PUBLIC SERVICE COMMISSION OF MARYLAND

The EmPOWER Maryland Energy Efficiency Act STANDARD REPORT OF 2018

With Data for Compliance Year 2017

In compliance with Section 7-211 of the Public Utilities Article, Annotated Code of Maryland

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Report Contents

This document constitutes the 2018 annual report of the Public Service Commission of Maryland regarding the EmPOWER Maryland Energy Efficiency Act ("EmPOWER Maryland" or "EmPOWER"). This Report is submitted in compliance with §7-211 of the Public Utilities Article, *Annotated Code of Maryland* ("PUA"). PUA §7-211 requires that, on or before March 1 of each year, the Commission, in consultation with the Maryland Energy Administration ("MEA"), shall report to the General Assembly on the following:

- 1. the status of programs and services to encourage and promote the efficient use and conservation of energy, including an evaluation of the impacts of the programs and services that are directed to low-income communities, low-to moderate-income communities to the extent possible, and other particular classes of ratepayers;
- 2. a recommendation for the appropriate funding level to adequately fund these programs and services; and
- 3. in accordance with subsection (c) of this section, the per capita electricity consumption and the peak demand for the previous calendar year.

In compliance with PUA §7-211, topics addressed in this report include a summary of: the Energy Efficiency & Conservation ("EE&C") and Demand Response ("DR") program achievements; and information regarding forthcoming milestones.

Executive Summary

The Commission reviews the progress of EmPOWER programs on a semi-annual basis, typically in May to review the results of the third and fourth quarters of the previous year, and again in October to review the results of the first and second quarters of the current year. As part of these semi-annual hearings, parties may also request program modifications and budget adjustments. As needed, the Commission also holds *ad hoc* proceedings to address specific EmPOWER elements.

The Commission held a legislative-style hearing on May 23, 24, and 25, 2017 to review the semi-annual EmPOWER reports with data from the third and fourth quarters of 2016 filed by the EmPOWER Maryland Utilities¹ and Washington Gas Light Company ("WGL") (hereinafter "Utilities"), and the Maryland Department of Housing and Community Development ("DHCD"),. Following these hearings, on September 26, 2017, the Commission issued Order No. 88402 that addressed program design and marketing issues. Specifically, the Commission directed the Utilities to create a standardized protocol for Commercial and Industrial ("C&I") project pre-approvals and the Behavior Based Work Group to develop a report for future

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¹ The "EmPOWER Maryland Utilities" (electric) are The Potomac Edison Company ("PE"), Baltimore Gas and Electric Company ("BGE"), Delmarva Power & Light Company ("Delmarva" or "DPL"), Potomac Electric Power Company ("Pepco"), and Southern Maryland Electric Cooperative ("SMECO").

consideration by the Commission. Further, the Commission directed the Utilities to include specific messaging related to EmPOWER across six different marketing mediums.

The Commission held its second legislative-style hearing on October 25, 26, 27, 30, and 31, 2017 to consider the semi-annual EmPOWER reports for the first and second quarters of 2017 and the 2018-2020 plan proposals filed by the Utilities, WGL, and DHCD. On December 22, 2017, the Commission issued Order No. 88514, which approved the 2018-2020 plans for the Utilities, WGL, and DHCD, subject to the conditions and modifications listed in the Order. The Order also directed several work groups, including the Marketing and Smart Thermostat Work Groups, to develop reports to be filed throughout 2018 for the Commission's review.

Initiative Highlights

- Program-to-date, the Utilities' EmPOWER Maryland programs have saved a total of 7,605,324 MWh and 2,693 MW. This translates into over 71.1 billion kilowatt-hours ("kWh") saved over the lifetime of the installed measures, which is equivalent to \$8.4 billion in lifetime energy bill savings.
- Across all Utilities, the lifecycle cost per kWh for the EE&C programs is \$0.023 per kWh²—significantly lower than the current cost of Standard Offer Service ("SOS"), which ranges from \$0.069 to \$0.081 per kWh.
- Program-to-date, the Utilities have spent over \$2.4 billion on the EmPOWER Maryland programs, including approximately \$1.5 billion on EE&C programs and \$703 million on DR programs.
- EmPOWER EE&C programs continue to be cost effective on a statewide basis in 2017, with a statewide Total Resource Cost ("TRC") score of 2.08 verified for program year 2016. For every dollar of reported utility or participant cost, the EmPOWER EE&C programs generate approximately \$2.08 in benefits.
- Program-to-date, 29,548 limited-income customers participated in EmPOWER Maryland through the Residential Limited-Income Programs. Of the program-to-date participants, 4,121 limited-income households participated in 2017. The average savings per participant in 2017 was 1,265 kWh. Program-to-date spending on limited-income energy efficiency programs is approximately \$144.8 million.
- The average monthly residential surcharge bill impacts for 2017 were as follows:³

² The lifecycle cost per kWh is calculated by dividing the total EE&C expenditures by the total lifecycle energy savings of the Utilities.

³ Bill impacts are calculated assuming an average residential monthly usage of 1,000 kilowatt-hours ("kWh"). The calculated bill impact does not reflect savings produced by EmPOWER Maryland programs through reduced customer usage or energy rate reductions due to reduced system demand.

Table 1: Average Monthly Residential Bill Impacts from EmPOWER Maryland Surcharge in 2017

REPORT ALM	EE&C	DR	Dynamic Pricing ⁴	Total
BGE	\$3.86	\$2.47	(\$0.05)	\$6.28
DPL	\$5.74	\$1.89	(\$0.85)	\$6.78
PE	\$6.31	N/A	N/A	\$6.31
Pepco	\$5.79	\$2.92	(\$1.12)	\$7.59
SMECO	\$5.13	\$3.53	N/A	\$8.66

• The reported energy savings for 2017 and program to date are as follows:

Table 2 EE&C Reported Achievements^{5,6}

	Incremental 2017 Reported Energy Savings (MWh) ⁷	2017 Energy Savings Target (MWh)	2017 Energy Savings as a % of 2013 Retail Sales Baseline	2017 Target Energy Savings %	Program-to- Date Reduction (MWh) ⁸
BGE	668,340	631,138	2.05%	1.94%	3,564,995
DPL	128,928	88,557	2.82%	1.67%	570,373
PE	75,853	76,060	1.00%	1.17%	744,905
Pepco	427,446	268,599	2.73%	1.72%	2,358,731
SMECO	57,850	78,284	1.60%	2.17%	318,163

⁴ The difference between rebates paid to participants and revenues received from PJM markets are trued-up in the subsequent calendar year review of the EmPOWER Maryland surcharge. Therefore, the 2016 dynamic pricing bill impacts include trued-up costs associated with the Peak Time Rebate program offered by BGE, DPL, and Pepco in the summer of 2015. Pepco's dynamic pricing surcharge was negative in 2016 (*i.e.* resulted in a credit) because the PJM Capacity payments received by Pepco exceeded the rebate credits paid to customers.

⁵ "Reported savings" constitute unverified energy savings and demand reductions based on the Utilities' quarterly programmatic reports. An independent, third-party verification of reported savings is conducted annually.

⁶ EmPOWER Maryland 2017 Annual Target was defined in the Schedule for Evaluation of Utilities' Achievement of 2015-2017 Program Cycle Goals in Order No. 87285 (Dec. 8, 2015) at 28.

⁷ Based on preliminary energy savings from semi-annual programmatic reports. These savings will be verified through an EM&V process.

⁸ Program-to-date reported reductions include savings contributions from Fast Track Programs, which were Lighting and Appliance Rebate programs that began before the EmPOWER Maryland Law was enacted.

EmPOWER Maryland Portfolios

For the 2015-2017 program cycle, the Commission directed the Utilities to meet the EmPOWER Maryland goals through a diverse array of cost-effective solutions for Maryland ratepayers, which can include EE&C, DR, and Advanced Metering Infrastructure ("AMI") or Smart Grid-enabled opportunities.⁹ While the EmPOWER Maryland Act mandates that the Commission require each gas and electric utility to establish energy efficiency programs, the directive is limited to those programs that the Commission deems appropriate and cost effective. Furthermore, the Commission must consider the impact on rates of each ratepayer class in determining whether to approve an energy efficiency program. Other statutory factors that the Commission must consider in determining whether an energy efficiency program is appropriate include the impact on jobs and on the environment.¹⁰

In order to verify the Utilities' energy and peak demand savings resulting from individual EE&C and DR programs, the Commission has developed an independent, third-party Evaluation, Measurement & Verification ("EM&V") process for the EmPOWER programs, consistent with national best practices. See the "Evaluation, Measurement & Verification" section herein for further information. Beginning with the 2016 program year, the Utilities were evaluated against the post-2015 electric energy efficiency goals established by Order No. 87082, 11 which are designed to achieve an annual incremental gross energy savings equivalent to 2.0 percent of the individual utility's weather normalized gross retail sales baseline, with a ramp-up rate of 0.20 percent per year.

Energy Efficiency & Conservation Programs

In Order No. 86785, issued on December 23, 2014, the Commission approved plans for the 2015-2017 program cycle. The Utilities' EmPOWER Maryland core EE&C program offerings are similarly designed with standardized customer incentives across the State, albeit with some variation in program implementation based on service territory demographics. Residential EE&C programs include discounted light-emitting diodes ("LEDs"); appliance rebates and recycling; heating, ventilation, and air conditioning ("HVAC") rebates; home energy audits; weatherization; and limited-income programs. Commercial and Industrial EE&C programs are designed to encourage businesses to upgrade to more efficient equipment, such as lighting or HVAC retrofits, or to improve overall building performance through weatherization

⁹ Beginning in 2015, the Commission also directed WGL to implement natural gas energy efficiency and conservation programs. See Case No. 9362, In the Matter of Washington Gas Light Company's Energy Efficiency, Conservation and Demand Response Programs Pursuant to the EmPOWER Maryland Energy Efficiency Act of 2008.

¹⁰ PUA §7-211(i)(1). In its evaluation of a program or service, the Commission must consider the following four factors: cost effectiveness, impact on rates of each ratepayer class, impact on jobs, and impact on the environment.

The electric energy efficiency goals are codified in statute for the duration of the 2018-2020 and 2021-2023 program cycles as a result of legislation enacted during the 2017 legislative session. See Md. Laws Ch. 014 (2017); PUA § 7-211(g).

Other than the volumetric surcharge collected from all ratepayers, limited-income programs are offered at no additional cost for those who qualify.

or building shell upgrades. For larger commercial buildings or industrial facilities, a utility can customize its program offerings for cost-effective improvements.

As the 2015-2017 EmPOWER Maryland program cycle ends and the 2018-2020 EmPOWER Maryland program cycle begins, there are several changes to evaluation parameters, building codes, and efficiency standards that have reduced the *incremental* energy and demand savings derived from the installation of efficient lighting, appliances, and equipment incentivized by EmPOWER programs or will be in the future. Table 3 provides some examples of changes to federal codes and standards, although it does not represent an exhaustive compilation. For products to qualify under EmPOWER, they must be Energy Star qualified. The increases in standards impact the types and quantities of measures that qualify for the EmPOWER programs. Some of these baseline changes result in reduced savings potential available from historically-predominant EmPOWER Maryland programs, such as lighting-based programs.

Table 3 Energy Star Standard Changes Occurring in 2017

	0 0	
Measure	New Standard	Effective Date
Lighting	Version 2.0	January 2017
Commercial Refrigerators and Freezers	Version 4.0	March 2017
Clothes Dryers	Version 1.1	May 2017

Baltimore Gas and Electric Company ("BGE")

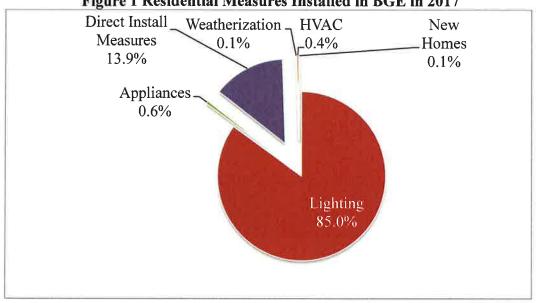
BGE EmPOWER Programs				
Residential Program	Commercial Programs			
Appliance Rebate	Benchmarking			
Appliance Recycling	Building Operator Certification			
Behavior Based	Combined Heat and Power			
Natural Gas Conversions	Custom			
Home Performance with Energy Star	Energy Analytics			
HVAC	Master-Metered Multi-Family			
Lighting	Prescriptive			
Quick Home Energy Check-up	Retrocommissioning			
Residential New Construction	Small Business Solutions			
	Upstream Lighting			

BGE realized 114 percent of its 2017 annual energy savings target (or 665,792 MWh) and 104 percent of its forecasted 2017 annual demand reduction target (or 418 MW). BGE's programs reached over 213,000 participants and installed over 4.5 million measures in homes and businesses in the BGE service territory for approximately \$136.5 million.

Table 4 BGE Reported Savings vs Targets for 2017

	Incremental 2017 Reported Savings	2017 Target Savings ^{13,14}	% of Target Achieved
MWh	665,792	584,505	114%
MW	418	402	104%

Figure 1 Residential Measures Installed in BGE in 2017



Potomac Electric Power Company ("Pepco")

Pepco EmPOWER Programs					
Residential Program	Commercial Programs				
Appliance Rebate	C&I New Construction				
Appliance Recycling	Combined Heat and Power				
Behavior Based	Custom				
Home Performance with Energy Star	Master-Metered Multi-Family				
HVAC	Prescriptive				
Lighting	Retrocommissioning				
Quick Home Energy Check-up	Small Business Solutions				
Residential New Construction					

Pepco realized 117 percent of its 2017 annual energy savings target (or 426,720 MWh) and 103 percent of its forecasted 2017 annual demand reduction target (or 376 MW). Pepco's programs reached over 464,000 participants and installed over 4.9 million measures in homes and businesses in the Pepco service territory for approximately \$76.5 million.

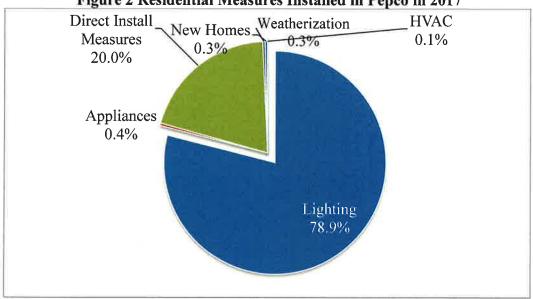
¹³ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each utility.

¹⁴ The demand reduction targets and reported achievements include peak demand reductions generated by both EE&C and DR programs, as both components are part of the total portfolio.

Table 5 Pepco Reported Savings vs Targets for 2017

	Incremental 2017 Reported Savings	2017 Target Savings ^{15,16}	% of Target Achieved
MWh	426,720	364,351	117%
MW	376	365	103%

Figure 2 Residential Measures Installed in Pepco in 2017



Potomac Edison Company ("PE")

PE EmPOWER Programs				
Residential Program	Commercial Programs			
Appliance Rebate	Custom			
Appliance Recycling	Prescriptive			
Behavior Based	Small Business			
Home Performance with Energy Star				
HVAC				
Lighting				
Quick Home Energy Check-up				
Residential New Construction				

PE realized 85 percent of its 2017 annual energy savings target (or 75,421 MWh) and 100 percent of its forecasted 2017 annual demand reduction target (or 13 MW). The main reason behind PE not making its energy savings target for the program year was the underperformance of the C&I programs. PE's programs reached over 267,000 participants and installed over

 $^{^{15}}$ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each utility.

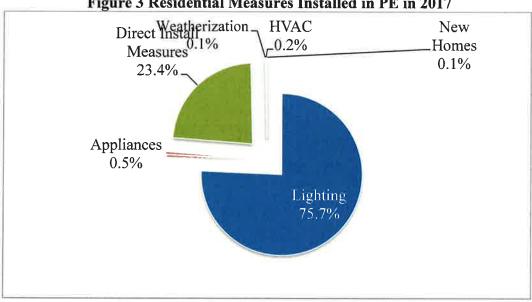
¹⁶ The demand reduction targets and reported achievements include peak demand reductions generated by both EE&C and DR programs, as both components are part of the total portfolio.

955,000 measures in homes and businesses in the PE service territory for approximately \$15.2 million.

Table 6 PE Reported Savings vs Targets for 2017

	Incremental 2017 Reported Savings	2017 Target Savings ¹⁷	% of Target Achieved
MWh	75,421	88,840	85%
MW	13	13	100%

Figure 3 Residential Measures Installed in PE in 2017



Delmarva Power & Light Company ("DPL")

DPL EmPOWER Programs					
Residential Program	Commercial Programs				
Appliance Rebate	C&I New Construction				
Appliance Recycling	Combined Heat and Power				
Behavior Based	Custom				
Home Performance with Energy Star	Master-Metered Multi-Family				
HVAC	Prescriptive				
Lighting	Retrocommissioning				
Quick Home Energy Check-up	Small Business Solutions				
Residential New Construction					

DPL realized 106 percent of its 2017 annual energy savings target (or 128,019 MWh) and 378 percent of its forecasted 2017 annual demand reduction target (or 87 MW). DPL's programs

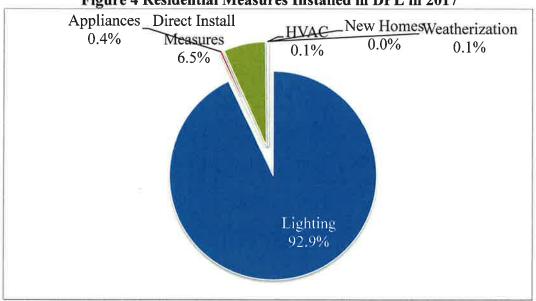
¹⁷ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each utility.

reached over 125,000 participants and installed over 1.1 million measures in homes and businesses in the DPL service territory for approximately \$21.2 million.

Table 7 DPL Reported Savings vs Targets for 2017

	Incremental 2017 Reported Savings	2017 Target Savings ^{18,19}	% of Target Achieved
MWh	128,019	121,121	106%
MW	87	23	378%

Figure 4 Residential Measures Installed in DPL in 2017



Southern Maryland Electric Cooperative ("SMECO")

SMECO EmPOWER Programs				
Residential Program	Commercial Programs			
Appliance Rebate	Custom			
Appliance Recycling	Master-Metered Multi-Family			
Assisted Home Performance with Energy Star	Prescriptive			
Behavior Based	Small Business			
Home Performance with Energy Star	Upstream Lighting			
HVAC				
Lighting				
Quick Home Energy Check-up				
Residential New Construction				

¹⁸ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each

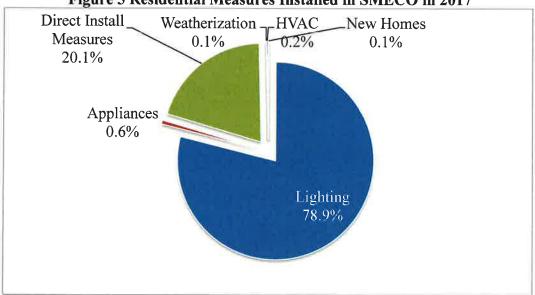
¹⁹ The demand reduction targets and reported achievements include peak demand reductions generated by both EE&C and DR programs, as both components are part of the total portfolio.

SMECO realized 99 percent of its 2017 annual energy savings target (or 57,247 MWh) and 57 percent of its forecasted 2017 annual demand reduction target (or 8 MW). The main reason behind SMECO not making its demand savings target for the program year was the underperformance of the Residential programs, specifically the Behavior program. SMECO's programs reached over 210,000 participants and installed over 944,000 measures in homes and businesses in the SMECO service territory for approximately \$21.7 million.

Table 8 SMECO Reported Savings vs Targets for 2017

	Incremental 2017 Reported Savings	2017 Target Savings ^{20,21}	% of Target Achieved
MWh	57,247	57,816	99%
$\mathbf{M}\mathbf{W}$	8	14	57%

Figure 5 Residential Measures Installed in SMECO in 2017



Washington Gas Light Company ("WGL")

WGL EmPOWER Programs			
Residential Program	Commercial Programs		
Residential Water Heater	C&I Water Heater		
Residential Heating System Replacement	C&I Heating System Replacement		
Behavior Based	C&I Boiler		
	Food Service		

²⁰ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each utility.

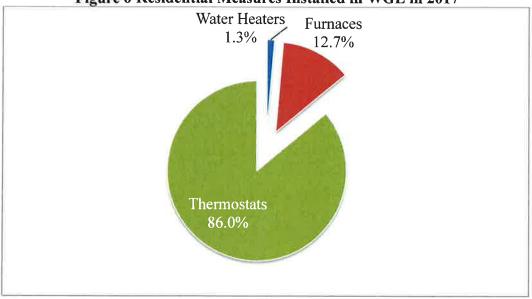
²¹ The demand reduction targets and reported achievements include peak demand reductions generated by both EE&C and DR programs, as both components are part of the total portfolio.

WGL realized 80 percent of its 2017 annual energy savings target (or 663,304 Therms). The main reason behind WGL not making its energy savings target for the program year was the underperformance of the C&I programs. This is WGL's first program cycle, and the C&I programs historically across EmPOWER have taken longer to become productive than the Residential programs. The electric utilities experienced a slow start as well in their first C&I program cycles. WGL's programs reached over 57,000 participants and installed over 57,000 measures in homes and businesses in the WGL service territory for approximately \$2.3 million.

Table 9 WGL Reported Savings vs Targets for 2017

	Incremental 2017	2017 Target	% of Target
	Reported Savings	Savings ²²	Achieved
Therms	663,304	829,871	80%

Figure 6 Residential Measures Installed in WGL in 2017



Limited-Income Programs

On December 22, 2011, the Commission in Order No. 84569 designated DHCD as the sole implementer of Limited-Income programs for the EmPOWER Maryland Utilities. In April 2012, DHCD accepted control of the residential limited-income programs of BGE, PE, and SMECO. In July 2012, the transition was completed with DHCD accepting control of the Pepco and DPL limited-income programs.

In Order No. 86785, issued on December 23, 2014, the Commission authorized DHCD to continue its implementation of the Limited-Income programs in Maryland during calendar year 2015, subject to certain specified structural enhancements such as spending guidelines per

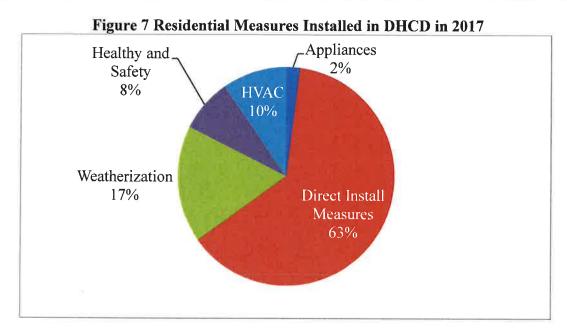
²² EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of each utility.

household. DHCD was approved as the implementer of the Limited-Income programs for the remainder of the 2015-2017 program cycle in Order No. 86995.

DHCD offers two programs, one for single family homes and another for multifamily properties. In 2017, DHCD weatherized approximately 4,108 limited-income homes and the common areas of 13 affordable multifamily dwellings at a total cost of \$25.3 million. Total energy savings per job averaged 1,167 kWh and 32,112 kWh, respectively. The number of participants and average energy savings per home decreased in 2017 when compared to the reported data for 2016; however, the average energy savings per common area increased.

Table 10 DHCD Reported Savings vs Targets for 2017

Program	Energy/Demand Savings	Incremental 2017 Reported Savings	2017 Target Savings ²³	% of Target Achieved
Single Family	MWh	3,705	10,314	36%
	MW	2.9	3.2	89%
Multifamily	MWh	1,507	5,000	30%
	MW	0.2	1.6	10%



Demand Response

The EmPOWER Maryland Act requires the Utilities to implement cost-effective demand response programs; although, there are not currently goals established for the magnitude of demand reduction that each Utility must target (following the realization of the legislatively mandated 15 percent by 2015 targets). The Commission approved four residential demand

²³ EmPOWER Maryland reduction targets are based upon the individual EmPOWER Maryland filings of DHCD.

response programs in late 2007 and early 2008,²⁴ all of which were operational by the end of 2009.²⁵

Customers who have actively chosen to participate in the direct load control programs included in the Utilities' demand response portfolios have a switch or thermostat installed at their properties to briefly curtail usage of central air conditioning or an electric heat pump in instances of system reliability issues or high electricity prices during critical peak hours. Each direct load control DR program includes the following common components: (1) customer participation in DR programs is voluntary; (2) upon receiving a customer request, the utility installs either a programmable thermostat or a direct load control switch for a central air conditioning system or for an electric heat pump on a customer's premise; (3) the Utilities provide a one-time installation incentive and annual bill credits to the participants during the specified summer peak months; and (4) with the exception of the SMECO DR program, customers can select one of three cycling choices (50 percent, 75 percent, or 100 percent). Utilities will invoke the cycling process when PJM calls for an emergency event or if the Utilities individually determine that an event is necessary during summer peak season. Table 11 summarizes the incentives offered by the Utilities to the program participants.

Table 11 Utilities' Incentive Levels for Demand Response Program Participants

	50% Cycling		75% Cycling		100% Cycling		Bill
Utility	Installation Incentive	Annual Bill Credit	Installation Incentive	Annual Bill Credit	Installation Incentive	Annual Bill Credit	Credit Months
BGE	\$50	\$50	\$75	\$75	\$100	\$100	Jun Sept
Pepco	\$40	\$40	\$60	\$60	\$80	\$80	Jun Oct
DPL	\$40	\$40	\$60	\$60	\$80	\$80	Jun Oct.
SMECO	***	\$50	***	\$75	N/A	N/A	Jun Oct.

^{***} A participant in SMECO CoolSentry program can keep the installed thermostat at no additional cost following 12 months of program participation; otherwise, the thermostat will be removed if the participant terminates participation less than 12 months after installation.

Table 12 summarizes the installation progress of these devices for each of the Utilities' direct load control program in 2017 and program-to-date through December 31, 2017. The 2017 device installations accounted for approximately -1 percent to 0.7 percent of the Utilities' program-to-date totals.

²⁵ The Commission did not approve a DR program for PE similar to those implemented for BGE, Pepco, DPL, and SMECO because PE's proposed program was not cost effective due to lower zonal capacity prices.

²⁴ See Commission Letter Order (Nov. 30, 2007).

²⁶ The three cycling choices represent the air conditioner compressor working cycled reduced by 50 percent, 75 percent, and 100 percent under PJM- or utility-invoked emergency events during summer peak season. SMECO only offers a 50 percent and 75 percent cycling level with corresponding bill credits of \$50 and \$75 during the summer months.

Table 12 Utilities' Residential Direct Load Program Device Net Installation

Utility	2017	Program-to-Date
BGE	923	367,977
DPL^{27}	(100)	38,604
Pepco	(1,648)	223,397
SMECO	325	46,069
Total	(500)	676,047

Table 13 summarizes the demand reductions achieved by the Utilities' DLC programs for 2017 and program-to-date. The total peak demand reduction reported in 2017 was -50 MW, or approximately 2,429 percent of the forecast, reinforcing the concern regarding market saturation. Program-to-date, the four Utilities have achieved 685 MW of demand reduction through the DLC programs.

Table 13 DLC Program Coincident Peak Demand Reduction (MW)

Utility	2017 Peak Demand Target	2017 Reported	Program-to- Date Reported
BGE	0.000	(54.647)	357.230
DPL	0.884	(0.129)	40.280
Pepco	(3.225)	3.708	231.928
SMECO	0.249	0.253	55.801
Total	(2.092)	(50.815)	685.239

Additional demand reductions are expected to stem from smart grid-enabled dynamic pricing programs, as well as from other non-EmPOWER funded programs, such as conservation voltage reduction ("CVR"). Table 14 summarizes the reported demand reductions from the dynamic pricing programs for 2013-2017. BGE, Pepco, and DPL are currently the only Utilities that operate dynamic pricing programs. Demand reductions from dynamic pricing programs represent a snapshot for a particular time period and are dependent upon customer engagement and participation; therefore, demand reductions attributable to dynamic pricing programs could change year-to-year.

Table 14 Dynamic Pricing Demand Reduction (MW)

		- 0			-
Utility	2013	2014	2015	2016	2017
BGE	0	209	309	336	330
DPL	0	0	143	39	31
Pepco	309	125	47	126	135
Total	309	334	499	501	496

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²⁷ The negative numbers for DPL and Pepco reflect that more customers left each of their direct load programs than new customers joined the direct load program.

The annual peak demand target represents incremental savings to the total capacity a utility has to call upon during a demand response event. Negative incremental savings means that customers left the program, resulting in a lower total capacity.

PJM RPM Capacity Market

In 2017, the Utilities' DLC programs resulted in a combined 425 MW bid into the PJM Reliability Pricing Model ("RPM") Base Residual Auction ("BRA") for Delivery Year ("DY") 2020/2021, a 15 percent increase from the 2016 PJM bid of 230 MW for DY 2019/2020. Todate, these programs have accounted for 6,554 MW of the total capacity bid into the PJM capacity market, which has resulted in a total of \$325.8 million in capacity payments PJM has or will make to the Utilities, thereby offsetting the total cost of the DLC programs, which totaled over \$703.4 million through the end of 2017. Table 15 summarizes the capacity bid into the PJM capacity market from the DLC programs by delivery year, as well as the resulting payments the Utilities receive from PJM, which are then used to offset the DLC program cost to ratepayers.

Table 15 Demand Response Program BRA Results

	Cleared Capacity (MW)	PJM Capacity Payment (Million \$)
DY 2009/2010	217	\$18.8
DY 2010/2011	415	\$26.4
DY 2011/2012	662	\$26.6
DY 2012/2013	953	\$46.5
DY 2013/2014	803	\$67.7
DY 2014/2015	772	\$33.9
DY 2015/2016	625	\$36.0
DY 2016/2017	554	\$24.1
DY 2017/2018	536	\$23.5
DY 2018/2019	522	\$11.5
DY 2019/2020	230	\$1.6
DY 2020/2021	265	\$9.2
Total	6,554	\$325.8

The Utilities also bid capacity reductions from their EE&C programs and AMI-enabled dynamic pricing programs. Similar to the DLC programs, the Utilities earn capacity payments from PJM for these commitments; the payments are used to offset EE&C program costs and to fund the rebates earned by customers in the dynamic pricing program. Table 16 and Table 17 summarize the capacity bid into the PJM capacity market from the EE&C and dynamic pricing programs by delivery year, and the payments the Utilities receive from PJM.

Table 16 EE&C Program BRA Results

MERCINI NO CONTRACTOR OF STREET					
	Cleared Capacity (MW)	PJM Capacity Payment (Million \$)			
DY 2012/2013	168	\$8.2			
DY 2013/2014	107	\$8.7			
DY 2014/2015	179	\$8.3			
DY 2015/2016	175	\$10.2			
DY 2016/2017	226	\$9.5			
DY 2017/2018	243	\$10.8			
DY 2018/2019	172	\$10.1			
DY 2019/2020	184	\$6.8			
DY 2020/2021	199	\$5.8			
Total	1,653	\$78.4			

Table 17 Dynamic Pricing Program BRA Results

	Cleared Capacity (MW)	PJM Capacity Payment (Million \$)
DY 2014/2015	267	\$12.2
DY 2015/2016	426	\$23.3
DY 2016/2017	461	\$20.0
DY 2017/2018	387	\$17.0
DY 2018/2019	378	\$10.0
DY 2019/2020	225	\$2.2
DY 2020/2021	425	\$13.1
Total	2,569	\$97.8

Table 18 illustrates the amount of capacity cleared in the BRA by the EmPOWER Utilities for the delivery years of 2019/2020 and 2020/2021. The table also shows the amount of capacity revenue that the Utilities can expect to receive from PJM in the two delivery years, which will be used to offset the costs of the DR, EE&C, and dynamic pricing programs borne by ratepayers.

The amount of capacity cleared in the 2020/2021 DY auction is 250 MW more than the amount of capacity cleared in 2019/2020 DY, primarily due to the increase of the capacity bids in dynamic pricing. PJM noted that the 2020/2021 BRA is the first where PJM procured 100 percent Capacity Performance²⁹, and the first to operate under PJM's Enhanced Aggregation method which was approved by FERC on March 21, 2017³⁰

²⁹ Capacity Performance resources must be able to produce sustained and predictable operation throughout the entire

delivery year while Base Capacity resources do not have this capability and are typically summer-only resources.

2020/2021 RPM Base Residual Auction Results, PJM (May 23, 2017), https://www.pjm.com/~/media/markets-ops/rpm/rpm-auction-info/2020-2021-base-residual-auction-report.ashx

Table 18 Maryland Utilities' PJM BRA Results and Expected Revenue for Delivery Years 2019/2020 and 2020/2021

DY 2019/2020							DY 2020/2	021	
	Cleared	Bids (MW)	THE SE	Value		Cleared	Bids (MW)		Value
DR	DP	EE&C	Total	(SMillion)	DR	DP	EE&C	Total	(SMillion)
230	225	184	639	\$10.6	265	425	199	889	\$28.0

EmPOWER Maryland Funding Levels

EE&C Program Funding

On December 23, 2014, in Order No. 86785, the Commission approved the 2015-2017 program cycle budgets based on the EmPOWER Maryland Utilities' proposals. Table 19 breaks down the 2017 Commission-approved budgets for each of the Utilities, while Table 20 illustrates the actual 2017 expenditures by the Utilities with respect to their EmPOWER Maryland EE&C programs.

Table 19 Forecasted 2017 EE&C Budgets

Utility	Residential	C&I	DHCD Limited- Income Program	Total
BGE	\$54,409,568	\$59,639,355	\$15,831,854	\$129,880,777
DPL	\$6,909,594	\$23,715,363	\$3,962,831	\$34,587,788
PE	\$13,072,533	\$11,007,642	\$2,600,173	\$26,680,348
Pepco	\$25,114,978	\$74,134,561	\$3,990,639	\$103,240,178
SMECO	\$11,770,431	\$7,268,742	\$1,423,838	\$20,463,011
Total	\$111,277,104	\$175,765,663	\$27,809,335	\$314,852,102

Table 20 Reported 2017 EE&C Spending

	1 4010	o responsed for E	Ecc opending	
Utility	Residential	C&I	DHCD Limited- Income Program	Total
BGE	\$44,169,966	\$45,714,291	\$14,230,604	\$104,114,861
DPL	\$5,514,936	\$10,951,993	\$4,592,964	\$21,059,893
\mathbf{PE}	\$11,891,071	\$3,341,910	\$1,530,687	\$16,763,668
Pepco	\$20,886,880	\$35,953,611	\$3,243,987	\$60,084,478
SMECO	\$8,293,446	\$4,419,835	\$1,685,753	\$14,399,034
Total	\$90,756,299	\$100,381,640	\$25,283,995	\$216,421,934

Table 21 details the EmPOWER Maryland EE&C program surcharges and revenue requirements for each of the Utilities. The EmPOWER Maryland surcharges are a volumetric-based charge, subject to the individual ratepayer's monthly energy usage. The revenue

³¹ During the course of the 2015-2017 program cycle, the Utilities may request and receive adjustments to the budgets of certain programs, which have resulted in 2017 budgets that differ in some respects from the proposals filed by the Utilities in September 2014.

requirements do not correspond to the filed budgets because program costs are amortized and collected over a five-year period as directed by the Commission in Order No. 81637.³²

Table 21 2017 EE&C Monthly Surcharges (per kWh) and Revenue Requirements

Utility	Residential	Small C&I	Large C&I	Revenue Requirement
BGE	\$0.00386	\$0.00714	\$0.00289	\$95,269,252
DPL	\$0.00574	\$0.00867	\$0.00867	\$28,751,669
PE	\$0.00631	\$0.00337	\$0.00311	\$29,957,738
Pepco	\$0.00579	\$0.00682	\$0.00682	\$87,338,863
SMECO	\$0.00513	\$0.00270	\$0.00270	\$15,599,669

Demand Response Program Funding

The December 23, 2014 Commission Order similarly approved three-year budgets for the demand response programs operated by BGE, DPL, Pepco, and SMECO. Table 22 details the EmPOWER Maryland demand response surcharges and revenue requirements for each of the Utilities operating an approved DR program.³³

Table 22 2017 Demand Response Monthly Surcharges (per kWh) and Revenue Requirements

Utility	Residential	C&I	Revenue Requirement					
BGE	\$0.00247	N/A	\$32,369,917					
DPL	\$0.00189	\$0.00000	\$3,938,642					
Pepco	\$0.00292	\$0.00009	\$17,311,092					
SMECO	\$0.00353	\$0.00149	\$10,027,296					

Table 23 details the respective forecasted and reported budgets for each of the EmPOWER Utilities operating an approved DR program during 2017. All of the Utilities' programs were under budget for the 2017 program year.

Table 23 2017 Demand Response Forecasted and Reported Budgets

Utility	Forecasted Budget	Reported Costs	Variance
BGE	\$38,085,398	\$33,138,864	(\$4,946,534)
DPL	\$7,552,357	\$4,708,453	(\$2,843,904)
Pepco	\$21,769,903	\$19,423,472	(\$2,346,431)
SMECO	\$9,923,071	\$8,277,053	(\$1,646,018)
Total	\$77,330,729	\$65,547,842	(\$11,782,887)

³² In the Matter of the Commission's Investigation of Advanced Metering Technical Standards, Demand Side Management (DSM) Cost Effectiveness Tests, DSM Competitive Neutrality, and Recovery of Costs Advanced Meters and DSM Programs, Case No. 9111.

³³ PE did not operate a separate DR program during 2017 and therefore did not file for a surcharge recovery of DR program costs.

Evaluation, Measurement & Verification

Determining and validating electricity savings and related impacts is a critical component of EE&C and DR programs. The process of evaluation, measurement, and verification ("EM&V") of resulting program savings is particularly important in determining the effectiveness of program delivery, the factors driving or impeding customer participation in programs, characteristics of participants and non-participant customers, determinants of equipment decisions, and customer satisfaction with program delivery. Moreover, the design and depth of program data collection, monitoring, and analyses can impact the accuracy and prudence of compliance results. Given the scale of the EmPOWER Maryland initiative and the potential bill impacts, the Commission is sensitive to the issue of program credibility and transparency. This process also evaluates free-ridership, spillover, cost-effectiveness, deemed savings calculations, etc., pertinent to a thorough and ongoing review of viable and cost-effective energy efficiency and demand response programs.

Based on EM&V best practices, the Commission adopted an independent, third-party evaluator model to review the EmPOWER portfolio results.³⁴ In this model, the Utilities direct primary evaluation and verification activities through an EM&V contractor; subsequently, the Commission's third-party, independent evaluator provides independent analysis and due diligence of the EM&V process. Because this thorough evaluation process requires up to six months following the receipt of program data from the prior calendar year to complete, this report illuminates the results of the Utilities' 2016 program year reported savings.

Overall EM&V Findings of the 2016 EmPOWER EE&C Program

Energy and Peak Demand Savings

In 2016, Navigant's evaluation of the first-year savings³⁵ was 618,018 MWh and 97.314 MW, which was 102 percent and 93 percent of the Utilities' reported energy and demand savings for that year. For the 2016 program year, Navigant estimated an effective Net-to-Gross ("NTG") ratio of 0.72 for annual energy savings and 0.73 for peak demand savings. The NTG ratio is used to derive savings specifically attributable to the EmPOWER programs by calculating free-ridership levels and reducing reported gross savings by that amount.³⁶ Following the application of the calculated NTG ratios, the net savings for program year 2015 were 447,608 MWh and 70,561 MW.

As the EmPOWER Maryland Independent Evaluator, Itron, Inc. ("Itron") supports the Commission's oversight of the statewide evaluation of the EmPOWER EE&C programs conducted by Navigant. Itron's verification analysis confirmed Navigant's results and accepted all of the evaluated energy and demand savings estimates for program year 2016. This important

³⁴ Order No. 82869 (Aug. 31, 2009).

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³⁵ "First-year savings" is the amount of energy a measure will save in the first year in which the measure is installed. ³⁶ A "free rider" is a customer who would have installed an energy efficiency measure absent the utility-provided EmPOWER incentive.

result should increase ratepayer and other stakeholders' confidence that the evaluated savings from the EmPOWER Maryland programs are real and credible.

Given that the key energy assumption values and NTG ratios have been updated and other anomalies in the program tracking databases have been rectified to improve the quality of reporting, it is expected that the Utilities' reported savings estimates for 2017 should continue to be very similar to the evaluation results. Changes to evaluation parameters and codes and standards will have the effect of raising the baseline level of energy savings, therefore reducing the incremental energy savings achieved by installing efficient equipment. The EM&V contractors will monitor and reflect these changes in future evaluation cycles.

Cost Effectiveness

Table 24 presents the 2016 total resource cost ("TRC") test cost-effectiveness results by sector for each of the Utilities.³⁷ The sector-level benefit-to-cost ratios reflect the present value of the benefits compared to the present value of the costs, aggregated from each program in the sector-level sub-portfolio. As noted, TRC ratios greater than 1.0 indicate that the financial benefits that accrue over the life of the measures exceed the financial costs of the program, specifically the costs associated with: utility program administration; the provision of incentives to free riders; and customer outlays for the efficiency measures. Statewide, both the Residential and C&I sub-portfolios were cost effective in 2016, with overall TRC scores of 1.75 and 2.31, respectively.

Table 24 2016 Portfolio TRC Results

Residential	Commercial	Portfolio					
1.89	2.83	2.45					
1.72	1.71	1.72					
1.36	1.22	1.28					
1.19	1.39	1.31					
1.72	2.77	2.12					
1.75	2.31	2.08					
	1.89 1.72 1.36 1.19 1.72	1.89 2.83 1.72 1.71 1.36 1.22 1.19 1.39 1.72 2.77					

At the statewide level, the 2016 EmPOWER portfolio is expected to generate approximately \$2.08 in utility and participant benefits for each dollar of utility and participant cost. For a total investment of \$233.3 million,³⁸ the State's Utilities, participants, and ratepayers will realize approximately \$485.6 million³⁹ in financial benefits via electricity, fuel, and water savings generated over the lifetime of the measures installed through the EmPOWER program. These results correspond to a net benefit of approximately \$252.3 million.

When assessing whether to approve the Utilities' plans, the Commission evaluates cost effectiveness at the sub-portfolio level, i.e., the C&I and Residential sub-portfolios should both generate TRC ratios greater than 1.0. Thus, individual programs do not necessarily need to be

³⁷ The 2017 program year cost-effectiveness results are expected in the second half of 2018.

³⁸ The \$233.3 million total investment is the present value of both utility and participant costs.

³⁹ The \$485.6 million in financial benefits is the present value of both utility and participant benefits.

cost effective as long as other programs are sufficiently cost-effective to generate sector-level TRC ratios that are greater than 1.0. The Commission may approve individual programs that are not individually cost effective to ensure a broader array of energy-saving opportunities amongst rate classes, income levels, etc., or because the program may promote innovative technologies and market-transformative practices leading to broader energy savings. All EmPOWER Utilities have developed cost-effective portfolios that pass the TRC test—most by a comfortable margin.

2017 per Capita Electricity Consumption and Peak Demand

Table 25 and Table 26 compare the per capita energy use and peak demand from 2007 to 2017 for all Maryland utilities. In 2017, a majority of the State's electric utilities experienced a decrease in per capita energy use and per capita peak demand as compared to 2016 levels.

Table 25 2007 - 2017 per Capita Energy Consumption

					-			, at a series			
CE IS DESIGNED			Per	Capita	Energy	Use M	Wh				
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
BGE	13.41	12.99	12.72	13.17	12.65	12.26	12.06	11.86	11.82	11.57	11.31
Pepco	9.32	9.05	8.81	8.97	8.91	8.18	8.10	7.81	7.94	7.73	7.56
PE	18.46	19.49	18.86	19.39	17.17	16.93	17.53	17.64	17.39	17.57	17.60
Delmarva	13.70	12.60	12.83	13.14	13.02	12.61	12.60	12.55	13.00	12.73	12.65
SMECO	11.22	10.57	10.47	10.83	10.85	10.61	10.49	10.21	10.25	10.03	9.72
Choptank	13.70	12.65	12.79	13.06	12.58	12.31	12.92	12.55	13.04	12.73	13.24
Hagerstown	9.33	9.01	8.67	8.95	8.37	7.93	7.71	7.60	7.62	7.58	7.49
Easton	20.25	19.23	17.82	18.48	16.59	16.65	16.52	16.41	16.55	16.33	16.03
Thurmont	15.08	14.53	14.26	14.37	13.73	13.02	13.27	13.02	13.68	13.06	12.61
Berlin	11.05	10.60	9.93	10.84	9.31	9.40	9.37	9.90	10.61	10.15	9.86
Williamsport	9.54	8.92	8.37	8.56	9.20	9.44	9.87	10.06	10.04	9.64	9.39
Somerset	4.22	N/A	N/A	4.48	4.49	N/A	N/A	N/A	N/A	N/A	N/A
A&N Coop.	9.25	11.10	9.52	8.87	8.05	10.83	10.81	11.06	N/A	N/A	N/A

Table 26 2007 - 2017 per Capita Peak Demand

ECHOLOGICA SHOWS	1 1 2 2	TOTAL BE	Pa	r Canit	Fnorg	y Use k	M/	211 -27 20		THE PERSON	(INCOM
		E CONTRACTO		THE RESERVE OF THE PERSON NAMED IN		ALC: UNITED BY THE PARTY OF THE					
原作中的 12 N C E/Sha	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
BGE	2.77	2.69	2.75	2.55	2.70	2.38	2.38	2.27	2.36	2.40	2.34
Pepco	1.96	1.95	2.05	1.99	1.98	1.79	1.55	1.57	1.88	2.03	1.62
PE	3.36	3.35	3.04	2.93	3.24	3.27	3.10	2.62	3.68	3.49	3.42
Delmarva	3.16	2.78	2.81	2.77	2.76	2.80	2.72	2.62	2.76	2.83	2.67
SMECO	2.28	2.29	2.43	2.40	2.42	2.22	2.15	1.93	2.76	2.36	2.41
Choptank	3.16	2.72	2.81	2.44	2.77	3.17	3.33	2.59	3.33	2.83	2.99
Hagerstown	1.87	1.78	1.68	1.76	1.71	1.65	1.54	1.28	1.66	1.50	1.52
Easton	4.54	4.37	3.91	4.13	4.04	4.09	3.81	3.24	4.27	3.73	3.63
Thurmont	2.74	2.55	2.20	2.21	2.58	2.41	2.39	2.03	4.33	3.26	2.94
Berlin	2.31	2.35	2.27	2.58	1.99	2.44	2.09	2.19	2.30	1.17	2.21
Williamsport	1.79	1.52	1.47	1.17	1.64	1.85	1.87	1.39	2.48	2.15	2.18
Somerset	1.11	N/A	N/A	0.36	1.00	N/A	N/A	N/A	N/A	N/A	N/A
A&N Coop.	2.10	2.29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 27 illustrates the per capita electricity usage and peak demand statewide. Generally, statewide per capita energy usage has been lower in 2012-2017 than 2007-2011.

Table 27 Statewide Per Capita Electricity Usage and Peak Demand 2007-2017

Year	Per Capita Energy Use MWh	Per Capita Energy Use kW
2007	12.38	2.56
2008	11.74	2.49
2009	11.73	2.53
2010	12.02	2.40
2011	11.70	2.50
2012	11.21	2.28
2013	11.13	2.18
2014	10.91	2.07
2015	10.96	2.37
2016	10.74	2.39
2017	10.53	2.21

Upcoming Milestones

On December 22, 2017, the Commission issued Order No. 88514 after holding semiannual hearings for results stemming from the first half of 2017 and for the 2018-2020 plans. The following directives were issued in the Order:

- EmPOWER Maryland Program Work Groups In Order No. 88514, the Commission directed the various EmPOWER Maryland work groups to investigate, among other things contained in the directive, issues involving marketing, smart thermostats, and the way in which the behavior programs are amortized as part of the EmPOWER surcharge. These topics will be reviewed by the Commission throughout 2018 and are subject to further directives.
- EmPOWER Maryland 2018-2020 Program Cycle Order No. 88514 approved the 2018-2020 EmPOWER Maryland plans for the EmPOWER Utilities, WGL, and DHCD, subject to the modifications within the Order. The Order also denied a request from Baltimore City for EmPOWER Maryland funding for several of its energy efficiency programs.