REPORT TO THE SENATE FINANCE COMMITTEE AND HOUSE ECONOMIC MATTERS COMMITTEE TO DISCUSS WHETHER TO SET EMPOWER MARYLAND TARGETS BEYOND 2015

The Maryland Energy Administration (MEA) is pleased to present this report to the Senate Finance Committee and House Economic Matters Committee to discuss the future direction of EmPOWER Maryland.

In 2008, the State passed the EmPOWER Maryland Energy Efficiency Act[1]. The current legislation set targets for electric energy and demand reductions through 2015. Specifically, the Act set a goal of a 15% reduction from a 2007 baseline in per capita electricity consumption and demand by 2015.[2]

The act also directed MEA, in consultation with the Public Service Commission (PSC), to review the anticipated achievement of the goals of EmPOWER, to determine whether electricity consumption and peak demand reduction targets should be set beyond 2015, and to advise the legislature on the feasibility of setting energy savings targets for natural gas companies.

This report details the steps that MEA and the PSC have taken to perform these analyses and serves as our fulfillment of our requirement to report to the Senate Finance Committee and House Economic Matters Committee. We welcome the opportunity to address these committees during the 2013 session to continue our discussion about EmPOWER.

Sincerely,

M. Woolf

Malcolm D. Woolf
Director
Maryland Energy Administration

[1] EmPOWER Maryland Energy Efficiency Act of 2008, 2008 Md. Laws Ch. 131
[2] *Id.* at B(2)(I)-(II)

Table of Contents

List of Tables

List of Figures

EXECUTIVE SUMMARY

In 2008, the Maryland General Assembly passed the EmPOWER Maryland Energy Efficiency Act[3]. The legislation set a target reduction of 15% from a 2007 baseline in per capita electricity consumption and peak demand by 2015. Since its inception, EmPOWER Maryland has helped fund measures that will reduce energy usage of ratepayers by over 1.4 million MWh per year and save $175 million annually. These savings will continue for years, with currently existing measures saving ratepayers $2.6 billion over their useful life.

While EmPOWER's statutory authority and program reduction targets will continue beyond 2015, any revision to specific reduction targets beyond 2015 will require legislative action. The act directed MEA, in consultation with the Public Service Commission (PSC), to review the anticipated achievement of the goals of EmPOWER, determine whether electricity consumption and peak demand reduction targets should be set beyond 2015, and advise the legislature on the feasibility of setting energy savings targets for natural gas companies.

To determine whether electricity and natural gas targets should be set beyond 2015, MEA has worked with relevant stakeholders, including electric and gas utilities and suppliers, the environmental advocacy community, and state agencies, to develop this report and its recommendations.

After a thorough review of program performance to date, and based on feedback received through our stakeholder process, MEA makes the following recommendations:

TO BE COMPLETED FOR FINAL REPORT

[3] EmPOWER Maryland Energy Efficiency Act of 2008, 2008 Md. Laws Ch. 131

INTRODUCTION

In 2008, the Maryland General Assembly passed the EmPOWER Maryland Energy Efficiency Act[4]. The legislation set a target reduction of 15% from a 2007 baseline in per capita electricity consumption and peak demand by 2015. Since its inception, EmPOWER Maryland has helped fund measures that will reduce energy usage of ratepayers by over 1.4 million MWh per year and save $175 million annually. These savings will continue for years, with currently existing measures saving ratepayers $2.6 billion over their useful life.

Maryland's utilities offer a diverse array of programs for residential, commercial, and industrial energy efficiency. In addition, residential customers in 4 of the 5 participating utilities have the option to enroll in residential demand response programs. Programs began initially in 2009, with a second round of program planning and approvals in the fall of 2011. Updated and improved programs have been rolling out throughout early 2012. Residential programs include appliance, HVAC, and lighting rebates, Home Performance with ENERGY STAR, and Quick Home Energy Checkups. For commercial and industrial customers, utilities offer lighting and equipment rebates, retro-commissioning, and rebates for custom projects.

While EmPOWER's statutory authority will continue beyond 2015, any modification of specific reduction targets beyond 2015 will require legislative action. As mentioned above, the EmPOWER Maryland Act specifically directs MEA and the PSC to evaluate the modification of reductions targets:

> *SECTION 4. AND BE IT FURTHER ENACTED, That, on or before December 31, 2012, the Maryland Energy Administration, in consultation with the Public Service Commission, shall:*
>
> > *(1) review the anticipated achievement of the goals specified under §7–211(b)(2) of the Public Utility Companies Article as enacted by this Act for purposes of determining whether electricity consumption and peak demand reduction targets should be set beyond 2015; and*
> >
> > *(2) after providing opportunity for public comment, report its findings, in accordance with § 2–1246 of the State Government Article, to the Senate Finance Committee and the House Economic Matters Committee.*
>
> *SECTION 5. AND BE IT FURTHER ENACTED, That on or before December 31, 2012, the Maryland Energy Administration, in consultation with the Public Service Commission, shall:*
>
> > *(1) study the feasibility of setting energy savings targets in 2015 and 2020 for natural gas companies; and (2) after providing opportunity for public comment, report its findings, in accordance with § 2–1246 of the State Government Article, to the Senate Finance Committee and the House Economic Matters Committee.*

To determine whether electricity and natural gas targets should be modified beyond 2015, MEA has worked with relevant stakeholders, including electric and gas utilities and suppliers, the environmental advocacy community, and state agencies, to develop this report and its recommendations. As part of this process, MEA has published several background documents and has hosted stakeholder meetings in summer and fall of 2012.

[4] EmPOWER Maryland Energy Efficiency Act of 2008, 2008 Md. Laws Ch. 131

The remainder of this report is divided into the following sections that provide background and context to our ultimate recommendations:

EmPOWER Progress to Date and Business as Usual Forecast

A discussion on the past performance of EmPOWER programs, including a "business as usual" forecast that projects program performance through 2020.

Potential Studies for Natural Gas, Combined Heat and Power, and Fuel Switching Programs

Summary of three reports detailing the potential savings in electricity and natural gas are provided. The full reports are available on MEA's webpage.[5]

Review of Other State's Energy Efficiency and Conservation Programs

This section provides a comparison of Maryland's programs to those in other states, including a discussion about approach, goals, funding, and program implementation.

Initial Stakeholder Comments

MEA received written feedback from nearly a dozen entities after our kickoff meeting in June, 2012. This section summarizes their comments; the full documents are available on MEA's website.

Options for Extending EmPOWER Targets Beyond 2015

Several options are discussed for each potential target structure, including target reduction methods, elements of cost effectiveness, and other characteristics.

Final Stakeholder Comments (Future Content)

Stakeholders were invited to provide additional feedback on the options for extending EmPOWER targets beyond 2015. Summaries are included here, with the full documents available on MEA's website

MEA Recommendations (Future Content)

This section discusses the ultimate recommendation of MEA.

Additional Considerations (Future Content)

If the recommendations are to be implemented by the General Assembly and/or the Commission, this section discusses additional considerations such as legislative timing, program development responsibilities, and implementation recommendations.

[5] http://energy.maryland.gov/empower2020/index.html

EmPOWER Maryland Progress to Date and "Business as Usual" Forecast

Demand Response Programs Progress to Date

EmPOWER Maryland demand response programs have been very successful since their inception. As of the end of 2011, electric distribution companies (EDCs) have developed approximately 930 MW of demand response capability[6], or the equivalent power output capacity of a large coal power plant. Some of this capacity has cleared the PJM capacity market auction, and as a result, Maryland will receive over $221 million in payments between 2009 and 2014. Based on PSC filings in fall 2011, proposed demand reduction programs will actually exceed the EmPOWER Maryland 2015 target of a 15% reduction in per capita demand.

Figure 1 shows a "top down" measurement of the progress to date and projected results through 2015. The top down approach looks at actual results from 2007 to 2011, and projects the impacts of programs from 2012 to 2015. It is important to note that the top down approach is heavily dependent on non-programmatic factors such as general economic output.

From this perspective, the currently planned utility programs will, in aggregate, exceed the 15% per capita reduction from the 2007 baseline.

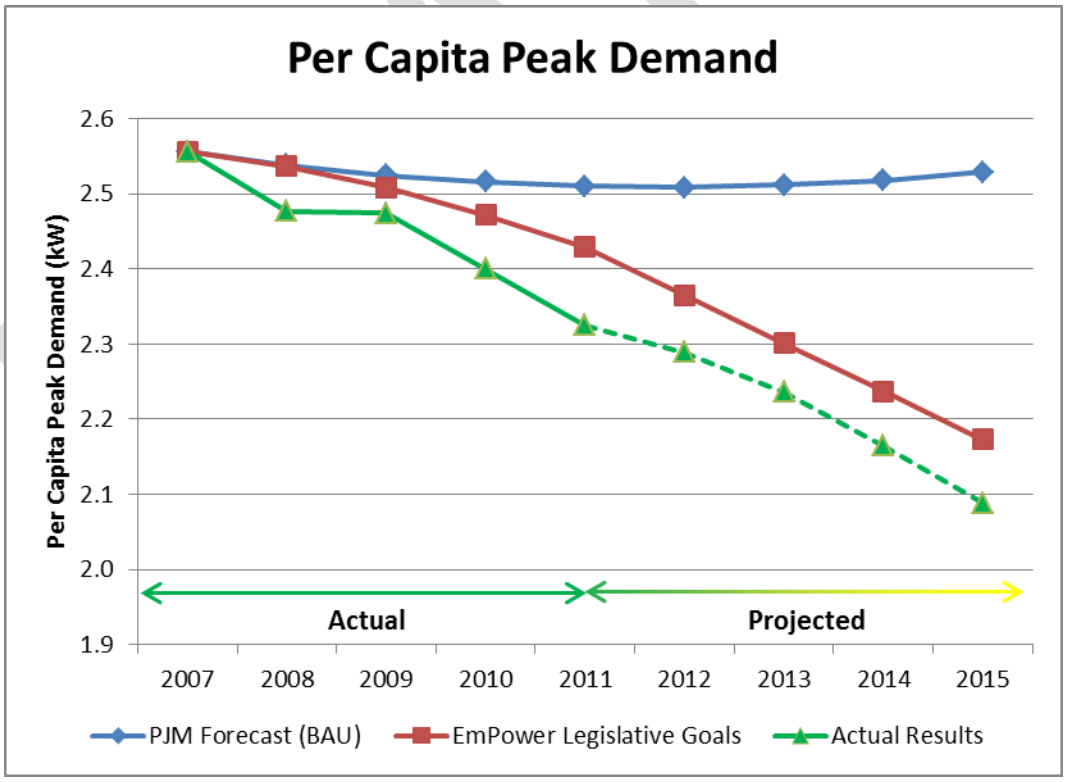

Figure 1 – Top-Down Demand Response Progress

Figure 2 depicts a "bottom up" approach to project the actual achieved demand savings, projected demand savings, and forecasted demand savings from the 2007 to 2020 time period.

[6] Data taken from utility filings with the PSC on their EmPOWER 2012-2014 program proposals.

Data from 2007 to 2015 were derived from MEA and EDC filings with the PSC. Data through 2011 were verified through evaluation, measurement, and verification (EM&V) procedures at each EDC. Data from 2012 to 2015 were based on EDC forecasts for their proposed programs. EDC data were augmented by MEA program results that were run in-house before wider utility roll out. Reductions are relative to the business as usual (BAU) forecast for peak demand.

Estimates for future savings were projected by assuming that program effectiveness continues at 50% of the 2015 levels from 2016 to 2020. It is important to realize two critical factors that are embedded in this assumption: first, that continued participation in existing programs or new programs will be able to deliver incremental demand savings in a cost effective manner; second, that existing participants continue in the demand reduction programs until 2020 and beyond. To the extent that these two assumptions fall short, it will likely mean that further decreasing peak demand after 2015 will either be more expensive, more difficult, or both.

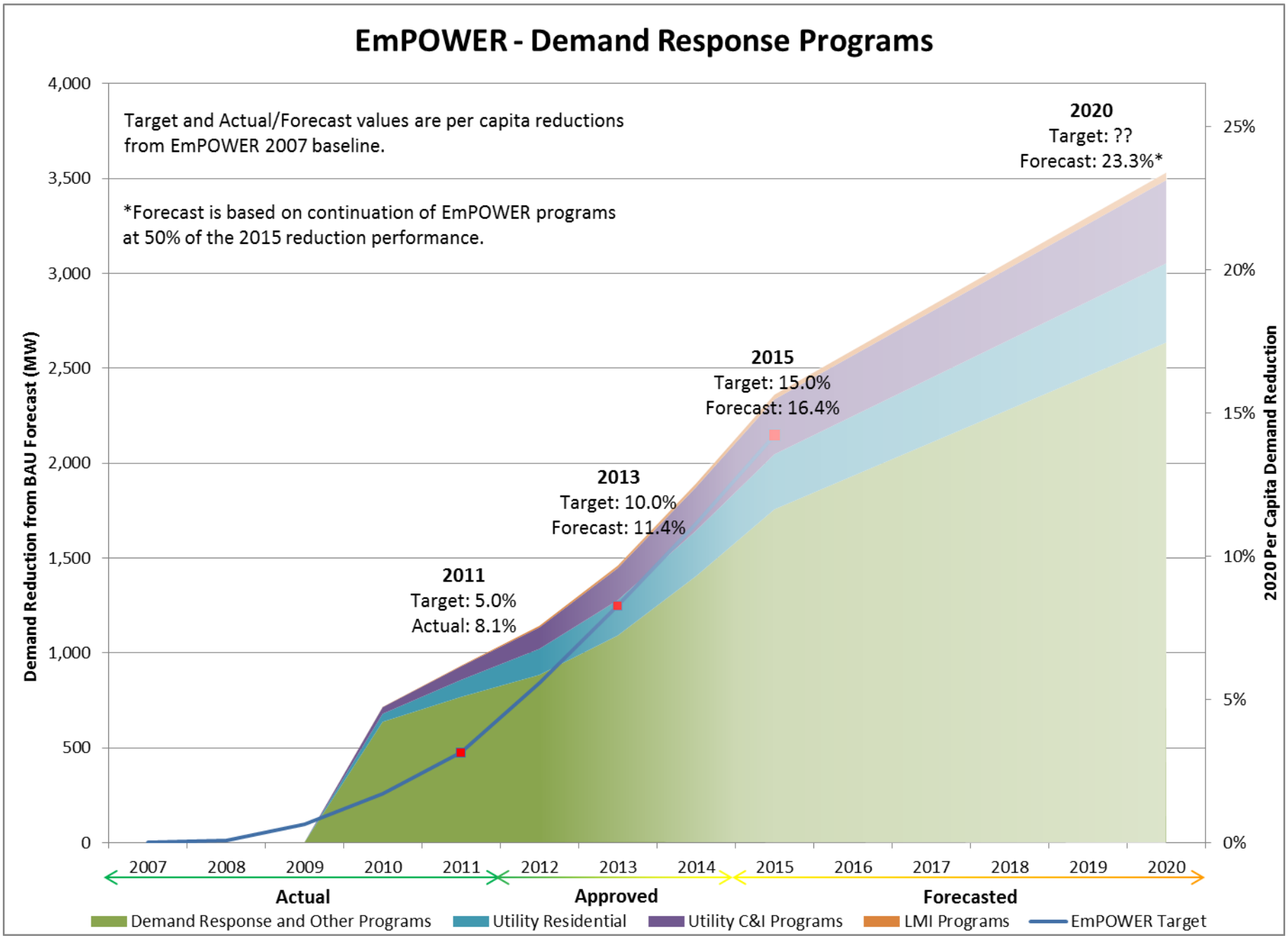

Figure 2 – Bottom-Up Demand Response Progress

It is important to revisit the embedded assumptions of this forecast. There are a number of challenges that would be involved in reducing demand by nearly 250 MW for multiple years between 2015 and 2020. By that time, the "low hanging fruit" may have been picked. PJM could change the rules on how demand response resources clear in their capacity auctions. Electric vehicle sales could increase without corresponding technology or price signals to prevent charging during the day. All of these scenarios would make it more difficult to sustain the level of demand reduction seen in recent years.

On the other hand, new innovations in dynamic pricing may enable customers to more closely monitor their behavior. Smart grid deployments could lead to new ways of time shifting demand. Improvements in buildings and appliance performance due to more stringent building codes and efficiency standards will be realized as assets turn over. If a substantial portion of the Renewable Portfolio Standard solar carve-out is met with behind-the-meter distributed generation, hundreds of MW of PV capacity will be available to help offset demand on sunny days.

On the balance, and given the substantial demand reduction already achieved through relatively inexpensive direct load control programs, we assume for discussion purposes that demand reduction programs would be able to achieve approximately 50% of the performance of recent fully funded years. Should stakeholders and legislators decide to extend EmPOWER Maryland beyond 2015, we will need more detailed forecasts and potential studies in order to set appropriate and achievable goals.

As seen above, these assumptions result in demand programs that are expected to exceed the 2013 and 2015 targets. The 2011 target has already been exceeded. Currently proposed programs will result in a forecasted 16.4% reduction over the 2007 baseline per capita demand by 2015. Extrapolating 50% of the 2015 performance forward would result in a reduction of more than 3,500 MW from the original forecasted peak demand and a corresponding 23.3% reduction in per capita demand. If this forecast is realized, Maryland's 2020 demand would be 13,509 MW compared to the 2007 demand of 14,387 MW.[7]

Energy Efficiency and Conservation Programs Progress to Date

While the demand programs have been very successful, the energy efficiency and conservation programs have been more challenging. Part of this discrepancy may be due to the difference in value of demand and energy reducing programs in the PJM market, as well as the fact that demand response programs tend to have low or no out of pocket costs.

Demand savings can be monetized through the capacity markets, and implementing them can avoid expensive infrastructure projects whose costs would be allocated to all rate payers. These benefits accrue independently of an individual customer's behavior (other than signing up for the program, of course). On the other hand, energy savings are largely realized through lower bills to the participants of the program rather than to all users[8], and achievable savings depend much more on an individual customer's behavior. Since its inception, EmPOWER Maryland has helped fund measures that will reduce energy usage of ratepayers by over 1.4

[7] The MW reduction is lower than the 623.3% per capita reduction due to population growth from 2007 to 2020.

[8] Energy Efficiency is eligible for inclusion in the capacity market auctions, and reductions in LMP through lower energy use at peak times can be gained. However, revenues from energy programs are substantially smaller than revenues and avoided cost savings from demand programs.

million MWh per year and save $175 million annually. These savings will continue for years, with currently existing measures saving ratepayers $2.6 billion over their useful life.

Regardless of the reason, energy reduction programs have fallen short of the target. Figure 3 shows the "top down" approach for energy efficiency and conservation programs. From this view, is appears that progress to date has been in line with expectations. However, the top down results can be heavily influenced by non-programmatic factors such as economic output and weather. Importantly, while the demand response goal is weather normalized, the energy efficiency and conservation goal is not. The sag relative to the EmPOWER goal from 2007 to 2009 was largely due to weather and economic factors more so than verifiable program results. Regardless of the historic results, it is clear from this view that the projected programs will fall behind the target line from 2012 to 2015.

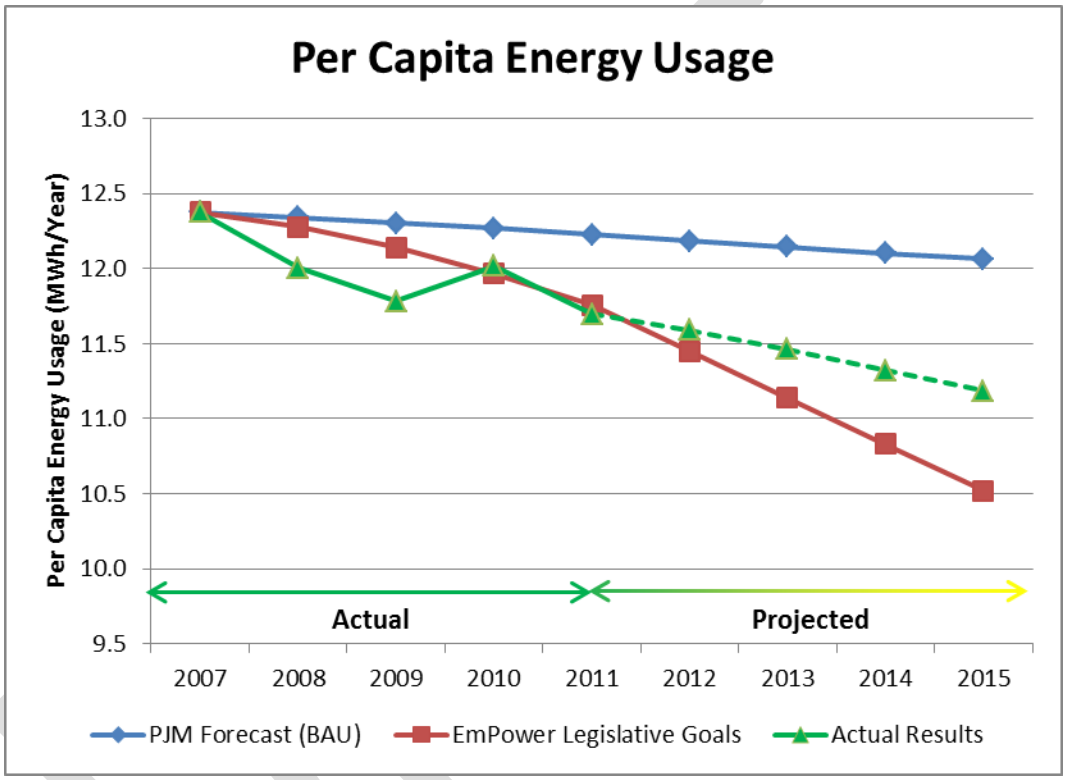

Figure 3 – Top-Down Energy Efficiency and Conservation Progress

The same set of assumptions from the bottom-up demand response graph was used to generate the following bottom-up energy efficiency and conservation progress graph in Figure 4. In this graph, external factors such as weather and economic output are removed. Here, a specific reduction goal for each year is shown along with actual program results against the target. While the top down graph showed good progress through 2011, the bottom up approach shows programs were severely short of the goal.[9]

2011 bottom up results are less than two thirds of the target, at 3.0% vs. 5.0%. 2015 results are projected to trail by a similar margin, 8.4% vs. 15.0%. Even if programs are continued at the full 2015 funding levels and performance results, the forecasted achievement in 2020 would be 13.7% energy savings below a 2007 baseline.

[9] The two graphs can be reconciled by attributing much of the 2007-2011 performance against the EmPOWER target to weather and economic impacts.

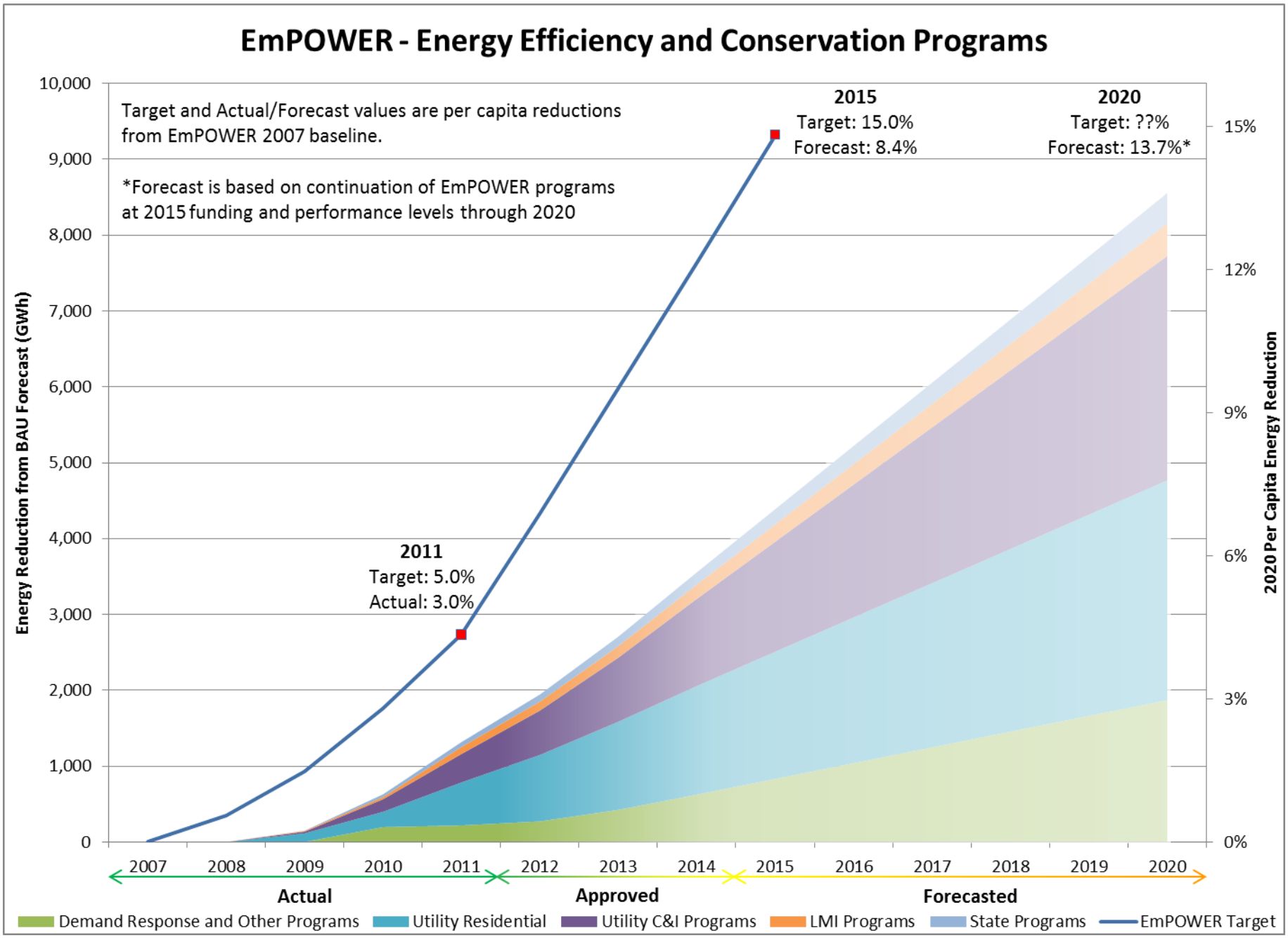

Figure 4 – Bottom-Up Energy Efficiency and Conservation Progress

The following chart blends the "top-down" data with the "bottom-up" data and attempts to isolate the impact of non-programmatic factors such as the economy and weather. Although program reductions begin to accelerate in 2011, they are projected to fall well short of the 2015 targets.

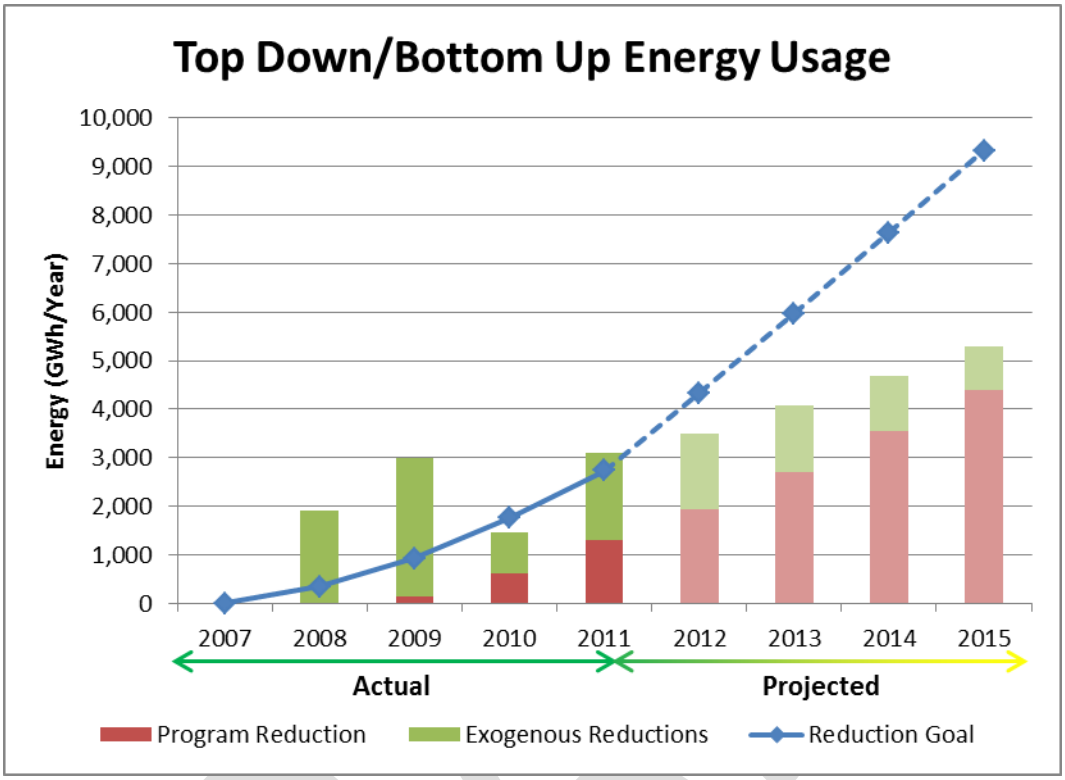

Figure 5 - Top Down/Bottom Up Energy Usage

Annual Reductions Required for Certain Targets

Figure 6 moves away from actual program results and focuses on the percentage reduction that would be needed to achieve certain per capita reduction goals.

As seen below, based on results through 2011, an annual, compounded reduction of 2.28% per year from the BAU forecast would be required to hit the 15% reduction goal in 2015. If the 2.28% rate of reduction from 2012 were continued to 2020, the per capita consumption would be roughly 25% lower than the 2007 baseline. This corresponds to an actual consumption of 58,211 GWh in 2020, compared to a 2007 consumption of 69,649 GWh and a 2020 BAU forecast of 74,928 GWh.

Two other data points are included in the graph, showing the results of a 0.50% and 1.50% annual reduction from the 2011 starting point. For the 0.50% annual reduction, energy use would stay relatively flat on an absolute basis (effectively offsetting population growth) while dropping nearly 10% on a per capita basis; a 1.50% annual reduction would bring per capita consumption about 18% below the 2007 baseline.

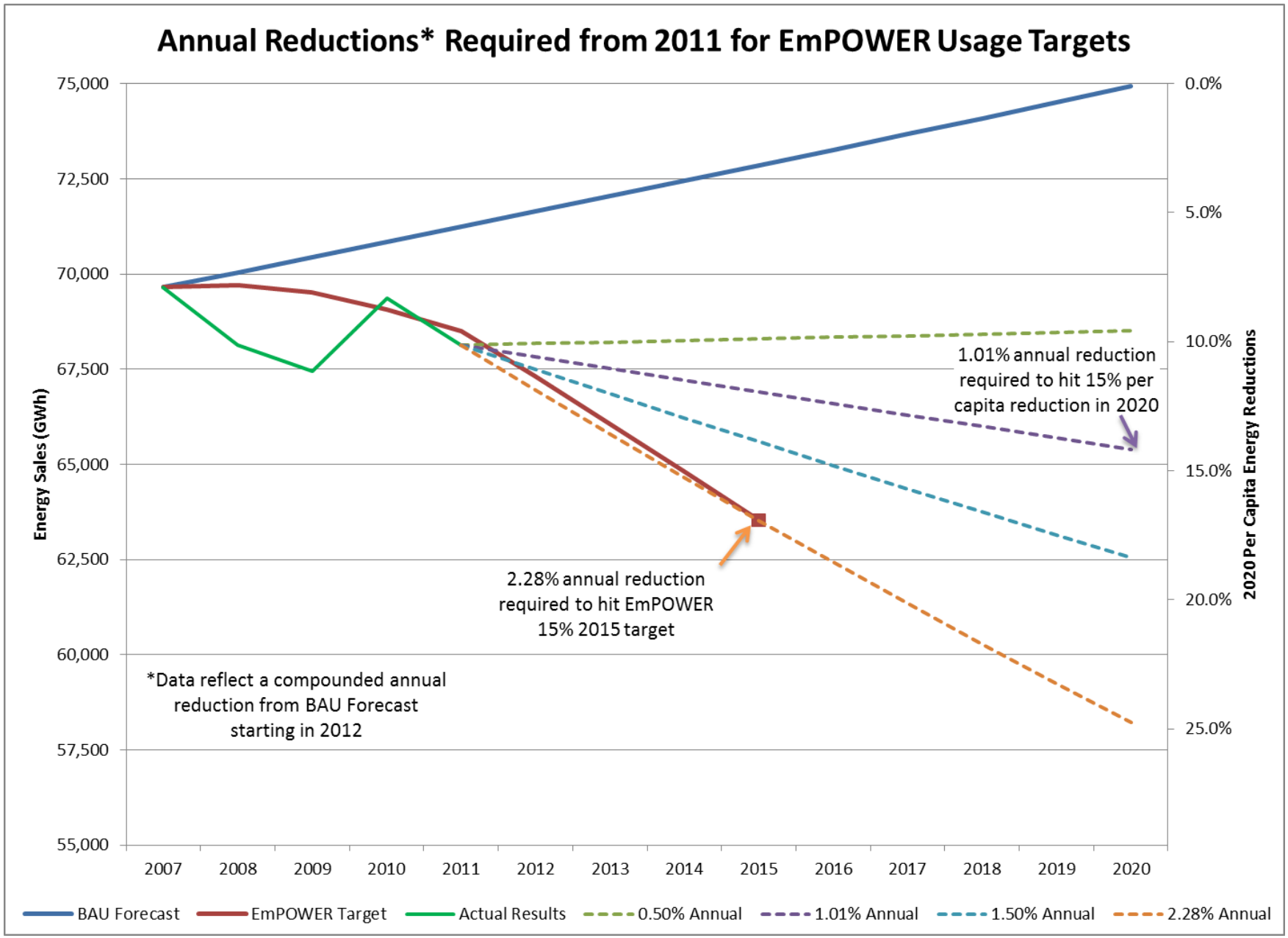

Figure 6 - Annualized Reduction Results

SUMMARY OF POTENTIAL STUDIES FOR NATURAL GAS, FUEL SWITCHING, AND COMBINED HEAT AND POWER

Due to the current favorable market conditions for natural gas, the ongoing economic incentives for electricity peak demand reduction, and the significant efficiency and greenhouse gas benefits of targeted direct natural gas use, MEA considered electricity and natural gas usage in Maryland in a more cohesive manner. We expect that the potential electricity demand and usage reductions from implementing end-use fuel switching[10] and combined heat and power (CHP) programs will be of particular interest to future EmPOWER programs. In fact, the Commission has recently approved a number of combined heat and power program incentives and is currently reviewing several fuel switching programs. We expect these programs to become increasingly important to the future reduction strategies of EmPOWER.

To that end, MEA has worked with GDS Associates to produce several studies that investigated the potential to reduce natural gas use and investigate the potential of CHP and fuel switching programs to reduce electricity usage and demand. This section briefly summarizes key aspects and results of these reports. These documents were made available to the stakeholders and helped inform the feedback and recommendations contained in this report. The full documents are available on MEA's website for reference.

Maryland Natural Gas Energy Efficiency Potential Study

MEA worked with GDS Associates to prepare a report on natural gas energy efficiency potential in Maryland. The report was finalized in late 2011 and outlines a number of cost-effective gas programs that, in aggregate, could significantly reduce the State's consumption of natural gas. This report did not examine the potential for combined heat and power or fuel switching in the state.

Natural Gas Fuel Switching Potential in Maryland

GDS Associates produced a study that examines the potential for fuel switching programs in the state, and its impact on electricity usage and demand. The report was finalized in September 2012 and projects the potential of electricity usage and demand savings through end-use fuel switching from electric appliances to natural gas appliances.

Maryland Combined Heat and Power Market Assessment

This report was prepared by the Mid-Atlantic Clean Energy Application Center and provides economic, market, jobs and carbon reduction information regarding applying CHP and combined cooling, heating and power (CCHP) systems in Maryland. It also assesses the impact of state incentives and rules changes on CHP and CCHP adoption rates, economic, environmental and employment impacts.

[10] In the context of this report, fuel switching is limited to end-use fuel switching, such as exchanging an electric water heater for a gas water heater.

Maryland Natural Gas Energy Efficiency Potential Study

Background

This study estimates the technical, economic, achievable, and program potential for natural gas energy efficiency savings in Maryland over a 10 year period (2012 to 2021) and determines achievable potential for the years 2015 and 2020.

This report was prepared for MEA in November, 2011, by GDS Associates. The study screened for cost effectiveness using the Total Resources Cost (TRC) test for three achievable scenarios representing high (80%), medium (60%), and low (40%) market penetration levels. Over 140 measures were examined for cost effective potential savings across the residential, commercial, and industrial markets in Maryland.

The measures included:

- Energy efficient natural gas water heaters and related water heating measures such as low flow shower heads, faucet aerators, pipe insulation and heat recovery systems
- Energy efficient natural gas boilers and furnaces and related space heating measures such as pipe insulation, boiler maintenance and control, heat recovery and ventilation control
- Building envelope improvements including attic, wall and floor insulation, weatherization, proper air/duct sealing, and energy efficient windows
- HVAC controls including programmable thermostats and energy management systems
- Energy efficient cooking including commercial griddles, ovens, fryers and steamers
- Energy efficient clothes washers, dryers and commercial laundry systems
- Energy efficient industrial process heating technologies

Findings

For a 60% market penetration, total achievable potential for natural gas energy efficiency savings in Maryland by 2015 is approximately 4.5% of the forecasted retail natural gas sales in 2015 and 10% of the forecasted retail natural gas sales in 2020. The study did not consider any increases in natural gas use through fuel switching or CHP.

Summary of Maryland Natural Gas Efficiency Potential			
Achievable with Market Penetration of:	**80%**	**60%**	**40%**
2015 (MMBTU)			
Residential	5,196,489	3,948,109	2,665,691
Commercial	5,264,938	3,948,704	2,632,469
Industrial	971,460	728,595	485,730
Total; MMBTU Savings	11,432,887	8,625,408	5,783,890
% of 2015 Forecasted Annual Sales	**5.9%**	**4.5%**	**3.0%**
2020 (MMBTU)			
Residential	13,557,142	10,300,041	6,954,603
Commercial	11,846,111	8,884,583	5,923,056
Industrial	1,667,323	1,250,492	833,661
Total; MMBTU Savings	27,070,576	20,435,116	13,711,320
% of 2020 Forecasted Annual Sales	**13.5%**	**10.2%**	**6.6%**

Table 1 - Natural Gas Efficiency Potential

The study recommended further research to provide better primary data to estimate the potential savings. Those recommendations include:

- Baseline studies that report the (1) saturation of natural gas equipment, (2) the penetration of high efficiency natural gas equipment and (3) the penetration of energy efficient building practices for the residential, commercial and industrial sectors
- A detailed statewide forecast of natural gas sales and customers with a breakdown of forecast natural gas sales by sector, building type and end use
- Compile historical data on natural gas consumption, customers, and use per customer
- Developing a Natural Gas Energy Efficiency Measure Technical Reference Manual (TRM) that identifies natural gas energy efficiency measure savings, cost, and life-times

Natural Gas Fuel Switching Potential in Maryland

Background

The purpose of this study is to estimate the technical, economic, and achievable fuel switching potential associated with natural gas fuel switching in the residential and commercial sectors in the State of Maryland over a 10 year period (2013 to 2022).

This report was prepared in August, 2012, for MEA by GDS Associates. Natural gas fuel switching potential is defined as the potential over time of energy efficient natural gas equipment replacing standard electric equipment. The study screened for cost effectiveness using the Total Resources Cost (TRC) test for three achievable scenarios representing high (80%), medium (60%), and low (40%) market penetration levels. Measures were examined for cost effective potential savings across the residential and commercial markets in Maryland.

GDS estimated the natural gas fuel switching potential for the following measures:

- Residential Space Heating
- Residential Water Heating
- Residential Clothes Dryers
- Commercial Space Heating
- Commercial Water Heating

For this study, natural gas availability is defined as the percent of electric customers in Maryland that either currently possess a natural gas account yet maintain selected electric-consuming end-uses (e.g., electric space heating, water heating, and/or clothes drying equipment) or are on a natural gas main but are not connected. Based on a review of the BGE and Washington Gas fuel switching program filings made for EmPOWER Maryland, GDS estimates that approximately 6.5% of current electric customers are on a natural gas main, but not connected. It is assumed that this percentage will remain unchanged over the 10 year study period.

Findings

For a 60% market penetration, total achievable potential for fuel switching programs in Maryland by 2015 is approximately 0.25% of the forecasted retail electricity sales in 2015, and 0.97% of the forecasted retail electricity sales in 2020. It is instructive to note that the primarily limited factor in this analysis is the availability of natural gas. The 0.97% reduction of sales is achieved through the 6.5% of electric customers who are on gas mains but do not have connections. If there were a concerted effort to increase access to natural gas service, the savings from this program would increase correspondingly.

Summary of Maryland Natural Gas Fuel Switching Potential			
Achievable with Market Penetration of:	**80%**	**60%**	**40%**
2015 (MWh)			
Residential	165,873	62,236	41,749
Commercial	108,160	81,120	54,080
Total MWh Savings	274,033	143,356	95,829
% of 2015 Forecasted Annual Sales	**0.48%**	**0.25%**	**0.17%**
2020 (MWh)			
Residential	719,425	373,597	249,214
Commercial	288,427	216,321	144,214
Total MWh Savings	1,007,852	589,918	493,429
% of 2020 Forecasted Annual Sales	**1.65%**	**0.97%**	**0.81%**

Table 2 - Fuel Switching Potential

Maryland Combined Heat and Power Market Assessment

Background

The purpose of this report is to provide economic, market, jobs and carbon reduction information the results from installation of combined heat and power (CHP) and combined cooling, heating and power (CCHP) systems in Maryland. It also assesses the impact of state incentives and rules changes on CHP and CCHP.

The report was prepared by the US DOE Mid-Atlantic Clean Energy Application Center in October 2010.

At the time of the report, Maryland's entire CHP installed base consisted of 20 sites totaling 828 MW. 697 MW are installed in five sites covering chemicals, pulp and paper, primary metals and solid waste-to-power facilities. Of the 828 MW installed, 557 MW of CHP was installed prior to 2000. The remaining 272 MW of CHP installed after 2000, with the last being installed in 2008.

The report estimated 10 and 20 year Technical Market potential for CHP in Maryland Technical potential. The Technical Market Potential projection does not consider screening for economic rate of return, or other factors such as ability to retrofit, owner interest in applying CHP, capital availability, natural gas availability, and variation of energy consumption within customer application/size class.

The study included a number of hypothetical incentives including:

- Capital Grant Program: a $5 million cap on the capital reduction incentive and no limitation on installed capacity.
- Alternative Energy Credit Program: This program would add a Tier III to the current Maryland Renewables Portfolio Standard covering high efficient clean power including CHP and waste heat-to-power that meet local air emissions regulations and meet a minimum annual efficiency requirement of 65%. The model assumed a $10/MWh credit paid over a seven year period.
- 0% Loans: In Maryland, a qualified commercial, institutional, or industrial entity with end-use energy efficiency projects including CHP is eligible for interest-free loans and grants through the Clean Energy Solutions Capital Investment (CESCI) program.
- Permit-by-Rule regulation: Currently, CHP plants in Maryland must undergo new source review. A long-term goal would be to create a Maryland "Permit by Rule" regulation that would apply to all CHP systems meeting the requisite EPA/DEP emissions requirements resulting in substantial time and applications cost savings.
- Export: Export potential was developed based on power limited facilities. These facilities have large thermal loads that can be serviced by CHP systems; however, to meet these thermal loads, excess electricity must be generated. This scenario assumes excess electricity is sold at wholesale market rates.

Findings

The Technical Market potential was used to create a set of market penetration estimates based on an ICF[11] CHP Market Model. This model allowed assumptions for policy measures (e.g., rebates, loan rates), market segmentation, prices, savings, and other economic factors to determine CHP projections with and without export of excess electricity. Some of the model's key results were:

Summary of Maryland Combined Heat and Power Potential				
"With Export" 10 Year (2020) Results	**Base Case**	**$900/kW Capital Incentive**	**Multiple Measures 1***	**Multiple Measures 2****
Economic Potential (MW)	249	1,118	674	556
Market Penetration (MW)	206	914	538	443
Electricity Avoided (MWh)	1,592,000	6,914,000	4,031,000	3,318,000
% of 2020 Electricity Forecast[12]	**(2.2%)**	**(9.7%)**	**(5.7%)**	**(4.7%)**
Incremental Onsite Fuel Use (MMBTU)	8,588,000	37,814,000	22,341,000	18,627,000
% of 2020 Natural Gas Forecast	**4.2%**	**18.6%**	**11.0%**	**9.2%**

Table 3 - Combined Heat and Power Potential

* - Includes $450/kW capital incentive, 0% interest loan, and permit by rule regulation

** - includes $10/MWh AEC, 0% interest loan, and permit by rule regulation

[11] ICF – ICF International was the Technical support contractor for the US DOE

[12] Total sales from PSC Ten Year Plan 2011-2020

REVIEW OF OTHER STATE'S ENERGY EFFICIENCY AND CONSERVATION PROGRAMS

According to the June 2011 ACEEE report "Energy Efficiency Resource Standards: A Progress Report on State Experience," Maryland achieved just over 0.5% electricity savings compared to retail sales in 2010, the first full year with programs in place. Maryland was one of only two states in the country in that year achieving less than 80% of their near-term target. Nine states, including Washington, Connecticut, and Massachusetts, achieved more than 1% annual savings compared to sales, and the top-performing state in the country, Vermont, achieved more than 2% savings. Program progress improved in 2011, and new programs were approved to be implemented in 2012-2014.

MEA examined the program portfolios of states with very successful energy efficiency programs and found only subtle differences in energy efficiency program offerings. The suite of energy efficiency programs administered by Maryland's utilities is largely consistent with the best practices of states with very successful energy efficiency programs. However, differences exist in the overall structure of the program framework and within the details of individual programs. Common differences include rebate amounts for particular products and marketing strategies.

The June 2011 ACEEE report identified key strategies of very successful states to achieve high savings:

- Increasing program funding, considered a fundamental requirement in order to achieve greatly enhanced savings impacts
- Identifying and prioritizing targeted technologies and end uses, especially those that contribute significant energy savings
- Developing programs capable of delivering "deep" savings first, and then seeking "broad" participation, meaning programs are designed to capture the most possible savings per customer. This generally means customers must enact more measures, with greater incremental gains, to achieve deep savings
- Creating programs for new and emerging technologies, including conservation voltage reduction and combined heat and power
- Extending portfolios with programs to reach new and under-served markets, including multifamily buildings
- Taking on innovative advertising and promotional channels and increasing incentives to raise customer participation

These strategies were assembled from in-depth interviews with seasoned energy practitioners from all the major energy efficiency programs around the country, and only the most significant strategies were included in the ACEEE report. Maryland should look to these strategies for improvement to the utility programs.

Many successful states have been operating energy efficiency programs in some form for 20 or more years, and program administrators understand what works. Residents and businesses in these established states are familiar with the concept of energy efficiency thanks to years of program marketing, feedback, and evaluation. In contrast, Maryland went through a period of

time when no efficiency programs were administered by the utilities, and essentially started from scratch in 2008. Although program experience and maturity only happens over time, Maryland must take action to create a climate for a dramatically expanded set of energy efficiency efforts that result in significant energy saving.

In 2011, the Maryland utilities spent about $19 per capita on energy efficiency and conservation programs, exclusive of demand response. In comparison, Connecticut projected to spend $43, Vermont will spend $70, and Massachusetts will spend nearly $83 per capita on energy efficiency programs in that same year.[13] There is a significant relationship between the amount of per capita spending on energy efficiency programs and the energy savings produced by high performing states. In 2010, Connecticut and Massachusetts achieved a 1.4% electricity savings compared to sales, while Vermont achieved more than 2% savings.

While it is important to be prudent when spending public dollars, spending needs to be at a level for an energy efficiency program to gain traction in the market, and produce the energy and dollar savings for a broad population of consumers across the state at a cost that is in most cases less than the cost of electricity.

Energy Efficiency Spending of Maryland Utilities					
	2010 (Forecast)	**2010 (Actual)**	**2011 (Forecast)**	**2011 (Actual)**	**2012 (Forecast)**
PE	$15,880,000	$6,540,000	$16,930,000	$12,448,000	$21,616,000
BGE	$47,500,000	$57,660,000	$58,760,000	$70,181,000	$73,332,000
DPL	$6,700,000	$2,730,000	$7,842,000	$4,434,000	$9,393,000
Pepco	$17,040,000	$9,950,000	$21,362,000	$14,376,000	$37,822,000
SMECO	$5,230,000	$4,670,000	$5,290,000	$7,226,000	$6,623,000
Total	$92,350,000	$81,550,000	$110,184,000	$108,665,000	$148,786,000
Per Capita	**$16.20**	**$14.31**	**$19.33**	**$19.07**	**$26.11**

Table 4 - Energy Efficiency Spending in Maryland

Energy Efficiency Spending By Other State's Utilities					
	2010 Per Capita Spending	**2010 Energy Savings (MWh)**	**2010 cents / kWh Saved**	**2010 Energy Savings as % of Sales**	**2011 Per Capita Spending (forecast)**
Maryland	$14.31	387,452	2.13	0.6%	$19.33
Massachusetts	$36.28	625,000	3.80	1.4%	$82.80
Vermont	$60.20	114,000	3.30	2.0%	$70.60
Connecticut	$48.30	423,000	4.08	1.4%	$43.60

Table 5 - Energy Efficiency Spending by Other State's Utilities

It is important to note that different states utilize cost effectiveness testing in different ways. While other states may spend more per capita dollars on energy reduction programs, they also authorize programs that spend more per kWh of reduction than in Maryland. Based on the

[13] Northeast Energy Efficiency Partnerships. *New England Energy Efficiency Snapshot: Energy Efficiency Policy By the Numbers*. Spring/Summer 2011.

data above, and assuming a 10 year measure life, in 2010, Maryland spent approximately 2.1 cents for every kWh of reductions. By contract, Massachusetts, Vermont, and Connecticut spent 3.8 cents, 3.3 cents, and 4.1 cents, respectively. While these costs are all significantly below the retail cost of electricity, it warrants comment that the utility commissions in those states weigh cost and savings differently than Maryland. Connecticut, for example, authorized a suite of programs that are in aggregate roughly twice as expensive on a per-kWh basis as Maryland.

Case Study: Massachusetts Achieving 1.4% of Sales - How did they do it?

Massachusetts passed the Green Communities Act in 2008, which set electricity savings targets of 5.8% between 2010 and 2012, compared to 2009 sales. In 2010, the first year of implementation for the Green Communities Act, program administrators[14] spent almost $240 million on energy efficiency programs to achieve nearly 1.4% savings compared to sales. Programs are funded through a combination of utility surcharges, a systems benefits charge, and proceeds from the Regional Greenhouse Gas Initiative auctions. Spending will increase substantially in 2011 and 2012, and savings compared to sales are expected to increase as spending on programs increases.

In comparison, Maryland's utilities spent around $81 million on electricity programs in 2010. Even if Maryland utilities nearly double their spending in 2012 as compared to 2010, they will be spending barely half of what Massachusetts spent in 2010, yet Maryland's electricity savings goals are just as ambitious as those in Massachusetts. When controlling for population, Massachusetts spent more than $36 per person, while Maryland utilities spent just $14 per person in 2010. Massachusetts plans to spend $2.1 billion on energy efficiency programs from 2010 to 2012.

Maryland spent more per capita in 2010 than Massachusetts on HVAC rebates and general awareness marketing. Massachusetts outspent Maryland by an exceptional amount in every other program category. For example, Massachusetts spent more than five times as much per capita as Maryland on residential retrofits[15] and four times as much on commercial and industrial (C&I) programs. In the 2008 Maryland utility filings, C&I programs had Total Resource Cost (TRC) test results of above 2.0 and represented approximately 60% of the potential electricity savings in the state. Massachusetts, which uses the Total Resource Cost test as its primary measure of cost-effectiveness, is spending just over $20 per capita on C&I programs while Maryland spent $5.69 per capita. In addition, Massachusetts spent $8.6 million in programs of which Maryland utilities offer no equivalent, including direct consumer loans, workforce development, and pilot programs. There are many opportunities for Maryland to accelerate electricity saving through the wise expenditure of additional dollars.

[14] Program administrators in Massachusetts are investor-owned electric and gas utilities and energy efficiency service providers. These figures do not include funds that are spent through other organizations on energy efficiency.

[15] Residential retrofits is one program where differences in cost effective screens influence state spending. Based on Maryland's evaluations, residential retrofits would not qualify under the current cost effective screens for non-market transformation programs. Massachusetts may drive more savings from this program, but at a greater cost per kWh saved.

Maryland vs. Massachusetts 2010 Program Spending[16]				
	Maryland	**Maryland Per Capita**	**Massachusetts**	**Massachusetts Per Capita**
Large C&I	$22,953,879	$4.05	$97,824,826	$14.84
Lighting	$10,827,443	$1.91	$12,674,083	$1.92
HVAC	$10,370,466	$1.83	$4,964,629	$0.75
Small Business	$9,292,872	$1.64	$34,555,378	$5.24
Limited Income	$7,728,105	$1.36	$24,853,310	$3.77
Residential Retrofits	$6,736,554	$1.19	$43,437,342	$6.59
Appliances	$6,069,994	$1.07	$5,526,694	$0.84
General Awareness	$5,391,971	$0.95	$1,095,351	$0.17
New Homes	$2,117,648	$0.38	$4,095,191	$0.62
Other Programs	$0	$0.00	$8,600,033	$1.30
Statewide Marketing and Education	$0	$0.00	$1,565,314	$0.24
Total	**$81,548,922**	**$14.38**	**$239,192,151**	**$36.28**

Table 6 - Maryland vs. Massachusetts Program Spending

Program success takes dedicated and lasting investment. Maryland's utilities must have the ability to spend more on programs that have a higher potential to save energy. Though the EmPOWER surcharge may increase, participants in the program will more than recoup the savings through reduced electric usage. Further, the experience of other states has proven that significant investments are necessary to obtain significant results.

[16] Source for Massachusetts information: "Energy Efficiency as Our First Fuel: Strategic Investments in Massachusetts' Energy Future, The 2010 Report of the Massachusetts Energy Efficiency Advisory Council," June 2011.

MEA Summary of Initial Stakeholder Comments

The following is a summary of stakeholder comments that MEA received regarding the June 29, 2012, meeting on EmPOWER Planning for 2020. This document is MEA's interpretation of the comments and is provided only for the stakeholders' convenience. We suggest viewing the original author's comments on our website for a more detailed understanding of their positions.

American Council for an Energy-Efficient Economy (ACEEE)

ACEEE recommends extending electricity EmPOWER targets beyond 2015 and introducing natural gas targets. Specifically, they suggest following 24 other states that currently base targets on annual sales without a per capita adjustment. ACEEE suggests annual reduction targets of 1.5% for electricity sales and 1% for natural gas sales, using the average of the previous two years as the baseline for each new program year target. If natural gas programs are started, they encourage joint electric and gas programs when appropriate to reduce costs or increase savings, with each utility getting credit for their fuel (gas or electricity) savings. ACEEE references studies that show that energy efficiency cost less per kWh than new generation, and high levels of investment can mitigate increasing energy prices in the long run.

Baltimore Gas and Electric (BGE)

BGE reiterates comments it has made before the Public Service Commission that recent adjustments to population and forecasted usage has resulted in the current EmPOWER metrics being skewed, with some utilities facing reduction targets of 10% and 17% while others face reduction targets of 2% and 2% for energy and demand, respectively. BGE recommends the future EmPOWER electric energy metric be shifted to a "bottom up" approach targeting 0.5% annual reductions from 2014 weather normalized sales to avoid the per capita issues. They do not recommend additional electric demand reduction programs, citing market saturation in areas served by utilities and an active third party provider market. BGE recommends that no natural gas targets be set as other program such as CHP and fuel switching may drive increased natural gas use, but they do recommend encouraging incentives for the purchase of energy efficient natural gas appliances. Finally, BGE recommends language in the law on cost recovery be reinforced, and suggests that utilities, rather than state agencies or the free market, are the appropriate entity for managing and delivering the EmPOWER incentive programs with market-based implementation and installation of the actual measures.

Joint Comments by Chesapeake Climate Action Network, Environment Maryland, Interfaith Power and Light, MD League of Conversation Voters

The Joint Commenters (JC) suggest that reduced funding relative to other high performing New England and Mid-Atlantic states contributes to Maryland's lack of success in achieving its electricity usage reduction goals. JC suggests several legislative changes, including extending EmPOWER targets to 2020 for electricity and natural gas, mandating an "all cost-effective" approach as opposed to a top-down consumption approach, creating a public benefits fund to pool resources and reduce administrative overhead, and increasing the share of RGGI proceeds to energy efficiency to at least their original statutory level of 46 percent. They also suggest

regulatory changes that reward exceptional utility program performance while penalizing poor performance, broaden the PSCs cost-effectiveness test to include avoided costs such as RGGI and RPS compliance, and make on-bill financing available to ratepayers.

Columbia Gas of Maryland

Columbia Gas of Maryland could support the proposal of a statewide natural gas energy efficiency program provided that certain conditions are considered that would make the offering of such programs beneficial to all ratepayers and the utilities. They are concerned that certain local distribution companies (LDCs) do not have a Revenue Normalization Adjustment[17], and would want to be able to recover costs due to lost sales from efficiency programs. Columbia also notes that smaller LDCs may face different resource and budget challenges than larger utilities and could see value in exemptions or modified programs for smaller LDCs.

Columbia Gas does not support specific energy savings targets for natural gas usage, but does support programs that encourage the wise use of natural gas, including end-use fuel switching. They acknowledge that reporting requirements are necessary but recommend that those requirements be developed with an eye towards minimizing implementation costs, particularly for small LDCs. Finally, Columbia Gas offered several specific comments and recommendations on the GDS Natural Gas Potential Study report, noting that the report did not include recovery of lost revenue from throughput reduction.

Maryland Power Plant Research Program

PPRP agrees that MEA's projection of program performance beyond 2015 may be optimistic, and suggests that market forces may make sustained performance difficult with less "low hanging fruit" available and low conventional energy prices. If EmPOWER goals are extended through 2020, PPRP suggests that they be based on a revised baseline that incorporates achievements of the initial programs and continue to be measured on a per capita basis. They also suggest effectively utilizing technology improvements related to the smart meter deployment. PPRP suggests more focus be placed on energy reduction programs rather than demand reduction programs due to higher market incentives that already exist for demand side programs. Finally, PPRP recommends expanding targets to natural gas program as well, but notes the importance of calculating energy savings net of fuel switching impacts and suggests looking at program design by California, Connecticut, and Massachusetts.

Northeast Energy Efficiency Partnerships (NEEP)

NEEP recommends extending electricity EmPOWER targets beyond 2015 and introducing natural gas targets. They also recommend recalibrating both current and future EmPOWER targets away from a per capita measurement and towards an "all cost effective" approach utilized by Massachusetts, Rhode Island, and Vermont. NEEP also suggests a minimum annual performance level to be refined by further analysis, but around 1.5% for electricity and 0.75% for natural gas. They suggest modifying the cost effective test to include other energy benefits such as environmental and RPS costs, to be applied to the program level rather than measure

[17] Revenue Normalization Adjustment is similar to electricity decoupling and allows a distribution utility to recover their authorized costs regardless of sales volume.

level, and to consider the Utility Cost Test as a supplement to the Societal Cost Test or the TRC. NEEP supports a structured performance incentive to reward achievement, and suggests increasing overall program spending to achieve higher results. Finally, NEEP recommends coordinating programs with building energy codes and appliance standards and supports common EM&V protocols.

The P3 Group

The P3 Group raises concerns about curtailment service providers failing to deliver committed demand response resources and asks whether the Maryland PSC should require a measurement and verification system independent of PJM. They also point out discussions at EPA that suggest that some forms of demand response are behind the meter diesel generators which tend to generate high emissions on the hottest days of the year. The P3 Group asks whether EmPOWER participants should be required to disclose the type of technology that is being used to deliver the demand response. Finally, they ask whether electricity received from behind the meter generation be required to comply with the state's RPS.

Sierra Club

Sierra Club recommends extending electricity EmPOWER targets beyond 2015 and introducing natural gas targets. They also recommend implementing an incentive and penalty program based on performance. Sierra Club suggests a blend between an "all cost effective" approach and long term targets to prevent program development stagnation over the long term.

Terra Logos

Terra Logos comments that the historic subsidization of conventional power production using public funds and the externalization of environmental degradation and health impacts serve to artificially lower the cost of conventional energy and make it more challenging for clean power and fuels to compete. Terra Logos recommends that Maryland include the hidden costs of conventional power production and the non-financial benefits of clean energy production when developing plans for EmPOWER 2020.

OPTIONS FOR SETTING EMPOWER TARGETS BEYOND 2015

Programs that are aimed at reducing electricity consumption face more challenges than those aimed at reducing electricity demand. They have different reduction potential across sectors, fewer available market-based incentives, and face behavioral factors that strongly influence program performance. These incremental challenges have been reflected in the results. Broadly speaking, electricity consumption programs are falling behind their targets, while demand reduction programs are meeting their targets.

While the current statute orders natural gas utilities to implement cost energy efficiency programs, those programs have not faced the same level of focus as electricity programs over the past five years. As such, they may face certain start up challenges that electricity programs have overcome.

Taking all this into consideration, while it is critical to analyze all the EmPOWER programs (electricity consumption, electricity peak demand, and natural gas consumption) as a cohesive, integrated policy, it is best to separately analyze each program's reduction target characteristics when considering whether to set reduction targets beyond 2015.

This section will not suggest a single option per program, or even a single methodology per program. Rather, it will present characteristics of program reduction targets that have been gleaned from program experience in Maryland and other states, along with specific feedback from other state agencies and our broad and diverse stakeholder group. Although each program could be defined by the same set of options, a particular choice that may make sense for electricity usage may not make sense for natural gas efficiency programs.

These characteristics can be broadly grouped into three categories[18]: reduction target methods, cost effectiveness definitions, and other characteristics. Some of these recommendations will be mutually exclusive, such as setting a specific reduction target and setting an annual reduction target. However, other options can be paired together to formulate an encompassing structure for program reduction targets.

We do not anticipate that all stakeholders will zero in on the same characteristics for a given program, or even be consistent across programs. However, by presenting a broad array of options, we hope to spark productive debate in advance of making final recommendations to the Senate Finance Committee and House Economic Matters Committee. The Final Draft of this report will be expanded to include comments from stakeholders on these options, and that feedback will shape our final recommendations.

In this section, any specific figures are illustrative only and do not represent the current projections or recommendations of MEA or the PSC.

[18] We recognize there are slight nuances within the options, such as using a single year for a baseline or a multiple year average for the baseline. For simplicity, we only present the high level detail here.

Reduction Target Methods

Do Not Revise Existing Targets Beyond 2015

It is important to note that the current EmPOWER statute maintains the existing electricity usage and demand reduction targets beyond 2015. This option would leave those targets in place. This does not imply all programs would cease to exist after 2015, but rather that program targets would not be revised when measuring future program performance.

Annual Percentage Reduction of Sales – "Top Down" Approach

In this option, EmPOWER goals would be tied to a specific reduction of total sales in the state. For example, when applied to the electricity usage target, if 2015 sales were 70,000 GWh, and the law specified a 1% annual reduction of previous year's sales, the 2016 sales target would be 69,300 GWh. Achievement of the target would be based on a final accounting of the annual sales and would be influenced by non-programmatic factors such as the economy and weather.

Annual Reduction based on Percentage of Sales – "Bottom Up" Approach

This is a slight variation of the previous where targets would be tied to implemented measures rather than overall sales. In this instance, a 1% reduction target would require implementation of 700 GWh of program reductions. As this is a bottom up approach, it specifically excludes external influences on electricity sales from the general state of the economy and weather. For instance, if utility programs demonstrate 700 GWh of verified savings, but the final annual sales were 69,700 GWh due to an extremely hot summer, the goal would have been deemed met.

Specific Reduction Target in Specific Year

In this option, a specific top down or bottom up target would be assigned to a particular year, such as a 10% reduction from 2015 sales by 2020. Following along the previous example, the top down approach would require a final 2020 sales figure of 63,000 GWh.

Cost Effective Definitions

Do Not Define Cost Effective in Statute

The current statute includes reference to cost effectiveness, but does not specifically define what cost effective is. Rather, the statute directs the Commission to determine the definition of cost effectiveness in their regulatory proceedings.

Define Cost Effective in Statute Based on Industry-Standard Tests

Numerous cost effective tests, such as Total Resource Cost Test, Program Administrator Cost Test, Ratepayer Impact Measure Test, Participant Test, and Societal Test[19] have been used at various times in EmPOWER proceedings. The statute could specify which test or tests to apply, and define a range of results that are deemed cost effective. These could be applied on an individual program level, a sector level, or a portfolio level.

Define Cost Effective in Statute Based on Avoided Cost

[19] More information is available in the California Standard Practice Manual at http://www.energy.ca.gov/greenbuilding/documents/background/07-J_CPUC_STANDARD_PRACTICE_MANUAL.PDF

In this option, any program that saves a kWh at a cost lower than the avoided cost of electricity would be defined as cost effective. The avoided cost could be defined in statute in any manner of ways. Potential examples would include the customer retail rate, the avoided cost of generation and transmission (i.e. retail rate excluding distribution), or the wholesale price of delivered electricity (i.e. the wholesale cost including energy, capacity, transmission, and other PJM charges). Alternatively, the statute could stay silent on the definition of avoided cost and allow the Commission to define it in regulatory proceedings.

Other Characteristics

Weather Normalization

Weather has a substantial influence on the amount of electricity consumed. While current targets for peak demand are weather normalized, targets for electricity consumption are not. Under a weather normalization mechanism, the annual target would be adjusted up or down based on the weather from that period. If the electricity usage target was adjusted to be weather normalized, in the "Top Down" approach example the final sales figures of 69,700 GWh would be adjusted to eliminate the impact of the hot summer. If the weather normalized sales figure was 69,300, then the top down goal would be hit. Note that this only eliminates the impact of weather, and not other effects such as economic activity.

Baseline Year

The current targets use 2007 as the baseline year for consumption reductions. This could be maintained, or the baseline year could be updated to something closer to the new targets. For example, 2014 could be used as the baseline for 2020 targets. This would account for program performance up to that point and enable the future goal to be measured on future performance. The baseline year definition could also be expanded to include a multiple year trailing average that would smooth out unusual influences that may disproportionally impact a single year's results.

Per Capita Metrics

EmPOWER targets are currently defined on a per capita basis. Although this has the benefit of adjusting targets for population growth, it faces challenges as population is only officially determined once a decade during the federal census. Further, it assumes there is a direct relationship between energy usage and population which does not always hold true.[20] While the Maryland Department of Planning can provide population forecasts, they are subject to adjustments. Recent adjustments to current EmPOWER programs from updated population forecasts resulted in some utility targets being substantially increased while other utility programs were substantially reduced. Shifting away from a per capita metric would eliminate these issues.

[20] Total energy usage in certain utility territories can be heavily influenced by commercial and industrial customers. If a large industrial customer were to dramatically reduce their usage, it would impact the per capita usage figure even if individual citizens did not change their behavior.

FINAL STAKEHOLDER COMMENTS

This section will hold the comments from the stakeholders as they relate to the options

MEA RECOMMENDATIONS

This section will contain the joint recommendation of MEA after final stakeholder comments have been received. It will be incorporated into the final version of this report.

ADDITIONAL CONSIDERATIONS

This section will contain information related to the final recommendations. It will be incorporated into the final report.