021-2023 Plan, pg. 39). HEIP had a slow start during the 2018-2020 cycle, but SMECO reported a strong first quarter of 2020, with the number of completed retrofits increasing 53%.

SMECO plans to continue HEIP as a subprogram within the Home Retrofit program during the 2021-2023 cycle, and will offer an HVAC tune-up in addition to the energy audit and retrofit offerings. For the 2021-2023 cycle, HEIP will consist of three components:

- Home Energy Analysis: Home energy audit based on visual inspection and diagnostic testing, which includes a prioritized list of recommendations with pre-negotiated pricing, potential safety corrections necessary to complete shell measures (e.g. bath fan venting), and low or no-cost, direct installation of base load measures.
- HVAC Services: HVAC tune-up and/or installation of program-approved smart thermostat direct install measure by SMECO HVAC subcontractor.
- Home Energy Retrofit Project: Third-party subcontractors managed by SMECO complete installations based on Home Energy Analysis recommendations.

Interestingly, SMECO's response to an OPC data request indicates that the utility is using HVAC tune-ups to drive participation in other measures, such as smart thermostats and the Home Energy Analysis. This indicates that SMECO's HEIP offers two entry points for customers: Home Energy Analysis or direct to HVAC services.

SMECO plans to enhance the HEIP offering by delivering a report at the time of the Home Energy Analysis. Providing the incentive and work scope information immediately after the home analysis,

rather than via email a week later, should increase conversion rates and customer satisfaction. SMECO also plans to explore a renovations and remodel portion offering that would create a participation pathway for customers who make improvements on their own, rather than working with one of the program-approved contractors.

ANALYSIS & BEST PRACTICES

As previously noted, the EmPOWER utilities are proposing a variety of different programs and subprograms to serve the residential retrofit market during the 2021-2023 cycle. The figure below offers a comparison of spending, savings, and participants across utilities. HVAC and HPwES offer the highest savings per participant, but the largest share of total savings comes from lighter-tough offerings: QHEC for BGE, Pepco, and Delmarva and Energy Efficiency Kits for SMECO and Potomac Edison.

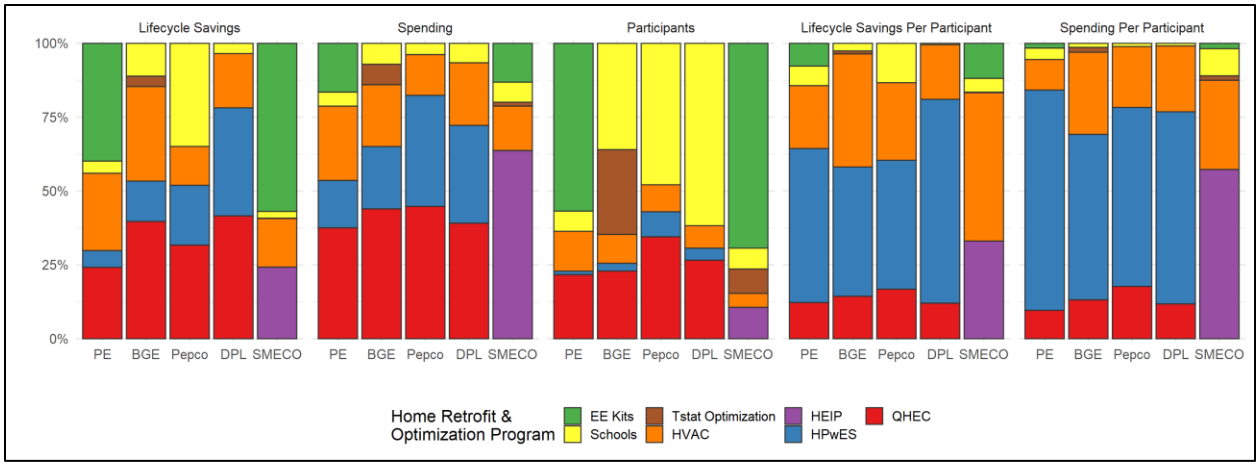

Figure 25: Comparisons of Residential Retrofit and Optimization Programs & Subprograms, 2021-2023 Forecast

We continue to believe that the HEIP model is worth considering in other utility service territories, beyond SMECO. Past feedback from Maryland contractors indicated customers may be confused by the difference between the free QHEC visit and the $100 HPwES energy audit. This concern is exacerbated by the fact that some EmPOWER utilities seem to be offering direct installation of smart thermostats at no cost to the customer during the QHEC visit, while smart thermostats are not consistently offered at no cost through the HPwES program. For example, BGE plans to offer a no-cost smart thermostat through QHEC while HPwES customers are eligible for a $100 rebate. The HEIP design alleviates that issue by offering a streamlined, no-cost audit to single-family homeowners as a single entry point to other home retrofit and HVAC offerings.

During the 2018-2020 cycle, the EmPOWER utilities made important progress aligning HPwES incentives with best practices through the PBI model. With the PBI model encouraging more comprehensive projects, which are more expensive - the average cost of a HPwES job has risen from around $4,000 to the $6,000-7,000 range. This increases the importance of offering

customers financing options to overcome first cost barriers. VEIC continues to identify the lack of an easy-to-access, integrated financing option as the most significant gap in the HPwES program design. Filling this gap would align the EmPOWER HPwES offering with best practices and increase program participation and savings.

Through the Better Buildings Neighborhood Program (BBNP), the U.S. Department of Energy (DOE) invested more than $100 million to support home energy efficiency upgrades from 2010-2013. Program partners tested a variety of financing approaches and program designs to identify the most successful approaches. The BBNP data show that the use of financing for home energy upgrades resulted in:

1. higher average project costs and more comprehensive home upgrades
2. higher average estimated energy savings per home
3. consumer investment by a wide range of income levels, including homeowners with median household incomes of $75,000 or less.[41]

DOE also identified the following best practices for residential energy efficiency financing based on BBNP program experience:

- The most successful BBNP financing programs offered interest rates and loan terms that were favorable to or below market interest rates.
- Credit enhancements allowed programs to offer more flexible underwriting criteria, reduced interest rates, and the ability to offer unsecured loans – all of which enabled faster loan approvals.
- Attributes of programs with high loan volumes included fast loan approvals, competitive interest rates along with rebates, and effective integration of the loan product with program marketing, contractors and outreach.
- Programs that struggled with generating demand for loans typically had loan application processes with longer approval timeframes, higher interest rates, or complex loan eligibility requirements (e.g., cost-effectiveness criteria limiting eligible measures).
- Integration of financing with utility-sponsored energy efficiency programs, such as the MASS Save Heat Loan,[42] offered multiple benefits, including reduced program costs and greater convenience for the homeowner and contractor.
- Integration with contractors was important to program success, with contractors preferring to receive payment directly from the lender.[43]

[41] Dunn, Stephen and Rebecca Ciraulo, Residential Energy Efficiency Financing: Insights and Lessons Learned from the Better Buildings Neighborhood Program, ACEEE Summer Study on Energy Efficiency in Buildings: 2014. https://www.aceee.org/files/proceedings/2014/data/papers/2-114.pdf
[42] Mass Save® HEAT Loan, https://www.masssave.com/en/saving/residential-rebates/heat-loan-program/
[43] Dunn, Stephen and Rebecca Ciraulo, Residential Energy Efficiency Financing: Insights and Lessons Learned from the Better Buildings Neighborhood Program, ACEEE Summer Study on Energy Efficiency in Buildings: 2014. https://www.aceee.org/files/proceedings/2014/data/papers/2-114.pdf

PROGRAM RECOMMENDATIONS

Review the various utility proposals for Home Retrofit programs and subprograms and direct the utilities to align them consistently to the extent feasible.

BGE proposes distinct programs for QHEC, HPwES, Residential HVAC, and Smart Thermostats and Optimization, while the other four electric utilities plan to bundle these as subprograms under a "Home Retrofit" umbrella program. Pepco, Delmarva, and Potomac Edison also plan to offer school and energy efficiency kits under the Home Retrofit program.

Direct EmPOWER utilities to implement all low and no-cost strategies to increase the use of financing and employ pilots that expand access to financing.

The lack of an easy-to-access, integrated financing option is the most significant gap in the EmPOWER HPwES program design. Filling this gap would align with best practices and increase program participation and savings. The Commission should consider the options discussed in the Financing Work Group report as well as recommendations earlier in this report. While progress is made toward more robust financing options, such as inclusive financing (i.e. tariff-based financing), the Commission should direct the EmPOWER utilities to take immediate low and no-cost steps to integrate existing financing offerings into Home Retrofit program marketing and delivery.

Direct all EmPOWER utilities to offer HPwES incentives of $3-6 per lifetime natural gas MMBtu, consistent with the Phase II Coordinated Program.

Based on WGL's Phase II Coordinated Program plan, along with the definition of fuel neutrality proposed by the Electric and Natural Gas Coordination Work Group in 2019, VEIC believes that PBI incentives in the HPwES program should be at the level of $12-20 per lifetime electric MMBtu and $3-6 per lifetime natural gas MMBtu during the 2021-2023 cycle. The Commission should direct all EmPOWER utilities to offer incentives in this previously approved range.

The HPwES Work Group should convene to review the various QHEC, HPwES, and HEIP offerings, with the goal of identifying the most successful practices, determining changes needed to position the Home Retrofit offering for future success, and aligning each utility's programs with a consistent, best-practice approach.

The EmPOWER utilities' 2021-2023 plans include widely varying approaches to QHEC and HPwES home energy audits. Some utilities appear to be offering smart thermostats for direct installation, while others do not. Some utilities are offering virtual assessments or virtual QHECs, while others do not. SMECO now offers a single point of entry into its Home Retrofit program through a Home Energy Analysis visit, while the other utilities plan to continue offering both a free QHEC visit and a $100 HPwES energy audit, despite the potential for customer confusion. All the utilities plan to

continue relying on LEDs as the core direct installation measure, despite the rapid transformation of the residential lighting market.

SMECO's HEIP has particular promise. In addition to the streamlined customer entry process that HEIP offers, SMECO is the only utility planning to increase home audit and retrofit savings (through HEIP) during the 2021-2023 cycle. The other utilities generally plan to increase spending while holding savings for QHEC and HPwES fairly flat.

We recommend that the HPwES Work Group convene to clarify and compare the utilities' current offerings, identify the most successful practices, and determine what changes are needed to position the offering for future success. At a minimum, the Work Group should:

- Explore options to position the QHEC offering for success when it is no longer viable to directly install lighting measures, including transitioning to a fully virtual offering and reorienting the site visit around installation of a smart thermostat.
- Review SMECO's experience with the HEIP offering and consider whether other utilities should adopt this approach.

Utilities should provide additional details on their plans to offer enhanced HPwES incentives for LMI customers.

BGE, Pepco, and Delmarva plan to offer program enhancements targeted to LMI customers, including Energy Coach incentives (BGE) and/or higher incentives. These utilities should provide details on potential incentive offers and discuss how LMI customers would be identified and targeted in coordination with DHCD. SMECO and Potomac Edison should clarify whether they also plan to offer enhanced incentives for LMI customers.

Heating, Ventilation, and Air Conditioning (HVAC)

The 2018-2020 performance cycle was a period of transition for the HVAC programs of the EmPOWER utilities. The utilities switched from a downstream delivery model relying on rebate forms to a predominantly midstream model that offered incentives through the supply channel. The midstream model has proven a powerful strategy for HVAC in other states. Yet by the end of last reporting period (Q1-Q2 2020), the utilities had achieved only about 50% of HVAC cycle-to-date saving forecasts. While some of this shortfall can be attributed to factors outside of the utilities' control (the COVID-19 slowdown, a decrease in allowable savings from ECM fans, etc.), the utilities have the opportunity to make program changes to achieve improved results.

OVERVIEW OF UTILITY THREE-YEAR HVAC PLANS

Proposed Savings, Participation, and Spending

Figure 26 shows HVAC program annualized savings and spending by utility. While the forecasted savings in the upcoming 2021-2023 performance period are higher on average than what the utilities achieved during the previous performance period, it is important to consider what was initially forecasted for the previous period. To-date in the 2018-2020 cycle, actual savings have been about half of the original forecasts. Forecasted savings in 2021-2023 are 35% lower than the original 2018-2020 forecast. Presumeably, the utilities reduced the HVAC forecast in response to lower than expected results of the midstream program, but no reason was stated.

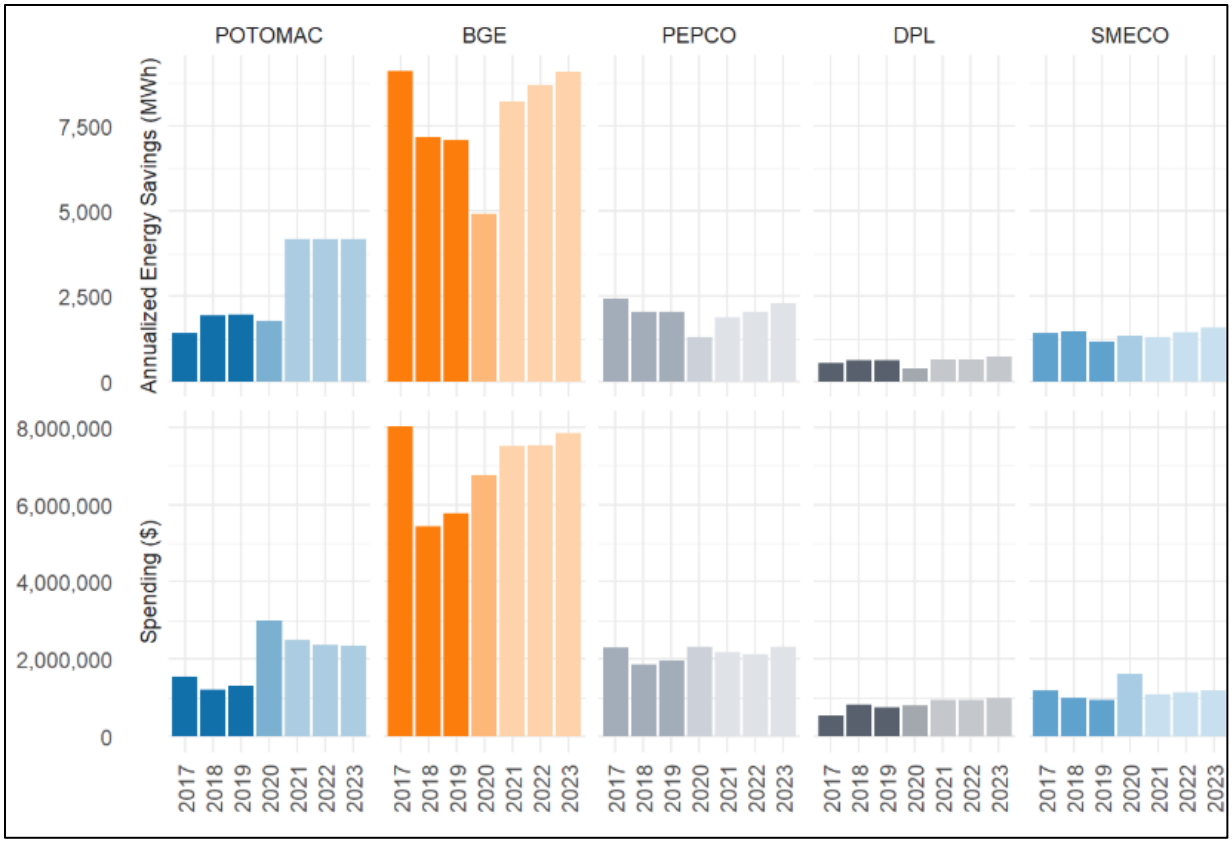

Figure 26: HVAC Rebate Savings and Spending, Reported (2018-2019), Projected (2020), and Forecast (2021-2023)

Considering the size of the HVAC savings shortfall as of the end of last reporting period, the utilities should remain focused on achieving increased results through midstream delivery for this important class of efficient products. While HVAC programs make up a small portion of the utilities' total planned savings these measures remain important because of long equipment lives, contribution to peak loads, and as an opportunity to engage residential customers in other offerings.

Cost of savings is estimated to be roughly the same in the 2021-2023 period as compared to the 2018-2020 period, with all utilities except Potomac Edison showing a slight increase in costs over time, as seen in Figure 27 below.

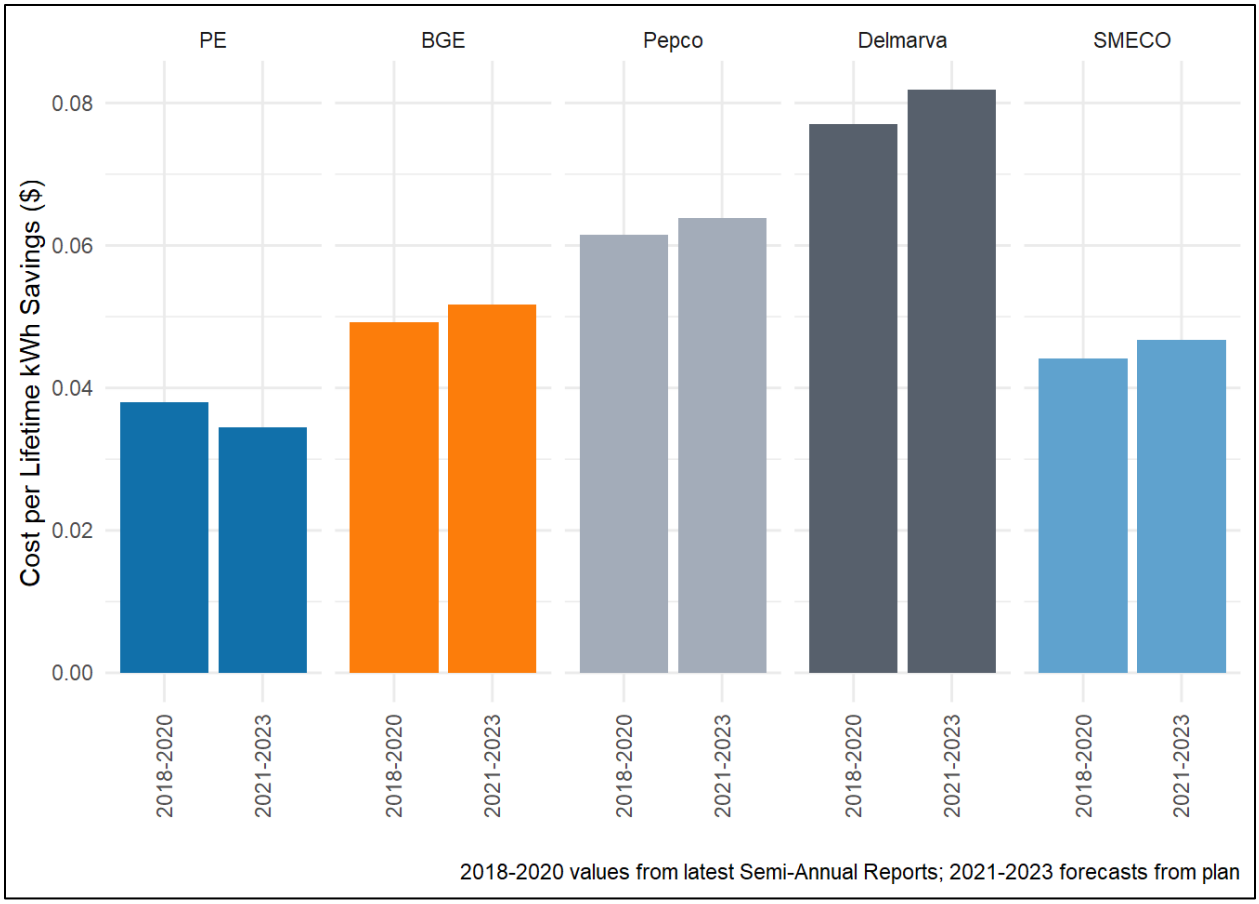

Figure 27: HVAC Rebate Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Changes from Current Programs

The proposed HVAC programs plans for the 2021-2023 cycle are largely consistent with the plans from the previous 2018-2020 cycle. We applaud the utilities for again continuing to coordinate most HVAC incentive tiers and levels for existing measures, including customer rebates ranging from $300 to $650 for ENERGY STAR ductless mini-split heat pumps, air source heat pumps, and central air conditioning and $1500 for geothermal heat pumps. The utilities' plans also express a common intention to continue utilizing a midstream delivery model largely unchanged from the current period. This also includes Washington Gas which did not have a midstream program but has announced a one-year research project toward possibly launching a midstream program by the second year of the period. Examples of minor additions include Potomac Edison's offer of Ductless Mini-Splits A/C and High Efficiency Bathroom Fans, which we welcome as an incremental expansion to current offerings.

The most notable program change of the 2021-2023 plans is the addition of an HVAC tune-up program. All of the utilities include plans to launch an HVAC tune-up program next year, citing customer engagement and savings opportunities, and pointing to SMECO's recent addition of an HVAC tune-up offering within its HEIP program. Washington Gas intends to offer HVAC tune-ups

as part of its Existing Homes program. WGL states the purpose of this addition is engage customers and to "focus on improving existing system performance instead of equipment replacement" (p. 8) and "extend the life of existing equipment" (p. 25). It is unclear how or whether extending the life of existing equipment as an alternative to system replacement offers energy savings; indeed the opposite may be true. Further, some utilities have offered HVAC tune-ups in the past and discontinued the effort. The utilities did not explain what has changed to justify this approach now.

ANALYSIS & BEST PRACTICES

Considering the shortfall in HVAC midstream savings results during the 2018-2020 cycle, it is important that utilities are willing to make program design adjustments and changes to deliver improved results both for serving customers and delivering on improved savings goals. Below are management practices we encourage utilities to consider.

Report Common Performance Metrics and Targets

The Midstream Status reports presented twice annually the past two years provide invaluable information for understanding midstream program performance. To our knowledge, the Midstream Status report was not provided by the utilities in the most recent reporting period. Without knowledge of specific aspects and metrics of performance, evaluators, regulators and stakeholders are unable to assess whether interim efforts towards a strategy are achieving program objectives. Once the status report is provided again, a common set of reporting metrics should be used by all utilities.

For example, one area of the midstream program which could be more effectively managed if common performance metrics were applied across utilities is the tracking of supply channel participation. If all the utilities reported on common aspects of supply channel participation, such as the number of participating distributor branches participating in the program relative to the total number of distributor branches in a utility program territory, then evaluators could provide a much more meaningful comparison and understanding of program performance.

Deepen Supply Channel Engagement and Support

We commend the utilities on the progress reported in the most recent Midstream Status report in October 2019. The utilities reported engaging and supporting the supply channel through a variety of efforts as shown in Table 10. All of the utilities reported some form of regular in-store meetings with distributors. Most utilities provided training for branch personnel and organized in-store promotion events, and also called on manufacturers to provide contract training in some cases.

However, there is little discussion of supply channel engagement and support in the 3-year plans; instead, in some cases, there is extensive descriptions of customer-oriented marketing strategies. While customer marketing about the benefits of efficient HVAC equipment can play a positive role, it should not be the focus of a midstream program. We believe the utilities will have greater success by focusing on the assets of a midstream approach, namely working to support and influence distributors whose behavior can have a more powerful impact on contractors and customers than advertising and other marketing.

We recommend that all utilities continue to employ these best practices as a part of broadening their support of the supply channel, especially during this period of increased economic need resulting from the COVID-19 pandemic. These practices include seeking feedback from the supply channel to identify the support they view as the most valuable. For example, Pepco reported that distributors have expressed the desire for additional marketing and communication materials for promoting program offerings.

Table 10: Supply Channel Support and Engagement Opportunities as Reported in Midstream Status Report, October 15, 2019.

Utility	Monthly in-store distributor training events	Regular distributor meetings to review budget, spend, pipeline, feedback	Review of distributor's quarterly performance scorecard	Contractor lunch-and-learn training events
Potomac Edison*				
BGE	✓			✓
Pepco	✓			✓
Delmarva	✓			✓
SMECO		✓	✓	

* Data for Potomac Edison was not provided in this report.

Consider Redesigning Midstream Incentives to Maximize Impact

In order to reach savings nearly twice the amount most recently achieved, the utilities may need to consider approaches they have not attempted previously. One approach we have recommended in the past, which has been used successfully in other jurisdictions, such as Efficiency Vermont, is to leverage the impact of the midstream incentive for the consumer.

While utilities make payments only to distributors in a midstream program, the impact of these incentive payments can be strengthened when the payments are passed on through the supply channel, eventually to the consumer. In their Q3-Q4 2019 reports, all utilities reported that at least 80% of incentive payments to distributors were passed to contractors. SMECO further reported that 95% of the incentive was passed on to the end-user, which is how incentives can be used to reduce the cost of the equipment for the consumer.

By defining a specific incentive amount to pass through to the end-user, the utility can create the greatest program impact by (a) increasing consumer demand through the incentive, (b) allowing a specific incentive amount to be promoted, enabling a more effective marketing campaign, (c) reducing cost and risk to distributors who would otherwise have to spend time determining how much incentive to pass through, and (d) allowing the distributors to receive a fixed, predictable administrative fee determined by the program for administering the incentive.

Articulate the Value of the HVAC Tune-up Program

With regard to the HVAC Tune-up program, significant questions arise. Relative to the benefits provided by the HVAC midstream program (1.26 in the Societal Cost Test, BGE), the HVAC tune-up program offers only a fraction of the savings (SCT 0.14). The main rationale the utilities give for launching the HVAC tune-up program is that the program would provide a "meaningful touch point with the end-use customer." In contrast, the utilities state that midstream programs make customer outreach and engagement more challenging. While by design, a midstream delivery model does not require the utility to engage with the customer directly in order to deliver incentives (a feature, not a bug), customer engagement can occur in other ways. For example, customers can also be engaged to explore efficiency opportunities through installation contractors, which can be made more effective through contractor training, offering end-user context to share, and by building up a network of contractors dedicated to energy efficiency.

Given that there are opportunities to engage customers through a midstream program, as well as other programs such as QHEC, it is not clear what makes launching the HVAC Tune-up program so compelling to utilities, particularly as this approach has been tried and discontinued in the past. If the utilities expect the HVAC tune-up program to drive increased customer engagement and participation in other measures, then the utilities should also measure this outcome both for quantifying its effectiveness and supporting informed resource allocation decisions.

In addition, the utilities are also planning to introduce a comparatively large incentive of up to $200 per tune-up, when nationally $25 to $50 per tune-up is more common. Contractor visits to a home are expensive for efficiency programs, requiring careful attention to value. Introducing the HVAC Tune-up program does not seem to address the larger need for HVAC program improvements, and may not be the best solution to the challenge of customer engagement.

HVAC PROGRAM RECOMMENDATIONS

Ask the utilities to justify addition of the HVAC Tune-up offering, given the significant opportunity to achieve improved HVAC savings results through the midstream program.

Considering the recent introduction of the midstream delivery model, and that all utilities fell well short of HVAC savings targets in the last performance cycle, we believe the utilities would be better served to remain focused on completing the transition to a fully functional midstream

program. Not only does the HVAC midstream program offer much greater savings than the HVAC Tune-up offering, the midstream program also contributes to the support and development of the supply channel to continue offering efficient product services. Rather than diverting attention away from the midstream program at a time of critical program improvement, we suggest that the utilities revisit the HVAC tune-up concept at a later time. If the Commission allows the utilities to proceed with this program, savings estimates should be closely scrutinized. This should include assessing the extent to which tune-ups designed to extend the life of existing equipment in lieu of equipment upgrades result in or reduce energy savings.

The Midstream Work Group should develop a common set of metrics and performance targets for the midstream program, on which the utilities should report consistently.

In order to measure the performance of the midstream program, it is essential the utilities have a well-established, common set of performance metrics that are consistently reported over time. By assigning this task to the Midstream Working Group, the Commission will help the utilities work together to agree upon a common approach for defining and measuring program success. Benefits of monitoring a common set of indicators is that it allows the impacts of strategies to be assessed over time, while also focusing efforts on agreed upon set of goals.

Direct Washington Gas to report HVAC program savings and set corresponding HVAC program savings goals.

All utilities, except Washington Gas, report on the results achieved in HVAC program. Without this data, the utility and evaluators are unable to assess the utility's impact on the sector. Furthermore, now that Washington Gas has said that over the next year it will consider launching a midstream program, the utility needs to begin measuring HVAC program savings in order to have the capability in place to assess the impact of midstream program.

The Midstream Work Group should explore alternative approaches to midstream delivery to drive increased uptake, participation and savings.

By monitoring the midstream program performance metrics as recommended above, the utilities will have the ability to make targeted adjustments, design changes, and to assess the results. By working with trade ally associations, the Midstream Working Group should consider a more effective means of deploying incentives, e.g. pass-through requirements, that offers greater benefits to trade allies, end-use customers, and market uptake.

Utilities should consider program enhancements that align with other program areas and goals, such as limited-income and connected devices.

The utilities should consider include offering a low-income pilot program that would offer an additional downstream rebate to income-eligible customers. In addition, the utilities could

consider a connected HVAC devices pilot which would offer an enhanced downstream rebate for installing certain connected controls for eligible equipment, such as an air-source heat pumps.

Residential New Construction

Residential New Construction programs often contribute a relatively small portion of utility energy efficiency program portfolios, but the impacts are long-term and serve to transform the market. RNC programs create a 'new normal' within the construction trades and encourage home buyers to expect more. The Maryland EmPOWER utilities have been providing a successful RNC program for a number of years based on the national ENERGY STAR Certified Homes program. Maryland is a leader in ENERGY STAR market share for single family homes. In 2019 Maryland was second in the nation at 44% market share, five times the national average. During this past program cycle, the electric utilities coordinated with Washington Gas and in 2020 began offering a fully coordinated ENERGY STAR program to all electric and gas customers This strong program delivery, market engagement, and coordination has positioned the utilities to expand their offerings in the 2021-2023 program cycle.

OVERVIEW OF UTILITY THREE-YEAR NEW CONSTRUCTION PLANS

Proposed Savings, Participation, and Spending

With some slight variation across utilities, overall the EmPOWER electric utilities are forecasting fairly constant savings, participation and spending when compared with the last program cycle, including reported data for 2018-2019 and projected data for 2020. While not called out specifically for the RNC program, these conservative program forecasts may be related to uncertainly around the COVID-19 pandemic. Across all electric utilities, a 2% increase in lifetime savings is expected over the last program cycle, and a 4% decrease in participation. Potomac Edison, BGE and Pepco forecast an average 8% increase in savings, while DPL and SMECO forecast a 7% and 24% decrease respectively. Only Potomac Edison forecasts an increase in participation for the entire program cycle. Across the remaining four electric utilities, an average 11% decrease in participation is forecasted.

Figure 28 below illustrates data reported for 2017-2019, projected in 2020, and forecasted for 2021-2023. Given the new additive measures proposed, and potential new program tier offerings, it is surprising to see these trends. Figure 29 illustrates changes in the cost per kwh savings in the two program cycles. Another unexpected trend is the conservative increase, and decrease by some utilities. Across all utilities, a 4% increase in kWh/participant has been forecasted. This average includes a significant increase from BGE and Potomac Edison, and a decrease from DPL and SMECO. It would be helpful to better understand the utilities' forecasted participation in the proposed added measures and new tiers or pilots that are discussed in the remainder of this section. As stated above, these additional offerings should bring an increase in savings per participant across the board, as BGE and PEPCO are forecasting.

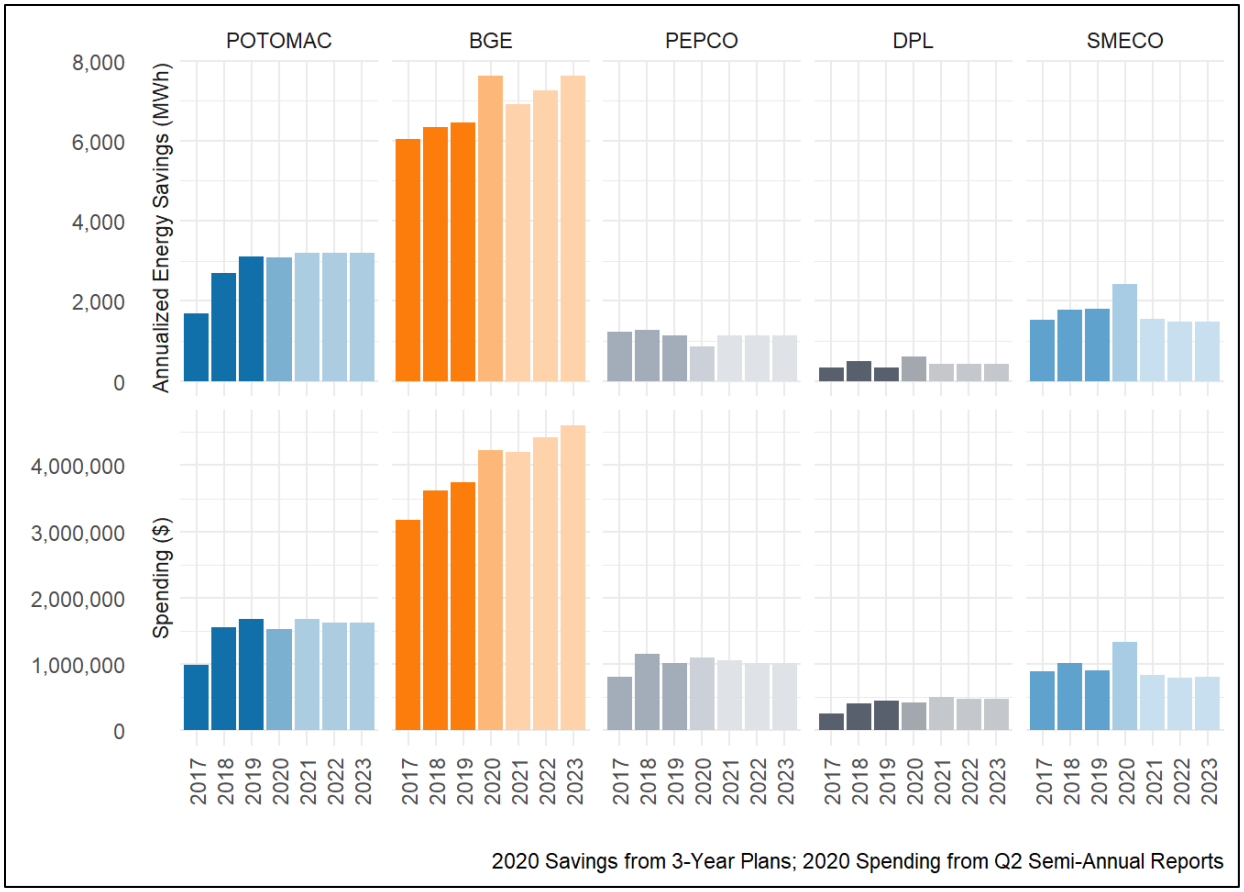

Figure 28: RNC Savings and Spending by Year as Reported (2017-2019), Projected (2020), and Forecast (2021-2023)

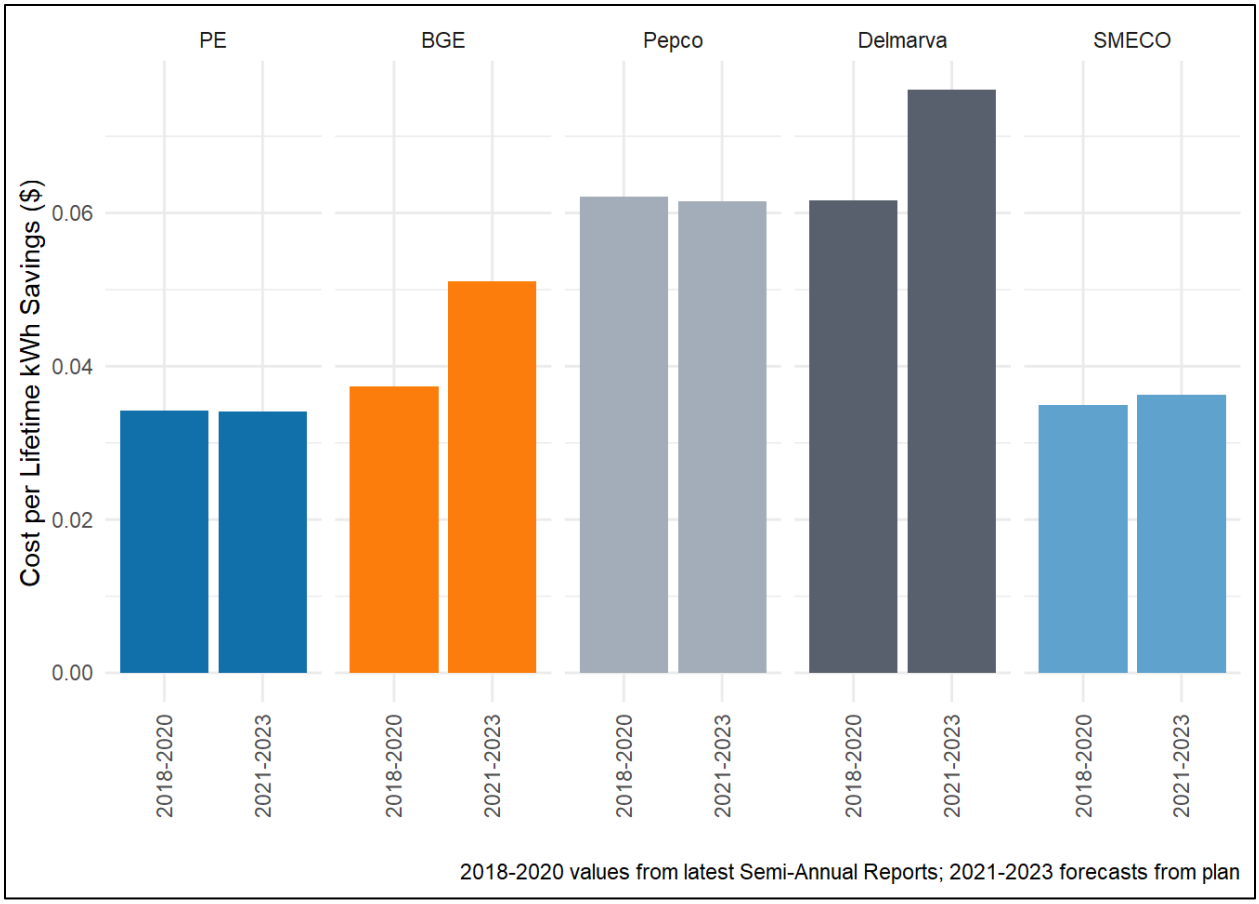

Figure 29: RNC Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Changes from Current Programs

The 2021-2023 brings a number of changes to the RNC program, including updated and new measure-specific offerings ("additive measures") as well as new program tiers. However, based on the individual utility filings there appears to be several opportunities for the utilities to remain coordinated in their offerings. The section below provides a high-level look at the existing and new offerings across all utilities. Individual differences in utility offerings will be described later in this section.

Whole Home Program Certification

- ENERGY STAR for New Homes v3.1 – single family
- ENERGY STAR for New Homes v3.1 – townhouse/duplex
- ENERGY STAR for New Homes v3.1 – two-on-two condo
- ENERGY STAR for New Homes v3.1 – multifamily low-rise
- ENERGY STAR for New Homes v3.1 – multifamily high-rise (*NEW, Potomac Edison only)
- 100% LED lighting requirements for all tiers (*NEW)
- Zero Energy Ready Home (*NEW, not all utilities)
- Passive House Certification (*NEW, not all utilities)

Additive Measures

- ENERGY STAR Smart Thermostat
- High Efficiency Air Conditioner (*NEW)
- High Efficiency Air Source Heat Pump (*NEW)
- Heat Pump Water Heater (*NEW)
- Electric Vehicle Charging pre-wire (*NEW, not all utilities)

The utilities have responded to feedback encouraging the offering of additional high performance while certification tiers, in addition to high performance prescriptive measures. These new offerings are anticipated to bring a higher level of savings and more opportunities for customer education and participation. However, in reviewing the individual utility filings, we note a number of discrepancies in relation the offerings. VEIC recommends the utilities coordinate on the items noted here to provide a consistent program with common offerings.

Areas Needing Coordination

ENERGY STAR for New Homes Certification:

- Only Potomac Edison has described expanding this offering to multifamily *high*-rise units.

Additive Measures:

- Utilities differ in Heat Pump Water Heater minimum efficiency requirement including varying minimum Energy Factor (EF) or specifying a minimum Uniform Energy Factor (UEF).
- Air Source Heat Pump: Potomac Edison and SMECO do not specify a minimum HSPF.
- Only Potomac Edison is not offering Electric Vehicle pre-wire.
- Among utilities offering Electric Vehicle pre-wire, only SMECO specifies 220V pre-wire required for more efficient Level 2 charging.

Certification Beyond ENERGY STAR:

All utilities discussed whole home certifications that require energy performance beyond ENERGY STAR, including Zero Energy Ready Homes (ZERH) and Passive House Institute US (PHIUS+). However, the offerings differed widely and were often not clearly defined in the filings.

- Potomac Edison states that the utilities intend to offer high performance tier certification for ZERH or PHIUS+ and list incentives.
- BGE's filing states the utilities are exploring the option of a ZERH certification tier and potential incentives, yet the tier is listed as an eligible measure with an incentive offering. Passive House certification is not mentioned but does appear in the statewide incentives

table. BGE has stated in response to data request the utility does not intend to offer incentives for PHIUS+ certification.

- Pepco and Delmarva – Both utilities state intention to offer a Zero Energy Ready Home proof of concept pilot but not committing to full program delivery. However, the statewide incentive table included their filings cites incentive values for a Coordinated High-Performance Tier for both Zero Energy Ready Homes (ZERH) and Passive House US (PHIUS+) certification.
- SMECO intends to pilot incentives for ZERH or Passive House certification in coordination with WG.
- WG states that the utility intends to offer a ZERH certification tier. Passive House is mentioned only in relation to Income-qualified program, where Net Zero, ZERH and Passive House are being considered.

Major Renovations and Additions:

- All electric utilities, except SMECO, mention adding incentive tiers for major renovations or additions however none specified the eligibility requirements or incentive offerings. Utilities should clarify eligibility requirements and incentive levels.

Reporting

While not addressed specifically in the 2021-2023 plans, VEIC urges the utilities to coordinate reporting efforts. With the addition of the smart thermostat measure in the 2018-2020 program cycle, some utilities report Smart Thermostats as Measures while other report it as Participants. The utilities are proposing many new additive measures in this next program cycle. It will be critical to have a common reporting methodology to capture the total number of measures, as well as the number of unique participants that installed additional measures (i.e. not all participants will have installed additive measures). This reporting occurs on the RNC mini-tab.

The tables below provide the eligibility requirements and incentive structure for whole home certification as well as the additive measures. Like the 2018-2020 program cycle, the incentive structure for ENERGY STAR Certified Homes remains based on housing type as an indicator of size and thus total energy savings achieved. New offerings are indicated with an asterisk.

Table 11. Whole Home Certification Eligibility and Incentive Structure

EmPOWER Maryland Whole Home Certification Program Eligibility and Incentive Structure 2021-2023		
Program Eligibility		**Incentive[(1)]**
ENERGY STAR Certified Homes v3.1 +100% LED lighting*	Single Family Homes	$1250
	Townhome/Duplex	$750
	Two-on-two Condo	$550

	Multifamily Low-Rise Unit[2]	$400
Zero Energy Ready*[3]	All homes	Up to $1000
PHIUS+*[3]	All homes	Up to $1500

[1] Where ENERGY STAR for New Homes is offered as a coordinated service with WGL, the incentive paid by each utility is half that noted in the table.
[2] Potomac Edison is extending the same incentive to multifamily high-rise units.
[3] Not offered consistency across utilities as noted in the narrative.

Table 12. Additive Measure Incentive Structure for EmPOWER Electric Utilities

EmPOWER Maryland Residential New Construction Program Electric Utility Additive Measure Incentive Structure 2021-2023					
Measure	**Potomac Edison**	**BGE**	**Pepco**	**Delmarva**	**SMECO**
Smart Thermostat	$100	$75	$100	$75	$100
Central Air Conditioner*	$300	$200	$400	$200	$300
Air Source Heat Pump*	$400	$350	$500	$400	$400
Heat Pump Water Heater*	$500	$500	$500	$500	$500
Electric Vehicle Pre-Wire*	n/a	$100	$100	$100	$100

Washington Gas

Washington Gas has stated in semi-annual report filings that the whole home ENERGY STAR offering has been successful. Only a small subset of builders have not participated and opted to participate in the prescriptive measure-based RNC program that was implemented prior to the coordinated efforts. Semi-annual reports also indicated an intention to discontinue the prescriptive program in the 2021-2023 program cycle, but this was not clear in the filed plan. It is not clear from the filing whether Washington Gas is intends to offer only a coordinated whole home RNC program, and high- performance gas measures that go beyond ENERGY STAR minimum requirements will only be available as additive measures or whether high efficiency gas measure incentives will be offered outside of a coordinated program.

Washington Gas has also expanded its offering of high efficiency gas measures. New measures for the 2021-2023 program cycle include combination ("combi") gas boilers and gas heat pumps.

Lastly, residential new construction programs tend to focus on the *building* rather than the *occupancy* of that building. In the 2018-2020 program cycle the utilities attempted to introduce a Concierge service. The stated goal of this service was to educate homeowners about the energy efficient features of their new home and provide training on best practices for operating and maintaining their home, as well as to seek additional savings opportunities. However, the service was ultimately ended due to lack of interest and difficulty marketing the program. The program was heavily focused on providing additional measures to already efficient homes.

ANALYSIS & BEST PRACTICES

Zero Energy and Zero Energy Ready Programs

As stated elsewhere in this section, Zero Energy and Zero Energy Ready program tiers are not a new offering for RNC programs. Some has been offered for as long as EmPOWER utilities have bene offering the ENERGY STAR program. ACEEE has recently published a topic brief on Zero Energy Building programs that highlight these local approaches to Zero Energy in addition to the national DOE ZERH program. It summarized the various approaches to ZE/ZER programs as well as incentive structures, estimated budgets and savings achieved. Table 13 below provides the incentive structure and additional notes related to the ZE/ZER programs offered by various programs from the topic brief. The brief reports that across the programs approximately 200 single-family homes and 900 apartments have been completed brining an estimated at 1.8 GWh and 5 billon Btu of fossil fuels in the last program year. On a per building basis, savings targets are at least 30%-40% over the local code.

Table 13. Incentives Structures for Residential ZE and ZER Utility Programs, from ACEEE[44]

Residential				
	Incentive			
Program	Single family	Townhouse	Multifamily	Additional incentives and notes
Efficiency Vermont high performance	$3,000	$3,000	$2,700	$1,000 for all electric
NYSERDA tier 3 (HERS ≤ 10) LMI	$4,200	$4,200	$3,100–3,500	Additional incentives in downstate zone with constrained natural gas supplies. For MF up to $10,000 for mentoring, $100/unit for smart controls
NYSERDA tier 3 (HERS ≤ 10) not LMI	$4,000	$4,000	$1,400–1,600	
Rhode Island Passive House	$1,500	$1,500	$750	
Energize Connecticut zero energy	$6,500	$4,600	$3,500	$250–750 for obtaining certification
Energize Connecticut HERS ≤ 40	$4,500	$3,500	$2,500	Additional incentives per HERS point <40
Energize Connecticut all-electric bonus	$2,500	$2,000	$1,000	
Commonwealth Edison all electric	$2,000	$2,000	$2,000	Only buildings with 4 units or less are eligible
Dominion Utah				Pay for performance up to $1,400; $50 DOE ZER
NJ Clean Energy zero-energy ready	$4,000	$2,500	$1,500	Plus $30/MMBtu; $1,200/home for rater
NJ Clean Energy zero-energy ready + RE	$6,000	$4,000	$2,250	$500 for LMI or located in an urban enterprise zone
Mass Save Passive House		$3,000	$3,000	Plus $0.75/kWh and $7.50/therm; also incentives for feasibility studies and modeling
Efficiency VT modular homes	$3,000			$5,500 more for low income; low-cost financing
Milford Homes, Delaware	$16,500			Low-cost financing

Given historic reticence of the Maryland utilities to offer DOE's ZERH program, citing cost barriers and lack of intertest, VEIC encourages the EmPOWER utilities to review this topic brief, engage the Program Administrators and collaborate to provide a ZE or ZER program offering.

Codes and Standards

Energy code adoptions tend to fall within the EmPOWER utility program cycle. During the 2018-2020 program cycle Maryland adopted the 2018 IECC. There were not substantial energy efficiency gains in the last code adoption, so the ENERGY STAR program requirements did not have to change. In anticipation of the new code, the electric utilities added a 90% LED lighting requirement prior to adoption of the new code. This prescriptive measure helped builders prepare for the new code, facilitated broader market acceptance for the new lighting requirement, and increased average home savings before the measure became code.

The 2021-2023 program cycle is also likely to see a new code adoption. The 2021 IECC is anticipated to be published by the end of 2020. Maryland's code update cycle follows the ICC triennial update cycle. If the state remains on this cycle, adoption of the 2021 IECC is expected in 2022. Industry stakeholders are expecting a 10% increase in energy efficiency over the 2018 IECC. The 2021 IECC will also include an optional Zero-Energy Buildings appendix for local adoption, provisions for electrification and electric vehicle readiness, increased lighting efficiencies and for the first time ever, water heating equipment efficiencies[45]. As if often the case with progressive

[44] ACEEE Topic Brief: Programs to Promote Zero-Energy New Homes and Buildings, September 2020. https://www.aceee.org/sites/default/files/pdfs/zeb_topic_brief_final_9-29-20.pdf

[45] https://www.nrdc.org/experts/lauren-urbanek/better-energy-code-holiday-gift-planet, https://newbuildings.org/code_policy/2021-iecc-base-codes/

model energy code proposals, many of the new energy efficiency gains in the 2021 IECC are being challenged[46].

The new model energy code, as well as the unfortunate opposition to it, provides an opportunity for the utilities to not only significantly enhance program offerings in preparation for the new code, but to also propose an attribution model to claim savings for supporting code development, adoption and enhanced compliance efforts. Utility RNC Program Administrators are uniquely positioned to educate and train not only the progressive builders wanting to go beyond the minimum, but also the majority of builders who will need help simply achieving minimum compliance. As noted in the market transformation section above, a number of code savings attribution models exist to learn from. Some have been in existence for several years and can provide lessons learned, others are in development and can provide opportunity for collaboration. An energy code savings attribution mechanism can take many years to set up - from initial research to planning and design, and finally implementation. We strongly urge the utilities to take action now in preparation for the new code, both enhancing the RNC program offerings as well as taking steps to initiate an attribution model. Table 14, from a Cadmus report, summarizes code support activities by energy efficiency program administrators in other states.

[46] https://www.nrdc.org/experts/lauren-urbanek/improved-building-energy-model-code-challenged

Table 14. Summary of Code Support Activities and Attribution Programs, from Cadmus[47]

Jurisdiction	Status	Activity for Adopting Codes?	Activity for Compliance Enhancement?	Program Administrator Attribution Method
Formal Attribution Approach				
California	Program and attribution process in place more than 10 years	✓	✓	Use evidentiary record, expert panel; focused on code adoption only
Pacific Northwest	Attribution process in place 10 years	✓	✓	Use evidentiary record; attribution based on share of funding for regional market effects program; focused on code adoption only
Massachusetts	Attribution completed in 2018		✓	Use evidentiary record, expert panel; focused on compliance enhancement
Rhode Island	Attribution completed in 2017		✓	Use evidentiary record; focused on compliance enhancement
New York	Process established; attribution not yet completed	✓	✓	Use evidentiary record, expert panel; focused on compliance enhancement only
Arizona – Salt River Project	Attribution process in place several years and multiple analyses completed	✓	✓	Use evidentiary record, evaluate attribution percentage, not-to-exceed 50%; focused on code adoption
Illinois	Process established; attribution not yet completed		✓	Use evidentiary record, expert panel; focused on compliance enhancement
District of Columbia	Process not developed yet		✓	Considering California and others
Deemed Attribution Approach				
Arizona – Investor Owned Utilities	Program and attribution process authorized for eight years	✓	✓	Evaluate portion of maximum allowable attribution percentage
Texas (Austin)		✓	✓	Deemed savings are claimed
Pennsylvania	Attribution permitted in late 2018		✓	Evaluate portion of maximum allowable attribution percentage

[47] Attributing Codes and Standards Savings to Program Administrator Activities: Review of Approaches in Canada and the United States, Cadmus (for BC Hydro). 2019.

Full Savings Without Determining Attribution				
Ontario				No support for codes; regional savings goal
Manitoba		✓		No attribution; claim full territory savings as a result of advocacy efforts
Attribution Permitted: No Approach Specified				
New Jersey	Attribution permitted in mid-2018		✓	No approach specified
Minnesota	Permitted since 2007		✓	No approach specified
No Attribution: Codes Savings Considered Non-Resource[a]				
Vermont			✓	No attribution; code program is non-resource
New Hampshire			✓	No attribution; code program is non-resource
Missouri			✓	No attribution; code program is non-resource
Iowa			✓	No attribution; code program is non-resource
Colorado			✓	
Utah			✓	No attribution; code program is non-resource
Hawaii		✓	✓	No attribution; code program is non-resource

Given the pending 2021 IECC model code, VEIC urges the utilities to take steps now to put in place an attribution approach to maintain savings for the RNC program. As noted elsewhere in this section, Maryland has already completed a significant component of attribution programs, the baseline study, and is well poised to claim savings for code support and enhanced compliance activities.

RESIDENTIAL NEW CONSTRUCTION PROGRAM RECOMMENDATIONS

Require a full-scale program certification tier beyond ENERGY STAR for New Homes

Residential New Construction programs are intended to promote market transformation. These programs provide the opportunity to change building practices long term as well as consumer mindset and expectations. Building envelopes have a lifetime of 30 years or more. New construction is a crucial time to implement energy efficiency. Some of the EmPOWER utilities have been offering a Residential New Construction program based on ENERGY STAR since 2009. The remaining electric utilities began offering it in 2012. ENERGY STAR Certified homes are expected to achieve at least 10% higher efficiency over the locally adopted code. We are now looking toward a model energy code (2021 IECC), which has not seen major improvements in

efficiency since the 2009 IECC, that is expected to be 10% more efficient than the 2018 IECC, include EV readiness requirements, and a zero energy buildings appendix. It is time to view ENERGY STAR as Step One, or a "Code Plus" tier, and focus efforts on bringing homes to zero energy and low carbon emissions.

EmPOWER utilities have cited cost barriers and lack of builder interest as reasons for not implementing the ZERH tier in the past. Yet Maryland homes and builders can be found in the ZERH, PHIUS+, NGBS Green, and USGBC LEED for Homes databases. In addition to these national programs geared toward ZE or ZER, a number of utilities offer incentive programs for ZE or ZER homes that are not based on these national certification programs. These local utility programs include purely prescriptive approaches, based on HERS Index, and/or based on energy savings over a baseline reference home.

Direct electric utilities to expand electrification incentives

Strategic electrification is a key policy solution for addressing climate change and greenhouse gas emissions. New construction is not only an ideal time to implement or prepare for electrification strategies, it affects buildings that will extend well into the time frame for Maryland's plans for a low carbon future . All EmPOWER electric utilities, with the exception of Potomac Edison, have committed to offering an Electric Vehicle pre-wire incentive. We recommend all utilities offer an EV pre-wire incentive and specify 220V, which is required for more efficient Level 2 charging equipment. We further recommend the electric utilities also consider offering incentives for one or more of the following electrification strategies: PV-readiness, space heating electric readiness[48], bonus incentive for all electric homes.

Develop code savings attribution

VEIC strongly recommends the EmPOWER utilities begin the process to propose a code attribution methodology, likely through the New Construction Work Group. As noted above, the next model energy code is expected to include significantly more gains in efficiency than we have seen since the 2009 IECC. Utility programs are well poised to support code development, adoption and enhanced compliance. EmPOWER Maryland utilities already support activities including builder and homeowner education and training. Utility programs should be able to claim savings for these efforts as program savings will continue to shrink as codes improve.

Attribution models can take years to implement and require a baseline study to assess local baseline code compliance. The EmPOWER utilities conducted a baseline study in 2014 to inform their training programs. Additionally, Maryland participated in the DOE Residential Energy Code

[48] https://www.cdpaccess.com/live/proposal/5253/html/

Field Study[49]. This study included a pre-training baseline study, a 24-month training and outreach and a 12-month post-training baseline study. Study results found nearly an 80% improvement in total energy and emissions following the training period[50]. These studies inform the gap between actual baseline construction practice and code and put Maryland in a good position to developan attribution program.

Require consistent offerings and incentive structures

A review of utility plans found a number of inconsistencies in both measure eligibility requirements and incentive levels, as listed above. Discrepancies in eligibility may be due to incomplete reporting or errors. Nevertheless, VEIC recommends the utilities review eligibility requirements for the new construction program ensure consistency. Incentives should also align where feasible. inconsistent offerings can lead to customer confusion and dissatisfaction. Additionally, different eligibility requirements will be more difficult to manage in the common application submission and rebate portal. Specifically, utilities should clarify minimum eligibility requirements for HPWH's and ASHP's. For the latter, consider limiting product eligibility to the Northeast Energy Efficiency Partnerships (NEEP) ccASHP Product List[51]. Where utilities are intending to extend services to renovations and additions, eligibility requirements and incentive levels should be clarified.

Update plans for multifamily offering

The ENERGY STAR Multifamily New Construction program was launched in 2019. Prior to this program change, multifamily units were certified under the ENERGY STAR Certified Homes program or the Multifamily High Rise (MFHR) program. Beginning in 2021, all multifamily projects permitted after July 1 must enroll in the ENERGY STAR Multifamily New Construction program[52], regardless of low-rise or high-rise designation. The utility filing language still references multi-family low rise units, and in the case of Potomac Edison, multi-family high rise units as a new offering. VEIC recommends the utilities update their plan language to reflect the new MFNC program. Additionally, VEIC recommends the utilities clarify whether units of low-rise and high-rise multifamily buildings are eligible to participate in the EmPOWER program.

Pursue opportunities for occupant-related savings

VEIC believes there could be significant energy savings to be gained through a behavioral approach to support homeowner education and engagement on how to operate their new home. We recommend the utilities engage the Behavior Work Group to consider a pilot of such an approach, which may be tested on a smaller scale in the near term in order to determine whether

[49] https://www.energycodes.gov/compliance/energy-code-field-studies
[50] http://newportpartnersllc.com/projects/residential_energy_efficiency.html
[51] https://neep.org/ASHP-Specification
[52] https://www.energystar.gov/partner_resources/residential_new/homes_prog_reqs/multifamily_national_page

to expand in the next program cycle. The 2021-2023 programs cite several Smart Home pilots that could be coordinated with the RNC program. In the multifamily space, utilities may want to consider offering a one-year post occupancy incentive for multifamily buildings that achieve the ENERGY STAR using EPA's Portfolio Manager. The first goal of an RNC program is to build better buildings. The second should be to educate and train homeowners to achieve or surpass the expected performance of the building.

Require greater reporting consistency

The 2018-2020 program cycle was the first to see individual measure offerings outside of the whole home ENERGY STAR Certified program. This led to inconsistencies in how the utilities reported these measures on the RNC mini-tab. Some utilities reported smart thermostats as measures, while others reported the number of participants that installed the measure. The 2021-2023 program cycle brings a number of new additive measures to the program. It is critical that the utilities forecast and report unique participants (homes and units) and individual measures (additive measures) consistently.

Clarify and update Washington Gas offerings

It is not clear from the plan submitted by WGL whether the intention is to *only* offer the whole home ENERGY STAR for New Homes certification in coordination with the electric utilities, or whether the intention is to continue offering prescriptive gas measures outside of the whole home program. VEIC recommends WGL only offer the whole home certification tiers in coordination with the electric utilities and clarify the narrative in their plan. A coordinated whole home certification not only results in higher savings and decreased emissions for new construction homes, it reduces customer confusion and streamlines utility administration.

Limited Income Programs

The Department of Housing and Community Development (DHCD) has been administering the bulk of the energy efficiency programming targeted to limited income (LI) customers since 2012. These programs provide whole building weatherization services to residents of single family and multifamily buildings. The utilities provide funds collected through the EmPOWER surcharge to DHCD so that it can coordinate the implementation of limited income programming statewide.

DHCD is also the administrator of a variety of other programs that serve limited income people in Maryland and which provide opportunities to leverage EmPOWER funding such as healthy homes and home rehabilitation programming, and the federal Weatherization Assistance Program. Over the last eight years, DHCD has tapped into millions of dollars of non-EmPOWER funding to support energy efficiency improvements in limited income homes.

The EmPOWER utilities have also launched initiatives designed for limited income people, such as partnering with food banks and other non-profits serving limited income customers to make energy efficient lighting and other low-cost measures available to them. The utilities also began tracking participation of identified limited income customers (those that receive utility bill assistance) in their EmPOWER residential programs in the 2018-2020 program cycle. Programs that limited income customers are most likely to take advantage of are no-cost programs such as QHEC and Appliance Recycling.

This section will focus on the limited income programs administered and proposed by DHCD.

OVERVIEW OF DHCD THREE-YEAR PLANS

Proposed Savings, Participation, and Spending

Figure 30 below shows proposed savings, spending, and participation for DHCD's LI programs from 2018 – 2023 by electric utility service territory. The bars for 2018 and 2019 include reported results and 2020-2023 are forecasted results.

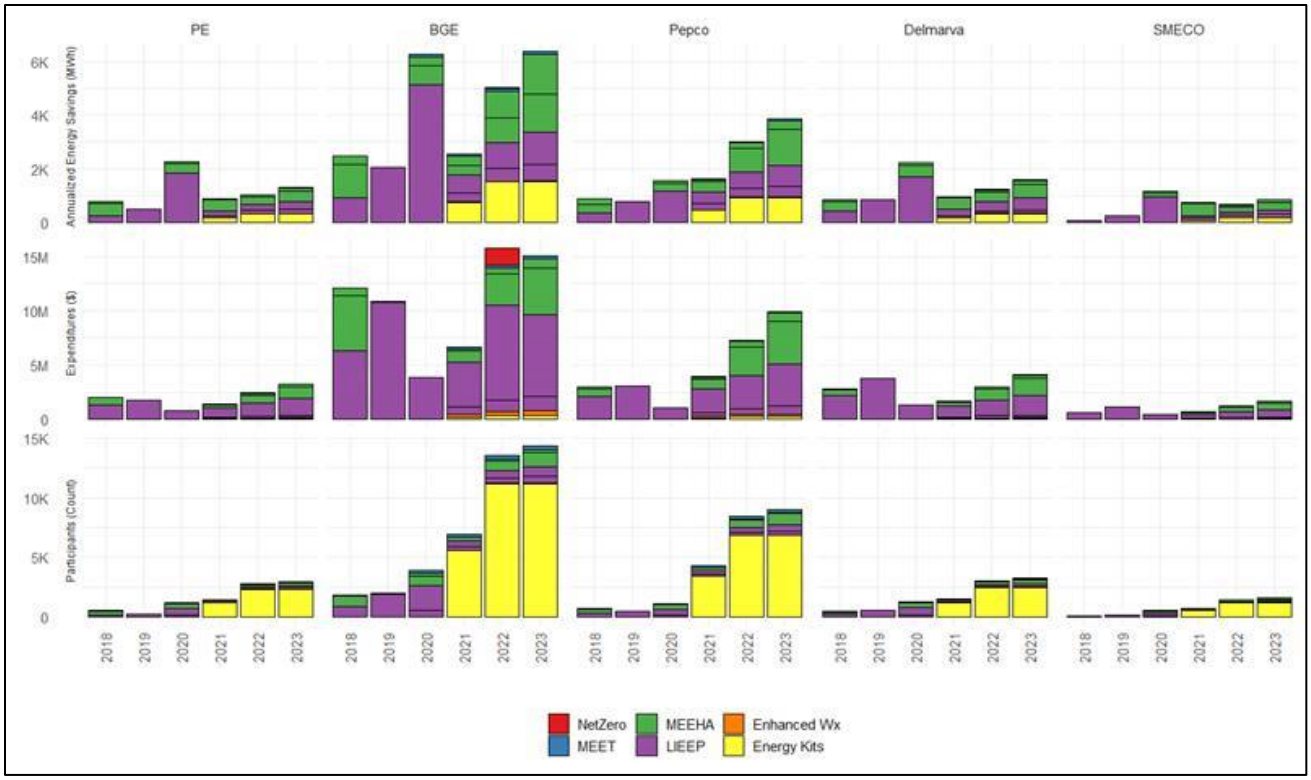

Figure 30: Annualized Savings, Expeditures and Participation for Limited Income Programs, by Utility, Reported (2018-2020) and Forecast (2021-2023)

DHCD is requesting the same budget for the next three-year cycle as the current cycle ($83,428,000). Like 2018-2020, this total request does not include contributions from Washington Gas. However, Washington Gas intends to subcontract with DHCD for most, if not all, of its LI programming. Washington Gas has just under $13.5M budgeted for limited income programming in its 2021-2023 plans. This is a significant increase from 2018-2020 when Washington Gas proposed $4.3M in LI programming. Assuming Washington Gas does contract with DHCD to provide these services, that would result in about a $9M increase in the total budget for DHCD-administered limited income programming.

While DHCD's proposed budget is the same as the previous program cycle (not counting any funding from Washington Gas), it proposes to serve over five times the participants in 2021-2023 compared to 2018-2020. As Figure 30 above shows, this increase in customers served is coming predominantly from the proposed addition of energy efficiency kits to its portfolio of programs. The 76,927 participants DHCD forecasts in the next program cycle is approximately 17% of limited income Marylanders under 200% of the federal poverty level.[53] This is a substantial improvement

[53] According to APPRISE's "Maryland Low-Income Market Characterization Report, there are approximately 450,000 households below 200% of the federal poverty level in Maryland.

from the 2018-2020 program cycle in which about 2% of the eligible population will receive benefits from DHCD administered EmPOWER programs.[54]

Changes from Current Programs

DHCD has proposed several changes to its programs in 2021-2023. Primarily these changes are aimed at increasing the number of limited income households receiving EmPOWER benefits, including by increasing the number of households eligible for limited income programming. DHCD is also proposing new initiatives designed to increase the depth of savings achieved through its limited income programming.

One portfolio-wide change it proposes is to align income eligibility across all its programs. In the current program cycle, eligibility for the single family program is 200% of the federal poverty level (FPL), whereas for the multifamily program it aligns with the guidelines of other affordable housing programs and the definition of "low income" used by the U.S. Department of Housing and Urban Development, which is 80% of Area Median Income (AMI).

DCHD proposes to increase its FPL guideline to 250% and to also accept applicants with incomes up to 80% of the AMI. It provides the following table comparing the two and suggests that they would accept whichever is the higher income guideline based on household size.[55]

Table 15: Alternative Qualifying Maximium Income Levels for DHCD Programs

Household members	250% FPL	80% AMI
1	$31,896.00	$52,850.00
2	$43,104.00	$60,400.00
3	$54,300.00	$67,950.00
4	$65,496.00	$75,500.00
5	$76,704.00	$81,550.00
6	$87,900.00	$87,600.00
7	$99,096.00	$93,600.00
8	$110,304.00	$99,650.00
Source https://dhcd.maryland.gov/HousingDevelopment/Documents/prhp/2019_MD_Income_Limits.pdf		

[54] The number of participants reported cycle-to-date in the Q1-Q2 2020 semi-annual reports was 8,474. We assumed approximately 10,000 total participants by the end of the year to arrive at the 2% figure.
[55] Table 10 – Comparison of 250% FPL with Statewide AMI Limits, page 34 of DHCD's 2021-2023 EmPOWER Maryland Program Limited Income Program Plan submitted August 31, 2020.

As a general matter, VEIC supports aligning eligibility criteria between affordable housing and low-income programs in order to streamline the application process and increase opportunities to partner with programs that address issues that are beyond the scope of weatherization (e.g., health and safety issues and housing rehabilitation needs). Complexity or duplication in application and eligibility criteria, as well as underlying problems in low-income housing constitute barriers to participation. However, we recognize that the proposed change could divert resources from the neediest households that still haven't been served by DHCD programming. This concern could be alleviated by more clearly defining target populations, such as those with the highest energy burdens, and addressing equity issues in the distribution of program benefits more comprehensively, as described in our overall recommendations. There are also important implementation questions, including in relation to the Office of Home Energy Programs (OHEP), which need to be addressed.

Following is a description of the specific programs/initiatives proposed by DHCD, highlighting changes from the current program cycle.

Whole Home Efficiency and Multifamily Energy Efficiency and Housing Affordability

Whole Home Efficiency (WHE) is DHCD's comprehensive weatherization offering. Modeled after the long-standing, federally funded Weatherization Assistance Program, WHE installs electric and thermal energy efficiency measures that meet the program's Savings-to-Investment Ratio (SIR) criteria.

The Multifamily Energy Efficiency and Housing Affordability (MEEHA) program is the comprehensive energy efficiency offering for Multifamily buildings. MEEHA partners with affordable housing developers and property owners to provide funding to support cost-effective energy saving improvements. This program also includes funding for savings above baseline for multifamily new construction projects.

In 2021-2023, one of the proposed changes is to combine efforts between these programs to market to eligible customers and affordable housing partners. One of the issues encountered in past years is confusion about which program a property/project qualifies under. The hope is that by aligning eligibility and enrollment, that properties can be more easily served. DHCD will continue to report the number of single- and multifamily homes weatherized to ensure that these different housing types are equitably served.

Proposed enhancements to the WHE single family include:

- Ability to use seasonal winter load to qualify for the program: Instead of screening applicants solely on fuel type, include homes that have 2,000 kWh above baseload usage in the winter. *While we support this program modification, we also would support even*

more flexibility to serve limited income households through WHE. Placing restrictions on who can receive services based on fuel type or usage thresholds may restrict customers from services that have high energy burden but do not use enough energy to qualify for WHE.

- Credit savings from prior energy efficiency measures to the SIR calculation: For homes that have participated in some other program, such as QHEC or Tier 1 of the current LIEEP program, allow the saving from those measures to be included in the SIR calculation to allow for more energy efficiency measures to meet cost-effectiveness criteria. *We support this change, and would also encourage DHCD to consider allowing the option of using a prescriptive list of energy saving measures as opposed to requiring each home served under WHE to meet SIR criteria. While site-specific modeling can be useful in limited circumstances, DHCD could save time and money allowing certain energy efficiency measures, like insulation and air sealing or appliances below a minimum efficiency, to be installed whenever the opportunity presents itself.*
- Formalize the energy education component of the energy audit: Providing energy saving information and tips to program participants is a best practice and we support making this a key component of the energy audit.
- Increase the installation rate of HVAC equipment: In response to recent evaluation findings from Cadmus that suggest DHCD could be installing more energy efficient HVAC equipment, specifically heat pumps, DHCD proposes a modification to the landlord contribution requirement for HVAC replacement, which is currently 50% of the installed cost. DHCD proposes to cover 50% of the cost with EmPOWER funding and the landlord could cover 25% of the cost with the other 25% of cost made up by leveraged funds. *We support this enhancement and ask DHCD to report on how/whether it impacts the number of HVAC replacements for renters that are supported by the program.*
- Use evaluator verified savings rates to report program savings rather than modeled savings estimates: DHCD's evaluator found that applying realization rates to modeled savings estimates resulted in savings attributable to the program being under reported. DHCD has also found that the verified rate of savings has remained fairly consistent over time and suggests it is a more accurate predictor of achieved savings. DHCD therefore proposes to use the verified savings rates applied to customers actual energy consumption to report savings for WHE jobs. *We support this modification to reporting energy savings and suggest DHCD's evaluators and the statewide evaluator assess whether this meets the goal of providing more accurate savings forecasts and reporting.*
- Provide funding to MEEHA projects for incidental repairs and health and safety measures: DHCD proposes to provide additional funding of up to 10% of project costs to cover health and safety and incidental repair costs. *We support this enhancement.*

- Provide incentives to cover the cost of a Project Manager for MEEHA projects: DHCD reports that one of the biggest hurdles to multifamily property participation is the time it takes to apply for funding. To alleviate this burden, DHCD would provide funding to secure a Project Manager to manage the application and funding process on behalf of the building owner. DHCD would qualify Project Managers and maintain a list of eligible Project Managers on its website. *We conditionally support this enhancement pending a better understanding of DHCD's protocols for quality assurance/quality control of the Project Managers work. For example, will their work be subject to review for any missed opportunities? Will DHCD conduct satisfaction surveys with building owners to gauge the effectiveness of the Project Manager in the MEEHA process?*
- Provide building science training to contractors working on MEEHA projects: Unlike WHE which uses a program-approved set of weatherization agencies to work on projects, MEEHA uses contractors engaged by the building owner, who may not have the level of building science training needed to ensure that energy efficiency measures maximize savings. DHCD proposes to make these trainings available to contractors working on MEEHA projects. *We agree that DHCD should be allowed to use EmPOWER funding to make building science training available to MEEHA contractors.*
- Allow a prescriptive list of measures for MEEHA projects: Due to the high cost of a multifamily energy audit, DHCD requests the ability to approve project funding based on a prescriptive list of measures that have shown good energy savings results. *As noted above, we agree that prescriptive lists can streamline the process for approving energy efficiency measures and should be an option for both MEEHA and WHE.*
- Do not require duct sealing to meet the SIR requirement: DHCD proposes this change to align with the HPwES program which exempts duct sealing from project-based cost effectiveness screening. *We agree with this program modification to provide consistence across EmPOWER residential weatherization programs.*
- Withdraw the standardized price list for MEEHA projects: DHCD finds the list no longer serves its intended purpose as the SIR supports funding that meets cost effectiveness requirements. *We agree with this request.*

Base Efficiency

Formerly known as Tier 1, Base Efficiency provides energy saving measures to homes which cannot receive WHE due to health and safety or structural repairs that are beyond the scope of the program. DHCD proposes to make Base Efficiency its own standalone program for better tracking and reporting.

Base Efficiency jobs will continue to receive energy efficiency measures that do not impose any risk to the building occupants, such as LEDs and electric appliances, water heaters, and HVAC

systems, and that will not risk being damaged due to disrepair. Base Efficiency jobs do not require a full energy audit and measures can be installed prescriptively.

As has been the case for Tier 1 jobs, Base Efficiency program participants can participate in WHE once the issue that was preventing weatherization has been resolved. However, DHCD reports that very few Tier 1 participants end up receiving full weatherization services – only 0.6% in the 2018-2020 program cycle. Therefore, DHCD proposes to increase the hard and soft costs caps for Base Efficiency jobs to make sure that all eligible measures can be installed and maximum energy savings realized by program participants. We firmly believe that limited income households should get as much energy saving benefits from EmPOWER as possible, so we support the proposed changes to the cost caps.

Maryland Energy Efficiency Tune-Up (MEET)

MEET provides past weatherization participants with information and services aimed at increasing the amount and longevity of energy savings achieved. It does this by educating customers about their energy efficiency improvements, discussing low- and no-cost energy saving tips and behaviors, and providing HVAC clean and tune services. MEET was funded in the 2018-2020 program cycle by the City of Baltimore as a pilot available to City residents. DHCD proposes to expand this program statewide with EmPOWER funding and with a few proposed modifications:

- DHCD proposes to reduce the number of service visits to two per program cycle, rather than one visit per year. Program experience has shown that the most energy savings comes from providing HVAC clean and tunes, which are not necessary on an annual basis. The program will instead provide a follow up visit approximately two years after the first visit. *We support this proposed change.*
- In line with the statewide expansion, DHCD would allow any members of its weatherization network to provide MEET services. It also proposes to remove the requirement to recertify the participants' income eligibility, which was found to slow down the process of bringing past weatherization participants into the MEET program. *We agree with this change to the MEET program since the aim of the program is to maximize the savings and lifetimes of measures that these households received under weatherization.*
- DHCD also proposes to optimize the measure mix by taking into consideration the expected reduction in LEDs needed to replace inefficient lighting and adding the opportunity to conduct some HVAC repairs. *We agree with this proposed change and urge DHCD to consider additional cost-effective measures and/or behavioral approaches to energy savings as they emerge. DHCD should also consider adding installation of smart thermostats in homes that don't currently have them, and connecting households with*

eligible smart thermostats to utility-sponsored thermostat optimization and demand response programs.

Enhanced Weatherization

This is a new program proposed by DHCD which builds off a Community Investment Fund (CIF) pilot in BGE service territory from 2015-2019. Enhanced Weatherization targets the highest use limited income households (>15,000 kWh/year) that have been deferred due to health and safety or repair issues that are beyond the scope of the traditional weatherization program. Homes would be identified through the WHE and Base Efficiency programs.

DHCD proposes to serve 80 homes through this program in the next program cycle and it will attempt to leverage as much funding as possible from home rehab and health and safety programs. In addition to all traditional weatherization measures, these homes will also be able to receive mold and lead remediation services, replacement of gas cookstoves to electric, heat and energy recovery ventilation systems, and home repairs relevant to increasing the safety of elderly occupants, such as installation of handrails. DCHD proposes a $20,000 cost cap on EmPOWER funded measures and the SIR will only apply to energy-related measures.

We are supportive of exploring this new approach, especially as it may be able to gather data to support better estimation of the value of health improvements.

Net Zero Program

DHCD proses to add a net zero program which will provide incentives to builders and developers of affordable housing in Maryland to meet net zero standards – defined by DHCD as buildings achieving a Home Energy Rating System (HERS) score of 35 or below. Compared to the HERS score of a building that meets 2018 IECC building codes, which is 55, this new program would incentivize much deeper energy efficiency investments during the construction process, which is typically the most cost-effective time to integrate efficiency measures. DHCD has been running a net zero program for the last four years after it was created by the Maryland legislature.

The current program offers low-cost financing to developers of net zero affordable housing. By integrating its current efforts with the EmPOWER programming, DHCD expects to be able to be able to establish a revolving loan pool, using funds paid back by projects to fund more projects. Any renewable energy measures would be separated from the scope financed by the program. Eligible measures include architectural design, labor and materials for construction of housing designed to meet or exceed a HERS score of 35, site development and acquisition costs, and project management. Financing would be structured to offer lower interest rates for projects designed to meet lower HERS scores. DHCD also would consider leveraging grants available through MEEHA to offset the cost of financing a net zero project.

DHCD requests $1.2M in EmPOWER funds for the net zero program and anticipates funding 6 projects in the next program cycle. Net zero new construction is being proposed by most utilities in their 2021-2023 plans and, according to a recent ACEEE topic brief, is a growing component of energy efficiency program offerings nationwide.[56] It is critical that affordable housing has access to the same benefits associated with net zero housing as market-rate new construction projects. We therefore support this limited investment in creating a net zero revolving loan fund for affordable housing projects and look forward to DHCD's analysis of actual project results.

ANALYSIS & BEST PRACTICES

DHCD's programs follow many nationally demonstrated best practices in program design and implementation. Some examples include:

- They offer consistent, statewide programs that leverage other funding sources to support necessary repairs and health and safety improvements,
- They employ a highly trained network of service providers and have QA/QC mechanisms in place to identify issues and training needs,
- They serve renters and owners as well as single- and multifamily buildings,
- They partner with affordable housing developers to support high efficiency new construction projects, and
- They have multiple services which can meet the varying needs of the eligible population.

Some emerging best practices that DHCD and the utilities should consider in their limited income programming related to identifying and tracking metrics which help them ensure that programs are serving the population equitably. OPC has invested in the development of a search engine, available on its website, to search for a variety of statistics on Maryland's low-income population, including housing and demographic information.[57]

VEIC has also been working with a group of efficiency program implementers, advocates, and researchers to better understand the current state of equity metrics being used for energy efficiency programming, and discussing ways to improve our ability to measure how well we are serving people equitably. The team's research found that the most common dimensions of equity analysis relate to defining target populations, determining disparate impacts of programs, and including representative voices in program design and delivery.[58]

In terms of defining target populations, the most common way to do that has been through income and energy consumption; however, some programs are now focusing on energy burden (the percent of a household's income that is paid towards home energy costs) rather than setting

[56] https://www.aceee.org/topic-brief/2020/09/programs-promote-zero-energy-new-homes-and-buildings
[57] http://mlrt.opc.maryland.gov/
[58] https://www.veic.org/Media/default/documents/resources/reports/equity_measurement_clean_energy_industry.pdf

energy consumption thresholds (e.g., a home must use more than X kWh to qualify). A recent ACEEE report looked at energy burden nationally and across a number of metropolitan areas and found that "low-income, Black, Hispanic, Native American, and older adult households had disproportionately higher energy burdens than the average household".[59] These findings are consistent with similar ones set forth in OPC's APPRISE report, which has been filed in this docket and available on OPC's website.

LIMITED INCOME PROGRAMS RECOMMENDATIONS

DHCD should address areas of concern with its proposed higher income guidelines prior to Commission approval of this change.

DHCD's proposed guidelines specify that they would use the greater of 250% of the FPL or 80% of AMI as the income criteria for its programming in 2021-2023 – whichever is higher. While this change could be confusing to program implementers and applicants due to the use of different income guidelines for households of different sizes, a more critical concern is whether the increase in the income guideline would divert resources from the lowest income, most needy households. Clearer definition of target populations and a stronger focus on addressing energy burden may alleviate these concerns, and these issues should be addressed prior to approving a new income guideline.

The Limited Income Work Group should continue discussing goals, using a broad equity framework and focusing on which metrics best measure the success of the programs at meeting those goals.

The Limited Income Work Group has not been able to achieve consensus on an appropriate goal framework for over five years, and the electric utilities' 2% goal is set to expire at the end of the 2021-2023 program cycle. Rather than continuing to pursue 1% electric savings and 0.5% gas savings goals as OPC and the Advocates have been supporting over the last five years, we suggest the Commission order a broader initiative to discuss and develop new EmPOWER goals. We also suggest that the Limited Income Work Group engage in a comprehensive look at enhancing equity, through definitions, assessments and targeted strategies, as noted above. Both of these ideas are also discussed at greater length in the Overall Recommendations section of these comments.

[59] https://www.aceee.org/research-report/u2006

Behavior-based Programs

The Behavior programs in the 2021-2023 plans are continuations of the existing programs for all the electric utilities and Washington Gas, representing a large proportion of annual residential savings for both electric and gas. These programs will continue to utilize customer-specific home energy reports (HERs) as their core program element to drive those savings, with a growing emphasis on digital elements like web-based analytics and emailed reports. Utilities primarily differ in their approaches to additional digital channel services offered (such as e-mailed reports, web portals, and high usage alerts) and the degree of integration and cross-promotion marketing for the rest of the residential portfolio.

HERs are designed to motivate customers to change their behavior by comparing their energy usage to a relevant peer group. The program's energy savings come from periodic comparison of changes in energy consumption between a treatment group that receives the home energy report to a carefully maintained control group that does not. The utilities' residential Behavior programs have been run by Oracle/Opower, a well-accepted model of sending out customer-specific home energy reports. SMECO indicated in their plan that they intend to bring the HER functionality in-house.

OVERVIEW OF UTILITY THREE-YEAR BEHAVIOR PLANS

Proposed Savings, Participation, and Spending

Each utility continues to run mature Behavior programs and plan for relatively flat levels of savings, expenditures, and participants. It is worth noting that Washington Gas – which has lagged behind the other utilities in this metric - plans to more than double its rate of participation based on 2017 residential customer numbers. PEPCO and Delmarva expect slightly reduced levels of participation by approximately 10%, and BGE maintains a particularly high rate of participation at 80%. BGE's rationale is to track a fixed-size (rather than, for example, proportional) control group for estimating savings.

Figure 31 and Figure 32 describe the reported, projected, and forecasted savings, spending, and participation by utility during the current program cycle and the 2021-2023 cycle. During the 2018-2020 cycle, utilities continued to report metrics inconsistently and highlights the need to engage a working group amongst utilities around data consistency and reporting, especially when it comes to behavior programs.

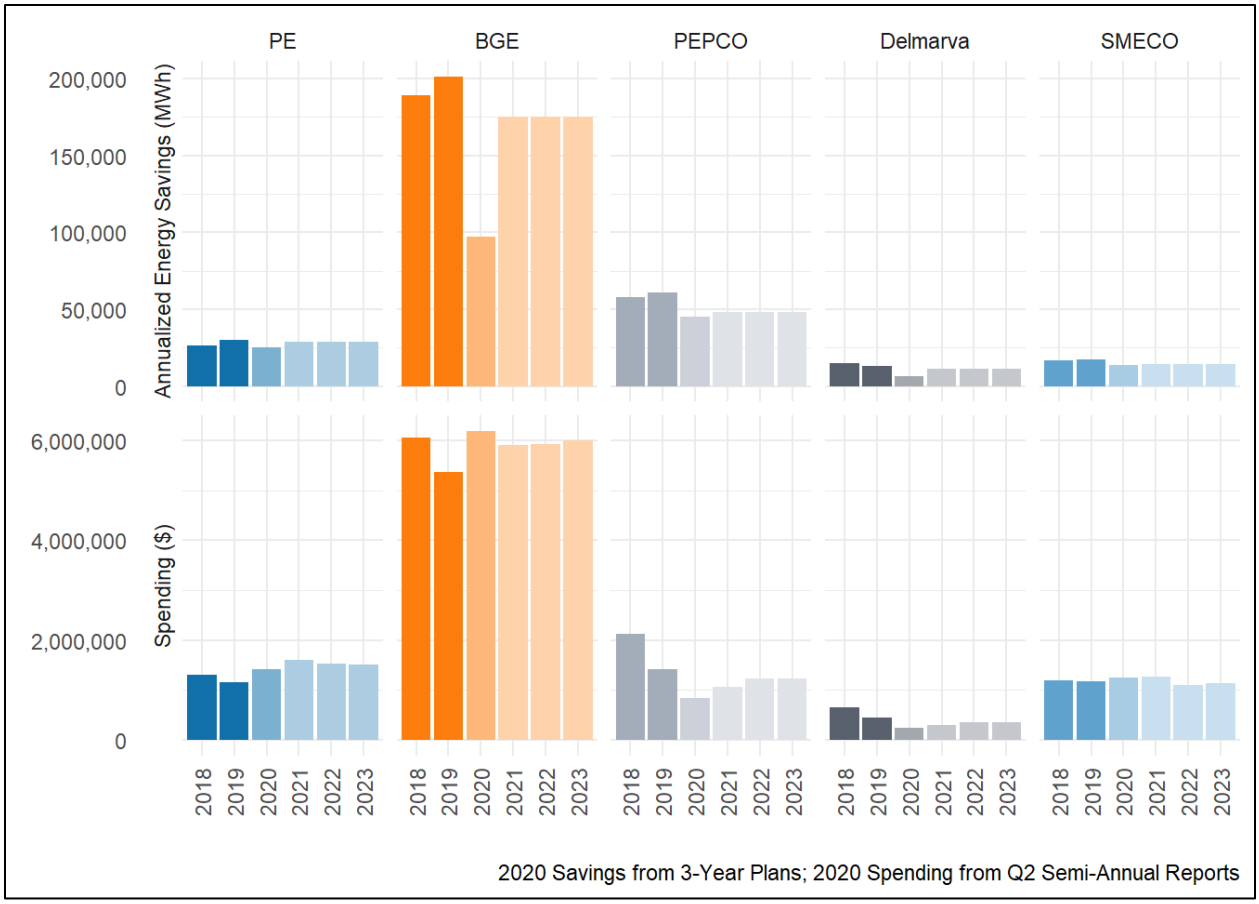

Figure 31: Behavioral Program Electric Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

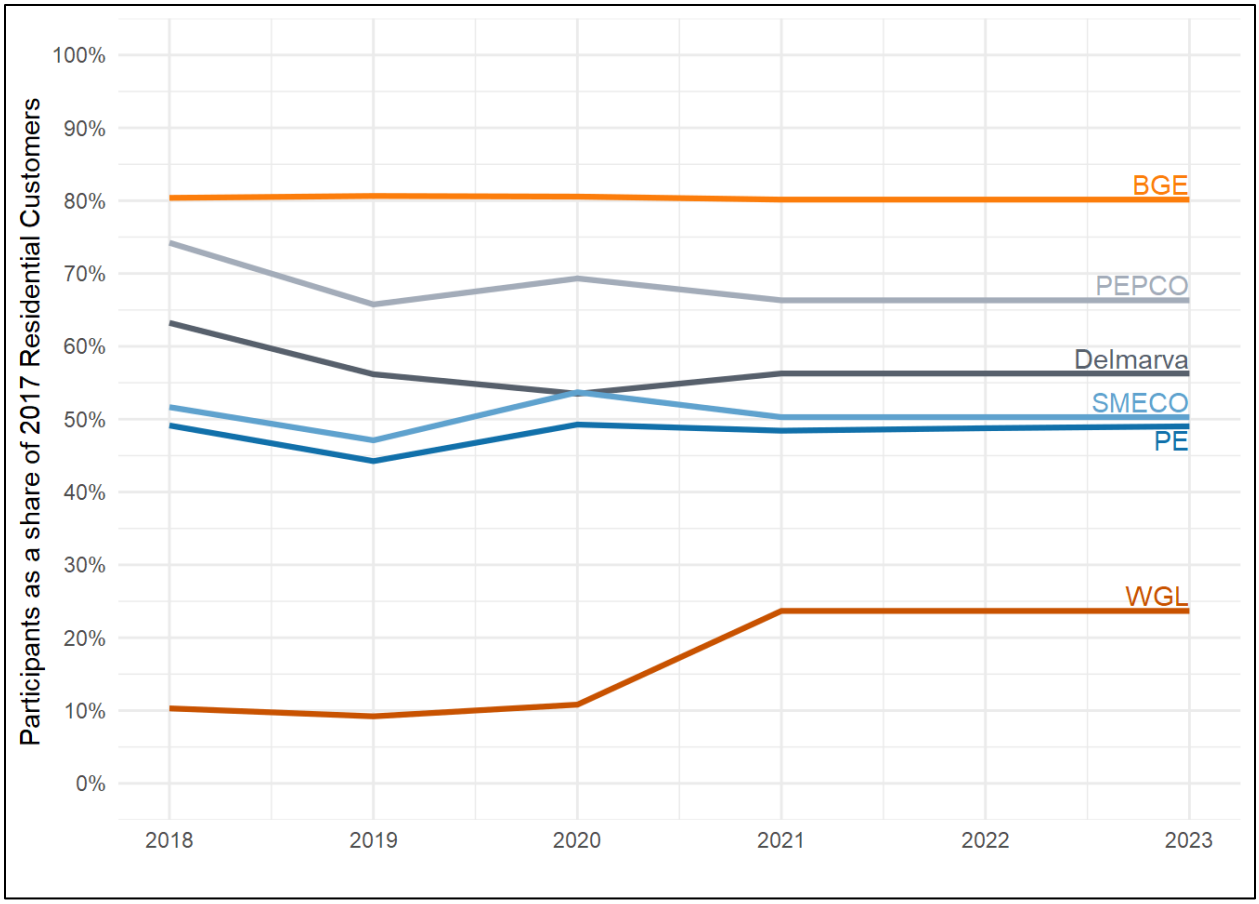

Figure 32: Behavioral Program Participation Rates- Reported (2018-2020) and Forecast (2021-2023)

As shown in Figure 32, BGE forecasts a slightly lower level of Therm savings from their Behavior program, while WGL forecasts significantly higher (roughly 5x) Therm savings that are not proportional to their roughly 1/3 increase in spending.

Figure 33: Behavioral Program Thermal Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

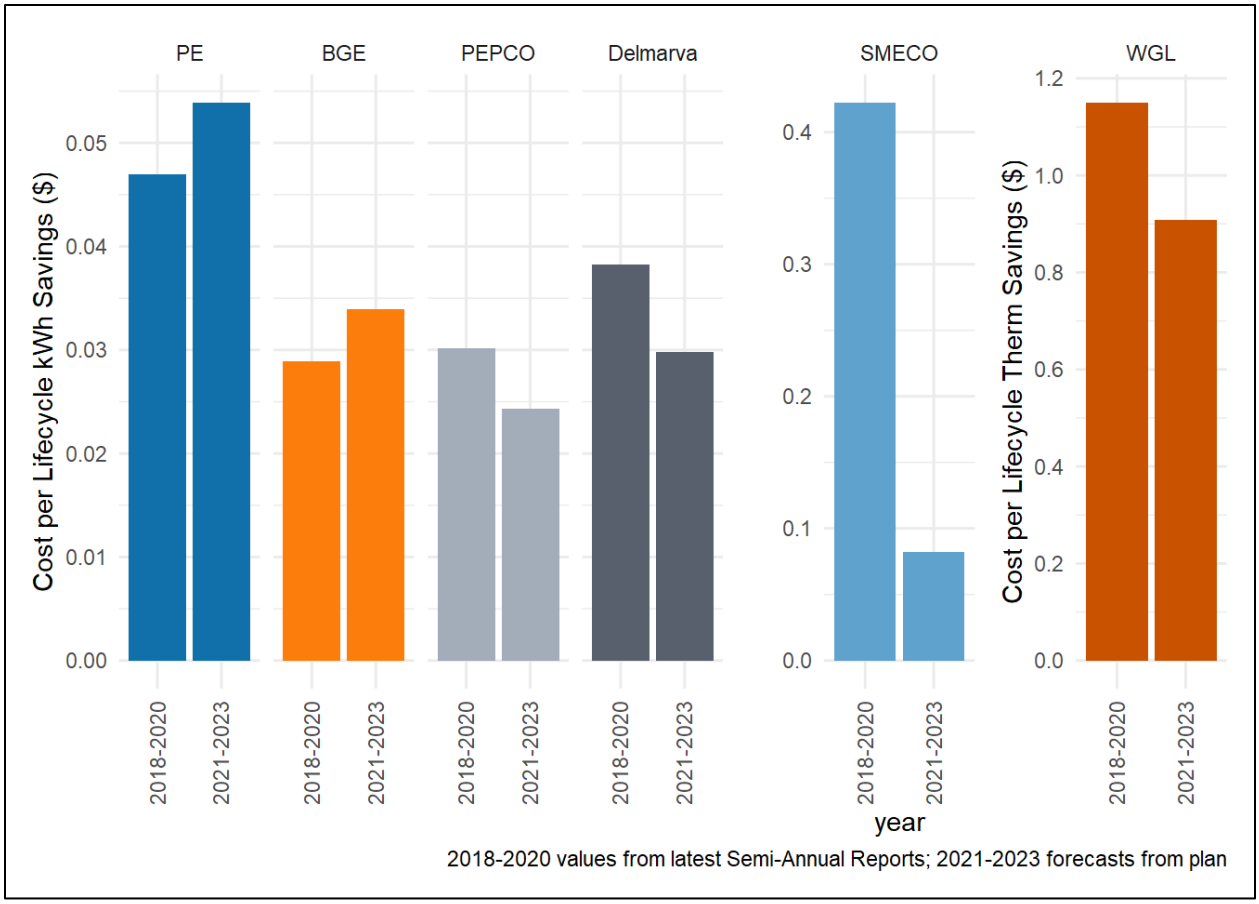

Figure 34: Behavioral Cost per kWh, Reported (2018-2020) and Forecast (2021-2023)

Figure 34 shows Cost per Lifecycle Savings for each utility's Behavior Programs. PE and BGE expect modestly increased costs in the 2021-2023 cycle, while PEPCO, Delmvarva, SMECO, and WGL expect lower costs. SMECO forecasts higher costs than the other utilities, but appear to be significantly lower than their reported costs per lifecycle kWh in the 2020 Mid-year reporting and is plotted separately from the other electric utilities in this figure.

Changes from Current Programs

All electric utilities plan to expand the features of their behavior-based Home Energy Report programs as program implementers evolve aspects of their product and the utilities continue to take advantage of systems built using Advanced Meter Infrastructure and data analytics. In many cases the utilities' reported advancements (evolving online tools that may include video or load disaggregation, more customized analytics based on AMI data, and improved look and feel to the HER product) are consistent with the primary vendor, Oracle/Opower, which has recently announced significant improvements in their platform.

SMECO plans to deliver HERs through an in-house solution, suggesting a departure from the Oracle platform. Competition in this marketplace is welcome, and ideally will encourage

improvements in the behavior-based programs available to EmPOWER utilities, but it is vital that consistent reporting across all programs be consistent and help utilities collaborate to make the most these tools. Additionally, utilities like BGE have begun reporting more detail about their behavior program, Smart Energy Manager, in semi-annual filings, while other utilities do not yet.

BEHAVIOR PROGRAM RECOMMENDATIONS

Require updated, consistent set of reporting metrics that include participant counts and control group size by delivery channel, for behavior programs.

This should include all delivery channels (print/email, web/mobile) and associated digital engagement (reports sent, email clicks). These metrics may be determined by a data/reporting working group and/or a behavior working group with input from the behavior program vendors.

Set clear definitions for annual, cycle-to-date, and program-to-date energy savings, spending, and participant metrics for behavior programs as they are reported in semi-annual filings.

This is important so the Commission and others may consistently track their ongoing performance. Due to the current 1-year measure life, there may be confusion in how mid-year and full-year values are reported at each reporting interval. If necessary, a working group should agree on these definitions.

The Behavior Work Group should actively share best practices as new behavior-based programming is deployed during the program cycle.

This includes such things as improved program participation tracking and treatment/control group stratification to increase accuracy of savings estimates, with an emphasis on leveraging data from AMI and other connected devices.

Report more detail from vendors on the status of behavior programs.

This includes the levels of engagement across different channels and the interrelationships between behavior programs and other EmPOWER programs.

Integrate and utilize datasets beyond AMI for behavior programs, such as smart thermostat telemetry and smart/connected home pilots.

Smart Thermostats & Smart Homes

As smart thermostats and other internet-connected devices proliferate throughout the market, EmPOWER utilities continue to innovate and offer energy savings associated with these products to Maryland residents. The 2018-2020 program cycle marked a significant increase in utilities' deployment of advanced thermostats across their portfolio, and continued exploration of savings from so-called "Smart Home" products and services. 2021-2023 is likely to be an exciting period for this class of products, as more pilot insights from EmPOWER utilities emerge and vendors begin to release updates to their existing systems that bring the dream of an energy-wise smart home to reality.

In the 2021-2023 cycle, the EmPOWER utilities are planning to offer programs that leverage a range of smart thermostat features:

- Downstream and midstream rebates to capture the direct energy savings potential of smart thermostats;
- Thermostat optimization programs that capture additional energy savings by fine-tuning thermostat schedules and optimizing use of HVAC systems;
- Virtual energy assessments that leverage smart thermostat data, along with weather and energy use data, to generate personalized energy insights; and
- Bring-your-own-device (BYOD) demand response programs that reduce peak demand by using smart thermostats to pre-cool or reduce cooling during critical peak times on the grid.

OVERVIEW OF UTILITY THREE-YEAR SMART HOMES PLANS

Proposed Savings, Participation, and Spending

A persistent challenge with the EmPOWER thermostat programs is the lack of consistent reporting, particularly given the wide range of programs involving smart thermostats. Smart thermostats may be incentivized as a standalone appliance or as part of the RNC, HVAC, HPwES, or QHEC programs, or may be included as traditional downstream rebates or sold through online stores. As some thermostats are eligible for the ENERGY STAR Retail Products Platform, they may soon be available through midstream channels as well. While each utility does mention smart thermostats in some way, only BGE and SMECO have specific line-items for programs based on smart thermostats. Having done so in previous years, it is assumed that other utilities plan for smart thermostats within their portfolios. Figure 35**Error! Not a valid bookmark self-reference.** below displays the reported and projected spending/savings for 2018-2020 and forecasted spending and savings for utilities that began offering thermostat optimization programs during the 2018-2020 cycle. Pepco and Delmarva reported spending, but only report lifecycle savings in 2019 and do not forecast specific thermostat programs in the current plan.

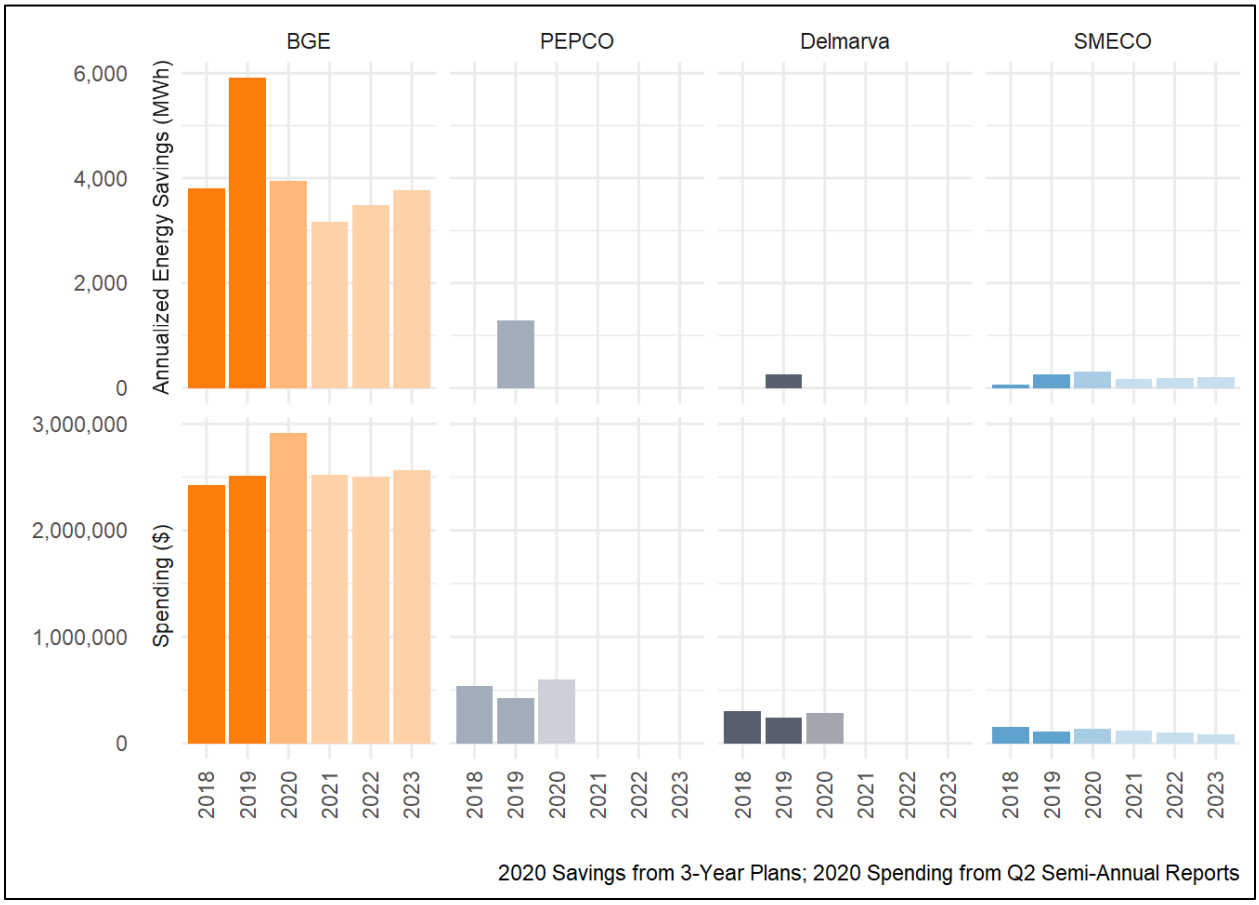

Figure 35: Smart Thermostat Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

Changes from Current Programs

Potomac Edison added an incentive opportunity for connected/smart home products and will introduce a Smart Home Management System pilot. BGE will continue to pilot extensions to their Connected Rewards DR program, going beyond Smart Thermostats. SMECO's successful "My Energy Target" smart home pilot will become a full offering, leveraging analytics and behavioral science to create customized goals and tools. At the same time, SMECO will no longer be using the Connected Rewards platform for thermostat optimization and instead will work with manufacturers in order to continue "device-agnostic" services to customers.

In a response to a data request, Potomac Edison noted that it "added smart thermostats to its ESRPP program in April of 2020 based on Order 88964 directing utilities to implement the full suite of ESRPP measures." However, in response to the same data request, BGE stated that "one of the principal drawbacks of an ESRPP [smart thermostat] offering is that this method does not allow for BGE to collect any customer information (including the thermostat's serial

number) during the purchase transaction… this impedes BGE's ability to cross-promote the Connected Rewards and Thermostat Optimization programs."

ANALYSIS & BEST PRACTICES

Smart thermostats are advanced programmable thermostats that can, at a minimum, offer end-users the ability to set schedules for heating and cooling, either from the unit itself or via a website or smartphone app. Beyond internet-connected controls, smart thermostats specifically have advanced "optimization algorithms," often based on machine learning and artificial intelligence, that learn occupant behavior to modulate heating and cooling setpoints automatically at convenient times during the day, such as when the building occupants are away, and may also be optimized at specific times that are ideal for utility operations.

Smart thermostat optimization can be supported in three ways, which are not consistent across all utilities. Originally, these optimization schemes that support utilities had to be deployed through a vendor-utility partnership, but as of 2019 two of the largest thermostat vendors, Google Nest and ecobee, provide out-of-the-box optimization programs for utilities based on the customer location. Utilities may further incentivize participation in specific programs by offering an additional reward to allow utilities to adjust optimization strategies at critical times. Finally, fleets of smart thermostats may be recruited to participate in demand response programs in which devices are set to pre-cooling before or reduced cooling during critical peak times on the grid. Participants in these programs may receive one-time rewards for participation.

While smart thermostats have been on the market for over a decade, they represent the "tip of the iceberg" when it comes to the often-idealized smart home that blends modern convenience and energy savings. Thermostats are often at their highest and best use when they are actively optimizing on a regular basis and participating as a demand response resource; as a goal, all utilities should strive to maximize their fleet of smart thermostats during the program cycle.

It is vitally important that the Commission and EmPOWER utilities recognize and exploit the interconnected relationship between behavior change programs, demand response programs, and the role smart thermostats and other connected devices - including AMI - play in bridging traditional energy efficiency programs to integrated, grid-flexible efficiency programs of future. Just as behavior programs continue to leverage AMI data to provide custom insights and potentially end-use analytics, some programs are looking into thermostat data to provide remote audits. The integration of smart meter data and smart thermostat data can provide even more precise and personalized insights to recommend energy and cost-saving opportunities to end users. While it is significant that the ESRPP listing of Smart Thermostats allows midstream incentives for smart thermostats, it will become more important for utilities to collaborate with vendors and create tools to connect information about devices purchased through midstream

channels to customer-specific offerings like enrollment in demand response programs. Failing to do so puts at risk a significant portion of grid and customer benefits, or, on the other hand, may miss the opportunity to benefit from midstream channels as a leverage point.

SMART THERMOSTAT & CONNECTED HOMES PROGRAM RECOMMENDATIONS

Require all utilities to offer thermostat optimization programs.

Potomac Edison is the only utility that does not offer thermostat optimization and there is no clear reason why this is the case. Optimization strategies are generating savings for other utilities and through promotion of smart thermostats, there is significant penetration of these devices is Potomac Edison territory. The utility proposes to "continue to monitor" industry trends. Given the maturity of programs in Maryland, there is no reason to delay in offering an optimization program.

Require utilities to provide a clear plan for how Smart Home pilots will be concluded and advanced as full programs as appropriate.

The utilities offering Smart Home pilots from the previous cycle are at different stages of collecting and assessing data. SMECO is the only utility proposing to advance a full smart home program in 2021. Early in the upcoming cycle, all utilities should share their smart home pilot results and data in a coordinated fashion. Program design strategies that demonstrate strong savings potential should be adopted as full-scale programs for all utilities, unless there is some clear reason not to.

Require utilities to provide consistent reporting on the adoption and deployment of thermostats (and eventually, connected devices) across the portfolio to ensure accurate assessment of impacts and savings.

Smart thermostats continue to proliferate across multiple channels and there is a high risk of double-counting. Reporting should include the various permutations of the number of devices being utilized across programs. For example, utilities should report the number of thermostats rebated through an online store that *are* participating in an optimization or DR program, and those that *are not*. VEIC has previously provided example reporting templates for smart thermostat activities across the EmPOWER portfolio.

A Connected Device Work Group should be formed to share ongoing insights, challenges, and lessons learned from the various Smart Home pilots, emerging programs, and market developments underway.

VEIC recommends that the EmPOWER utilities create a more coherent and coordinated "innovation pipeline" to better understand how related pilots fit together and avoid needlessly duplicative efforts. A Work Group that would create a forum to share insights, challenges, and lessons learned from Smart Home and Smart Thermostat pilots and programs would be

particularly helpful, given the number and complexity of the various efforts that are currently underway. A Connected Device Work Group could also support the coordination needed to ensure complete and consistent reporting of smart thermostat measures and savings.

If not already underway, utilities should connect behavior-based programming that uses smart meter data to connected thermostat telemetry when conducting remote audits and analytics.

All EmPOWER utilities should adopt a consistent use of ESRPP for smart thermostats to reflect the intent of the Commission order, while working to integrate smart thermostat user information into optimization, demand response and other programs.

Different utilities are apparently using different approaches to ESRPP for smart thermostats. Those utilities not offering the devices through the ESRPP platform recognize an important limitation for gaining device and user information at the time of purchase that can help them track, enroll and integrate smart thermostats in other programs. However, there may be other approaches to achieve those benefits while still taking advantage of the midstream channel. Utilities should work together to share strategies and adopt a consistent approach.

Demand Response

All electric utilities except for Potomac Edison continue to evolve their Residential Demand Response (DR) programs, leveraging the changing connected device market and the growing set of tools made available from AMI, behavior-based programs, and new rate designs. Historically DR programs in this category involved a form of direct load control (DLC) tied to specially installed devices at the appliance, or more recently, specific models of smart thermostats, which could be remotely controlled by the utility at critical peak times. The utility offers customers a per-event credit or annual reward for making these behind-the-meter grid resources available. DLC programs have been historically challenged with issues like low customer opt-in rates, high installation costs, and various customer satisfaction issues. Beyond direct control of devices, other frameworks to reduce demand during peak periods have emerged more recently that rely on behavior-based signals integrated with advanced metering infrastructure (AMI). These use customer notifications delivered in advance of a peak, as well as financial rewards for performance tied to the magnitude of measurable peak savings activities a customer is willing to perform. As tools and systems get better at presenting AMI-based insights to customers, and connected devices like smart thermostats continue to proliferate across the state, EmPOWER utilities may be able to reduce barriers and expand the benefits of these DR programs.

OVERVIEW OF UTILITY THREE-YEAR DEMAND RESPONSE PLANS

Proposed Savings, Participation, and Spending

Figure 36 reports most recent reported, projected, and forecasted savings/spending for residential DR programs. Pepco, Delmarva, and SMECO expect fairly stable levels of spending over the next three years, while SMECO and Delmarva expect slightly higher demand reductions in 2021-2023 relative to the current cycle. BGE expects progressively higher savings and spending, which correlates to the eventual sunset of the PeakRewards program and growth in the Connected Rewards and Smart Energy Rewards programs.

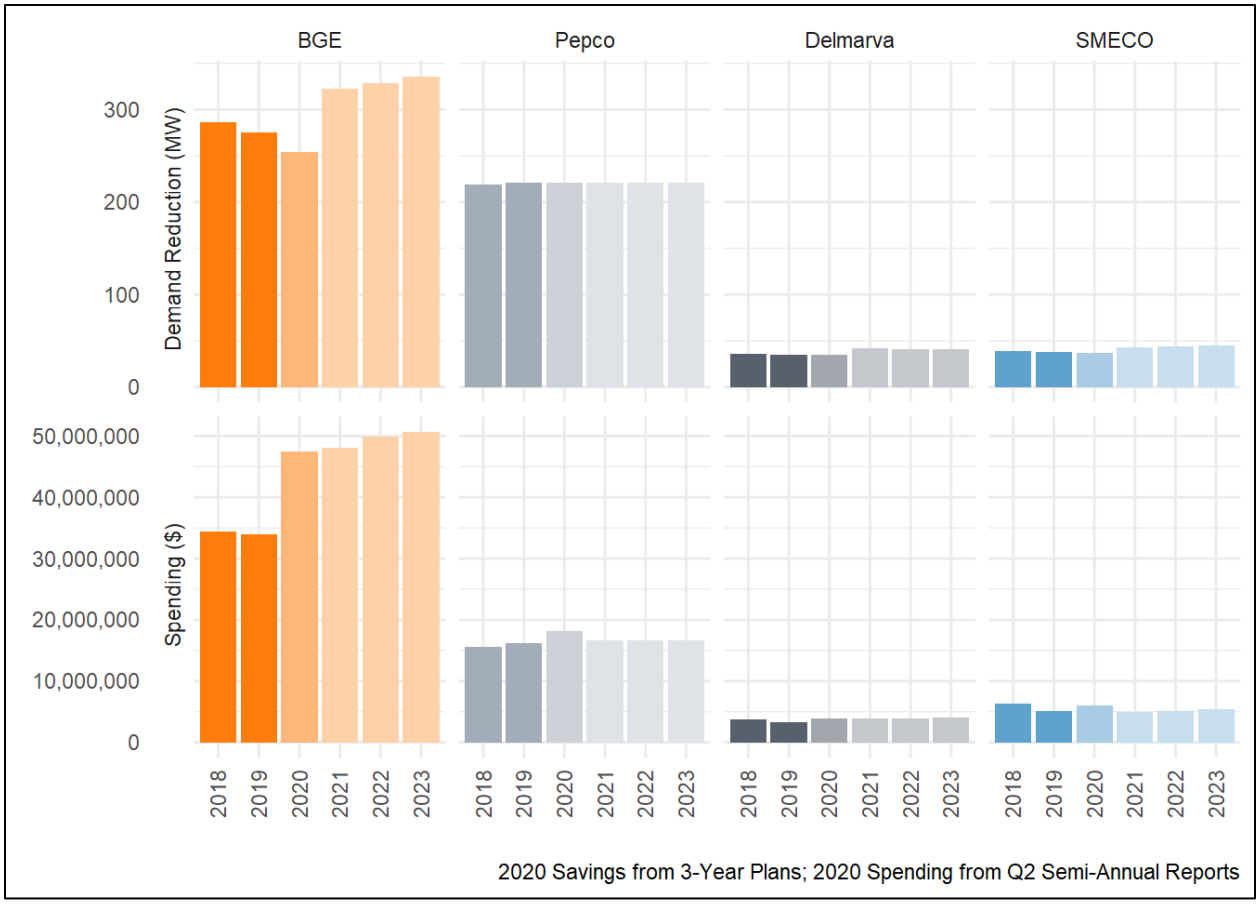

Figure 36: Demand Response Savings and Spending - Reported (2017-2019), Projected (2020) and Forecast (2021-2023)

Figure 36 shows the actual cycle-to-date cost per reported kW demand reduction during the current cycle in dark shades in the left columns, and the forecasted value for the 2021-2023 plan cycle in light shades in the right columns. For reference, the previously forecasted value for 2018-2020 (as reported during the most recent semi-annual report) is also presented on this figure, in light shades in the left column.

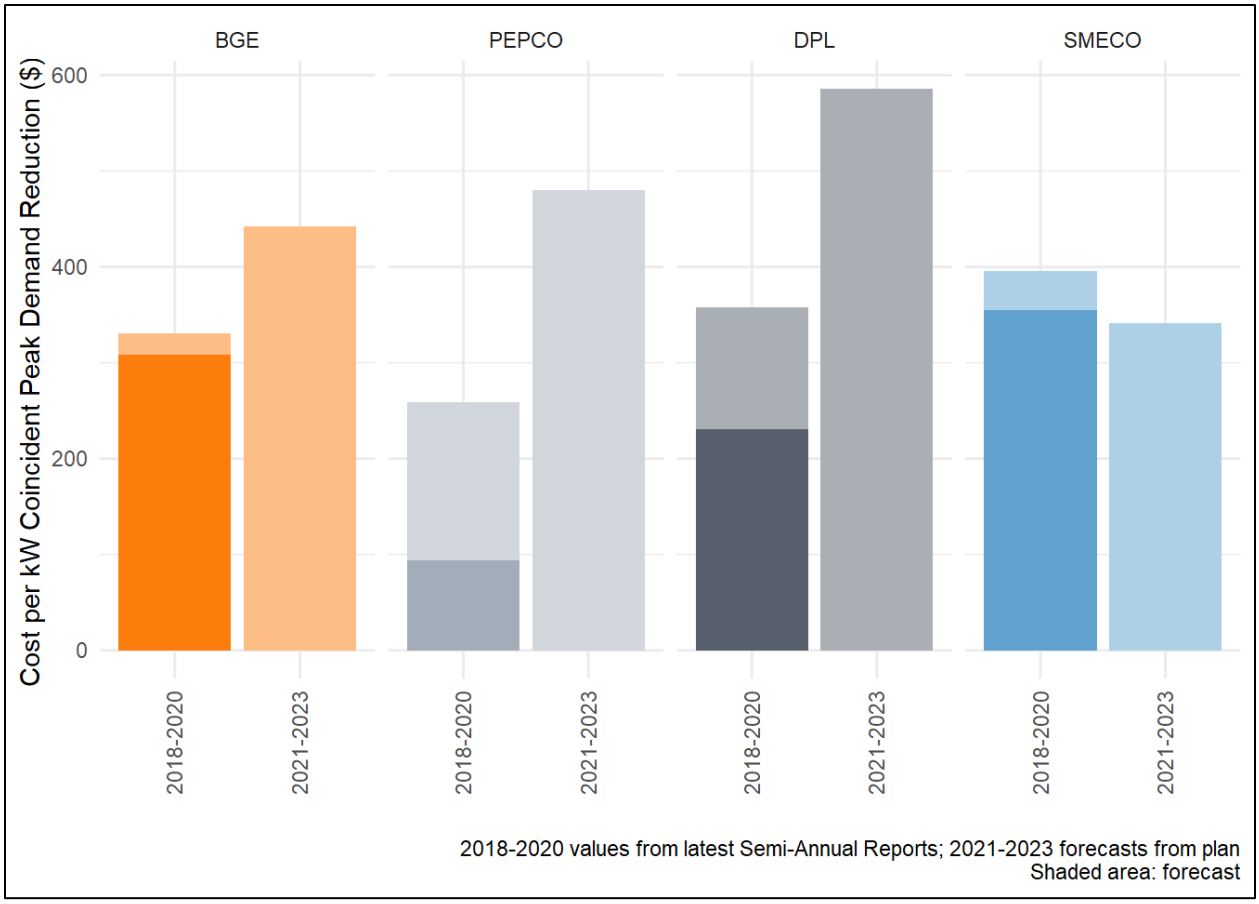

Figure 37: Demand Response Cost per kWh, Forecasted & Reported (2018-2020) and Forecast (2021-2023)

During the current cycle, utilities are below or well below their projected costs, which raises some questions about their forecast of significantly higher cost per kW—except SMECO—in the 2021-2023 plan. This may be due to programmatic expansions and ongoing costs to recruit participants and maintain the program. If the previous cycle is any indicator, the utilities may see improved performance relative to these forecasts. Programs like BGE's Connected Rewards, which has a long-term vision to allow more devices to be compatible DR resources, speaks to the potential scalability of residential DR resources.

Changes from Current Programs

Washington Gas intends to pilot a Gas DR program that appears similar to the electric utilities' device-based programs. As of late 2019, BGE was approved to sunset their PeakRewards DLC program and bring online their Connected Rewards bring-your-own-device (BYOD) program. The new program is designed to be offered to any new smart thermostat installation, and program registration is co-branded and coordinated between the utility and the manufacturer. SMECO and BGE both expect to pilot and expand their BYOD offerings and may include using different devices

as DR resources. BGE plans to pilot a Virtual Power Plant (VPP) offering that leverages controllable electric battery storage for grid needs.

ANALYSIS & BEST PRACTICES

BGE, Pepco, Delmarva, and SMECO offer DR programs centered around remote control of specific devices, typically air conditioning systems. While each utility offers a device-based DR program, Pepco (Energy Wise Rewards), Delmarva (Energy Wise Rewards), and SMECO (CoolSentry) are more traditional direct load control (DLC)-type programs while BGE has begun the process of sunsetting their DLC program – Peak Rewards – to a more device-agnostic program, Connected Rewards. While Connected Rewards is focused on eligible smart thermostats currently, BGE expects to pilot additional products in this (BYOD offering, which may include ductless minisplits, pool pumps, and other internet-enabled devices.

BGE and Pepco include what are essentially behavior-based DR programs leveraging economic incentives utilizing smart meters, known as Peak Time Rebates. These programs deploy advanced notifications via email, text message, phone call, and app notifications (when possible, new for BGE in 2020) to participating customers. These messages may include tips on how to save energy.

As DR programs understandably embrace internet-connected devices in lieu of programs relying on radio signals, a gap may emerge between households who can afford internet access and those that cannot. While may households of varying incomes have internet access, it is not always the kind of persistent, high-speed access suitable for connected devices. According to Pew Research Center, while 73% of American households in 2019 had broadband access, but only 56% of homes making less than $30,000 did; 26% of homes making less than $30,000 were smartphone dependent, while only 6% of homes making more than $75,000 were smartphone dependent.

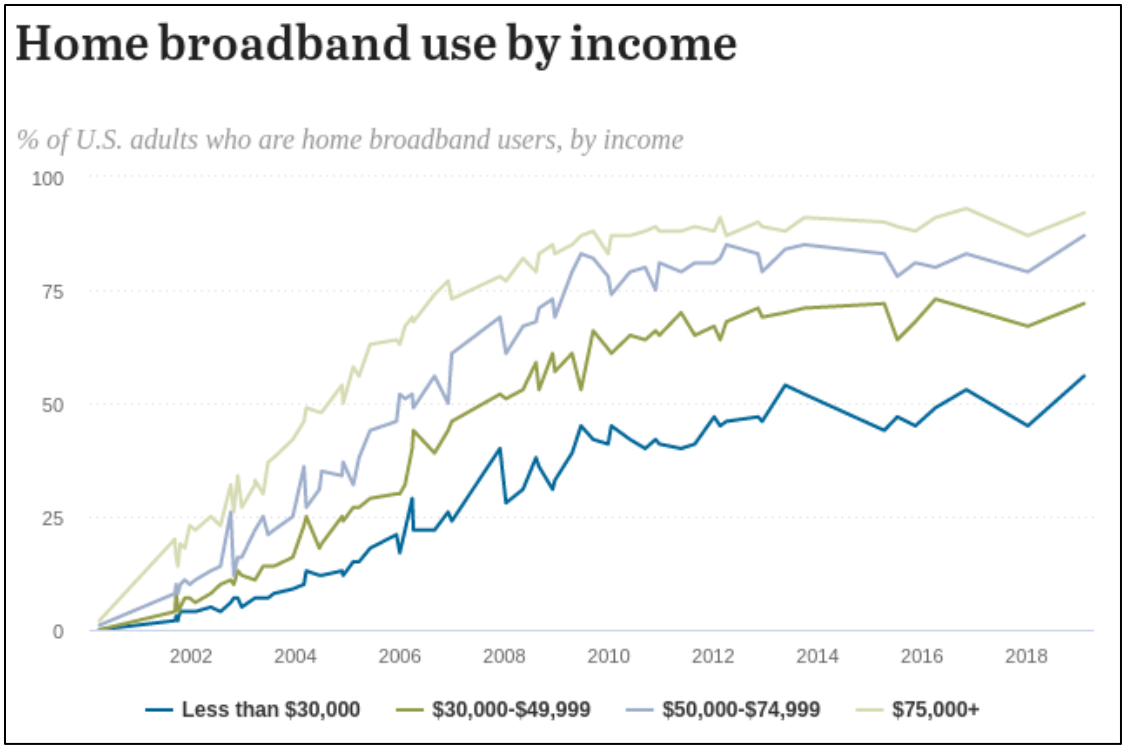

Figure 38: Home Broadband Use by Income[60]

If households without this type of internet access are left behind, the cost-saving benefits (and potential grid resource) from DR programs may continue to widen energy burdens, especially as the time and use of energy consumption becomes more important to grid stability.

DEMAND RESPONSE PROGRAM RECOMMENDATIONS

Direct Potomac Edison to offer Demand Response programs along with the other electric utilities.

Demand response provides significant benefits to consumers and the utility system as a whole and should be integrated into the EmPOWER portfolio for all utilities.

Require BGE, Pepco and DPL to describe in more detail why the cost of demand reduction savings are forecast to increase so substantially.

The utilities should provide additional information for cost increase forecasts, given that actual costs were so far below forecasts for Pepco and DPL during the 2018-2020 cycle.

A Connected Device Work Group should meet to develop solutions that bridge DR, smart/connected devices, and behavioral domains.

This should be part of a connected home roadmap described in our overall recommendations at the beginning of this report. The scope of work should also include consistent and appropriate

[60] Figure citation needed – Pew Research

reporting methods for programs that bridge traditional boundaries, as described in previous program sections.

Utilities should look for ways to test and integrate DR program marketing tactics to further optimize performance of programs.

Utilities should investigate how changes in message content, cadence, and timing influences performance and persistence amongst DR participants.

For utilities that do not yet offer behavioral DR programs, i.e. Potomac Edison and Delmarva, prioritize plans that bring these tools and services online, and for all utilities, ensure that households without broadband are priority targets for behavioral DR programs.

Whether they use Direct Load Control approaches or Bring Your Own Device, device-based DR programs have provided significant benefits for all utilities that have employed them. Behavioral DR programs that give consumers clear signals to respond to critical peaks are also important. Behavioral DR programs also provide opportunities for households without broadband internet to participate and benefit.

Investigate the prevalence of broadband internet connectivity across the state and consider the interrelationship of access to broadband and DR programs.

School Education Program

Several EmPOWER utilities have been offering School Education programs in the 2018-2020 program cycle. In the 2021-2023 plans, all of the EmPOWER electric utilities have proposed to offer a School Education Program.

These programs seek to engage school-age children – most frequently at the 5th grade level – in learning about energy efficiency through a curriculum designed to integrate with state and national standards and help advance Science, Technology, Engineering, and Math (STEM) skills through energy-based education. These programs include at a minimum: a kit with low-cost energy efficiency measures for each student participant and the teacher to bring home, teacher and student workbooks aligned with the curriculum, student and teacher surveys, and materials about EmPOWER programming. Most programs also offer a cash incentive (usually $50) for participating teachers that return a minimum number of student surveys. The teacher incentive is designed to help offset the cost of any classroom materials needed to support the program.

OVERVIEW OF UTILITY THREE-YEAR PLANS

Proposed Savings, Participation, and Spending

As shown in Table 16 below, the forecasted energy savings and cost per participant for the schools program varies considerably among the utilities. Savings per participant ranges from a low of 82 kWh for Delmarva to a high of 594 kWh for Pepco while the utilities note that they are following the same basic program design. We suspect this may be an error in either or both utilities forecasts, and this should be clarified by Pepco and Delmarva.

Table 16: 2021-2023 Schools Programs Savings, Participation, and Savings Forecasts

	Potomac	BGE	Pepco	DPL	SMECO
Total Annualized Energy Savings (MWh)	2,173	19,199	34,271	1,722	1,253
Total Participants	9,000	181,270	57,695	20,910	5,085
Total Program Costs	$ 1,354,183	$ 7,734,595	$ 1,805,287	$ 889,181	$ 1,543,967
Savings per Participant (Kwh)	241	106	594	82	246
Cost per Participant	$ 150	$ 43	$ 31	$ 43	$ 304

We also note SMECO's very high cost per participant – more than double the forecasted cost of Potomac Edison and nearly 10 times more than Pepco's. Since SMECO's approach includes direct install measures for schools as a result of the energy audit capstone component, there may be

some C&I measure costs embedded within the cost of the program. We recommend SMECO break out these measure costs and report them accordingly.

Changes from Current Programs

Potomac Edison, Delmarva, and SMECO had program offerings in 2018-2020 that engaged school age children in some way. For the 2021-2023 program cycle, BGE and Pepco have also added Schools programs and while the basic approach of the programs remains the same, a couple of new elements have been introduced by SMECO that may warrant consideration from other utilities.

In addition to the basic program elements described above, SMECO proposed offering each student participant that completes the curriculum's online quiz a $25 coupon for SMECO's online store where their family can purchase a variety of energy efficiency measures. They also propose to include a capstone activity where the students will conduct a "school audit" to search for energy efficiency opportunities in their school based on what they learned. They further propose to provide the recommended measures to the school at no cost. It is expected that most measures will be relatively low-cost and can be installed by school facilities personnel, such as advanced power strips and LED lighting. These are both excellent ideas to make the most out of the engagement opportunity offered by a Schools program. SMECO should report on the impacts of these new program elements and, if they are successful, other utilities should consider adding them to their Schools programs.

ANALYSIS & BEST PRACTICES

The program designs offered by the utilities in their 2021-2023 plans appear to largely align with best practices seen in other jurisdictions. All utility plans except Potomac Edison explicitly call out their programs' focus on integrating with national and state education standards. They also use surveys for program feedback and to gauge engagement of teachers and students in the programming, both of which can lead to better energy savings results.

One element that has had demonstrated success in other states is developing elements that work well with remote learning. For example, Xcel Energy's School Education program in Colorado provides online and DVD materials which are particularly helpful for remote learners.[61] Given the ongoing COVID-19 pandemic, we recommend all utilities offering Schools programs find ways to make their programs accessible to remote learners.

[61] https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/School-Education-Kits-Evaluation.pdf

SCHOOL EDUCATION PROGRAM RECOMMENDATIONS

Pepco and Delmarva should report back to the Commission on why their Schools programs have such vastly different savings forecasts per participant when they follow the same basic program design.

Pepco's savings per participant is forecasted to be seven times greater than Delmarva's which doesn't make sense based on the program descriptions offered in their 2021-2023 plans.

SMECO should report on the impacts of the $25 coupon for student families to the online store and the measures provided to schools based on the "school audit" element of its curriculum.

The other electric utilities should consider integrating these elements into their own Schools programs if they are successful.

SMECO should report on how much of its Schools Program budget is associated with supporting C&I direct install measures in schools rather than the residential measures included in school kits.

While we are excited about this new approach, costs and savings should be reported to the appropriate sector.

Given the ongoing COVID-19 pandemic, we recommend all utilities offering Schools programs consider ways to make their programs accessible to remote learners

All of these programs would appear to also work in an online learning environment. We recommend the utilities work with their vendors to assess the costs and any implementation challenges associated with offering an online learning option.

Energy Efficiency Kits

Energy efficiency kits distribute low-cost energy efficiency measures such as LED lighting and smart strips, and water saving measures such as faucet aerators and high efficiency showerheads. They also typically include customer information to support proper installation of the measures and to inform them about other EmPOWER program offerings. Energy efficiency kits have been used to provide all EmPOWER utility customers with a way to realize energy saving benefits; however, there has been concern over the years about whether kit contents were actually installed and whether they were creating unnecessary waste. There was also concern about some utilities over-relying on kits at the expense of programs with deeper savings.

In 2018-2020, Potomac Edison and SMECO offered energy efficiency kits to their customers. In the 2021-2023 plans, all utilities except BGE propose to offer some form of an energy efficiency kits program. In addition, DHCD proposes to incorporate energy efficiency kits into its portfolio of programs offered to limited income customers. The various approaches proposed are described below.

OVERVIEW OF UTILITY THREE-YEAR ENERGY EFFICIENCY KIT PLANS

Proposed Savings, Participation, and Spending

Table 17 below shows the total forecasted savings, participation, and spending for EE kits programs in 2021-2023. Note that Pepco and Delmarva have only included costs and no savings as they propose to run their kits programs through their Program Investigation, Design, and Development (PIDD) process.

Table 17: 2021-2023 EE Kits Savings, Participation, and Savings Forecasts

	PE	Pepco	Delmarva	SMECO
Total Annualized Energy Savings	21,210	NA	NA	12,723
Total Participants	75,000	NA	NA	50,000
Total Program Costs	$4,732,296	$1,379,498	$1,110,559	$2,992,803
kWh Savings per Participant	283	NA	NA	254
Cost per Participant	$63.10	NA	NA	$59.86

Washington Gas also proposes to add EE kits to its Residential Existing Homes program; however, unlike the electric utilities, Washington Gas does not break out budget, participation, and savings information for sub-programs. We recommend the Commission order Washington Gas to align its reporting detail to the level of detail offered by the other EmPOWER utilities.

Changes from Current Programs

While Potomac Edison and SMECO have offered energy efficiency kits in 2018-2020, both have proposed some design changes to their 2021-2023 offerings. Potomac Edison proposed to offer kits to new residential customers in its service territory, a program approach used by SMECO in 2018-2020. Potomac Edison also proposes to send kits to customers that request them and that kits may also be distributed to food banks and non-profit agencies serving limited income people in its service territory.

SMECO will continue with the same "welcome" kit for new customers and for customers that request them, which includes LEDs and a hand-held high efficiency showerhead, but they will add to the kits a coupon for up to 2 LED outdoor bulbs that can be redeemed at its online store. We appreciate SMECO's inclusion of another energy efficiency measure and find the provision of coupon redeemable at its online store to be an innovative way to support new measures while giving its customers choice.

Pepco and Delmarva propose to pilot a new approach to engaging customers with energy efficiency kits. They each propose to test a kit subscription offering whereby participants would receive 6-10 kits within a 2-year timeframe. Kits are designed around specific types of measures such as seasonal savings opportunities, baseload measures, smart home devices, weatherization measures, and water savings. For this pilot, customers can choose which kits they would like to receive. Pepco and Delmarva also note that kit contents can be adaptable to incorporate new technologies as they become available. They hope that by providing energy efficiency measures and information in smaller, more targeted ways that they can increase customer engagement and improve measure installation and maintenance.

Providing specialized kits and improved customer engagement through them is a promising approach to maximizing the savings associated with energy efficiency kits. It also provides customers increased opportunities to save, especially when in-home services can't be provided as has been the case during COVID-19. We are eager to see the results of Pepco and Delmarva's pilots.

Washington Gas also proposes to add energy efficiency kits to its suite of programs in the next program cycle. Like Pepco and Delmarva, it proposes to offer 3 different kits which customers can choose from: space heating, water heating, or a kit with a combination of space and water heating measures.

DHCD's proposed energy efficiency kit program is intended to broaden the number of limited income households that receive energy efficiency measures and engage them in further energy efficiency services provided by DHCD. DHCD proposes to send an energy efficiency kit to every new applicant/client referral. They note that many referrals do not convert into weatherization

projects for a variety of reasons such as lack of interest, inability to get landlord permission, and distrust of outside organizations. By sending them an energy efficiency kit, those households will get at least some amount of energy saving benefit from EmPOWER even if they are unable or choose not to participate further.

ANALYSIS & BEST PRACTICES

Kits have been part of energy efficiency programming for many years. Concerns about past iterations of kit programs were largely associated with CFLs which require proper disposal and were more often left uninstalled due to some quality issues early on. With LEDs coming down in price and improving in quality, this issue has been largely resolved.

Energy efficiency kits provide an opportunity for programs to reach many customers for relatively little money. They serve as an introduction or entry point for customers to learn about energy efficiency measures and additional opportunities to save energy through programs and behavior changes. A white paper written by Illume Advising analyzed a dozen third party evaluations of kit programs and identified best practices for maximizing the savings of energy efficiency kits, which include high quality outreach and engagement of customers so they know what they are receiving and how to install the kits, and partnering with community-based organizations to distribute and, if possible, install kit contents.[62] The kit programs proposed by the utilities and DHCD employ many best practices and are testing new approaches and incorporating new technologies.

ENERGY EFFICIENCY KITS RECOMMENDATIONS

DHCD and the utilities should coordinate on their kit offerings to avoid duplicate kit mailings to limited income households.

The utilities offering kits have highlighted an interest in increasing kit distributions to limited income customers while DHCD proposes to send an energy efficiency kit to all income qualified referrals. This could present some risk of duplicate kit mailings. Since all of the utilities' kit programs appear to require the customer to request a kit in order to receive them, this may be largely avoidable, but should be confirmed and well-coordinated.

DHCD should analyze the percent of direct mailings to its various referral lists that are returned for the wrong address or because the applicant has moved before it implements a broad kit mailing.

Mass mailings usually result in some number of returns due to bad/wrong addresses. DHCD should understand how many kits may be returned (with contents potentially damaged and unable to be reused) through a mass mailing campaign. DHCD could also consider a program design whereby applicants are asked if they would like to receive a kit. We understand this will

[62] https://illumeadvising.com/files/2016/08/KitsWhitePaper_Final.pdf

result in less kits being distributed, but it could also lead to better energy savings results and less waste.

The Commission should order Washington Gas to provide the same level of detail on EE kits and other sub-programs as the EmPOWER electric utilities.

Sub-program detail provides the Commission, evaluators, and other stakeholders with the information necessary to assess the effectiveness of sub-programs. Providing this level of detail is useful in identifying both concerns that should be addressed and best practices that should be replicated by others.

Other Proposals

EmPOWER Utilities are proposing new or continued initiatives not covered directly in the preceding sections.

LOW-MODERATE INCOME LOCATION-BASED DEMAND MANAGEMENT PILOT

BGE, Pepco, DPL and WGL are proposing a pilot to reduce electricity or gas demand in areas that that may face system constraints and have a higher degree of low to moderate income (LMI) households. SMECO says it is "considering" such a pilot as well. The electric utilities propose to overlay areas of current or possible grid-constraint with census data indicating income levels. WGL proposes to identify LMI areas that are constrained or targeted for distribution expansion. Once areas are selected, the utilities will offer enhanced incentives and engagement to increase energy efficiency improvements and thereby reduce, postpone or avoid the need for costly system upgrades. Although it is not clearly stated in the filed plans, it appears that all customers—including commercial customers—in the target areas will be eligible to participate.

The electric utilities also propose to consider additional "resiliency" measures. This is not defined but may refer to battery storage.

More details will be required before these pilots are implemented.

Location-based targeting of energy efficiency and other distributed energy resources as a "non-wires alternative" is an important strategy for EmPOWER utilities to gain experience with. While this strategy should ultimately be deployed wherever it is less expensive than the grid upgrades, we commend the utilities for initiating this pilot approach in LMI areas where the direct benefits will also serve customers with greater needs.

EFFICIENCY FOR AFFORDABLE HOUSING PROGRAM (DELMARVA)

Delmarva will continue its multifamily retrofit program, funded by the Pepco-Exelon merger settlement since 2018. This program brings together existing programs with additional support and incentives to make improvements to multifamily buildings in limited income or rent-controlled areas. The program is structured to require no or low costs to residents and building owners. Measures may include smart thermostats, LED lighting, ENERGY STAR refrigerators, heat pump water heaters, or mini split HVAC.

Settlement funds for this program will be exhausted in the upcoming cycle.

RECOMMENDATIONS

The commission should require the utilities participating in the LMI location-based DSM pilot to track in detail the types of measures installed to assess their relative cost-effectiveness

To serve as non-wired alternatives outside of a pilot context, and provide equal reliability benefits as traditional system upgrades, the impact of DSM measures must be carefully documented and verified. The utilities should be prepared to use this pilot to not only prove a concept, but to gather data about which measures prove most impactful and cost-effective at reducing demand. This must include analysis of hourly savings from different measures (even if on a TRM basis, not a metered basis.)

Delmarva should provide a detailed report on the Efficiency for Affordable Housing Program to share lessons applicable to the multifamily sector across the state

Given the importance and complexity of capturing energy efficiency savings in multifamily buildings, all EmPOWER utilities, and other stakeholders, should benefit from the lessons Delmarva learns during this initiative.