



Stepping Up to Bigger Savings

How Maryland Utilities Can Save More Energy by Adopting
the Nation's Most Ambitious Energy Efficiency Programs

Maryland PIRG
Foundation

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Jordan Schneider, Frontier Group
Jenny Levin and Emily Scarr, Maryland PIRG Foundation

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Graphic Design: Harriet Eckstein Graphic Design, harrieteckstein@cox.net

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Executive Summary

Energy efficiency is one of the best investments Maryland can make in its electricity system. Energy efficiency saves money on energy, increases the reliability of the state's electricity supply, and reduces harmful pollution from power plants. Recognizing these benefits, the state passed the EmPOWER Maryland Act in 2007, which directs utilities to cut per-capita energy use 15 percent below 2007 levels by 2015.

Unfortunately, due to poor implementation by the Public Service Commission (PSC) and the utilities, EmPOWER Maryland energy efficiency programs are not delivering adequate electricity savings to meet 2015 goals.

Maryland utilities can improve their performance and move the state toward an energy-efficient economy by adopting models for energy efficiency programs that are succeeding in other states. The Public Service Commission and the state's utilities should move toward implementation of these programs and ensure that Maryland takes advantage of its full potential for energy efficiency.

Energy efficiency is a powerful solution to Maryland's energy problems.

- Energy efficiency saves ratepayers money on their energy bills. EmPOWER Maryland efficiency investments made to date are helping Maryland consumers avoid about \$140 million in electricity costs annually.
- By reducing demand for electricity, energy efficiency helps increase the reliability of the state's electricity supply and reduces the need for expensive infrastructure upgrades paid for by all ratepayers. In summer 2012, PJM, Maryland's regional grid operator, cancelled several major transmission line projects once deemed critical to maintaining grid reliability in the state, saving almost \$4 billion, according to the Federal Energy Regulatory Commission.
- Energy savings through EmPOWER Maryland also clear the air, reducing emissions of smog-forming nitrogen oxides by 1.5 million pounds per year—equivalent to the amount emitted by 75,000 of today's passenger vehicles.

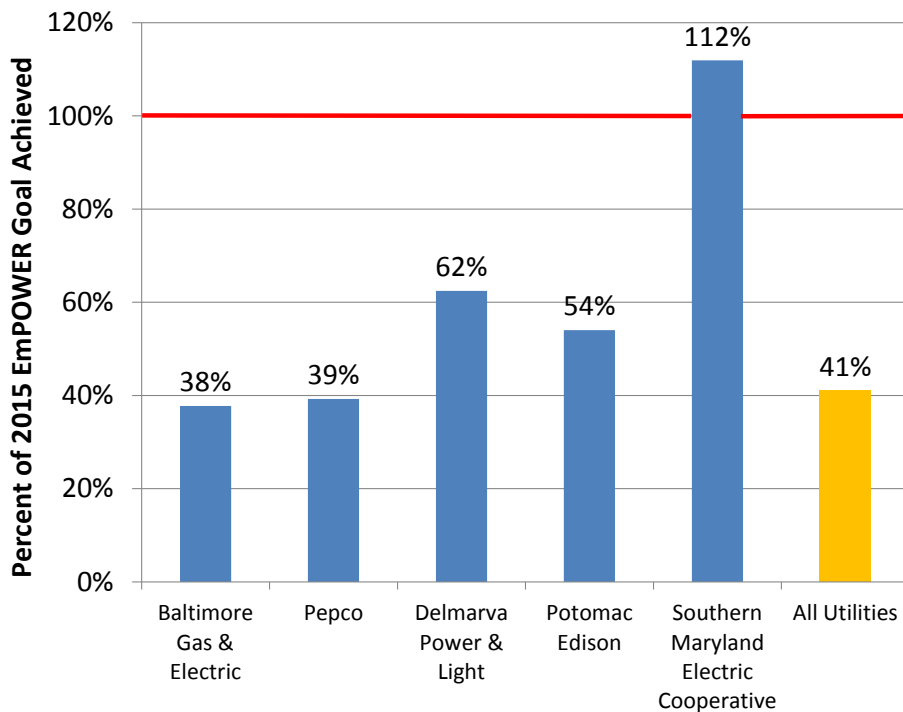
While utility-run energy efficiency programs are delivering significant benefits, they are failing to achieve the energy savings target established in the EmPOWER Maryland Act.

- **The PSC’s failure to set clear standards has hindered development of strong utility energy efficiency programs.** The PSC has rejected many utility programs that do not meet its narrow, yet poorly defined, standard for cost-effectiveness, driving utilities to “play it safe” and propose only programs that deliver short-term energy savings at the lowest possible cost.
- **Utility programs are not designed to achieve EmPOWER Maryland goals.** In part because of PSC restrictions on the type of energy efficiency programs utilities have been allowed

to pursue, utilities have not proposed programs sufficient to reach EmPOWER Maryland energy savings targets. For example, utility programs currently approved for 2012-2014 could only reach 73 percent of the utilities’ 2015 energy savings goal, even if they successfully deliver all projected energy savings, according to Maryland Energy Administration. To get back on track, utilities will have to propose—and the PSC will have to approve—more programs that reach beyond the “low hanging fruit” of energy efficiency opportunities and provide deep, long-term energy savings.

- **Utility programs are not delivering projected energy savings.** Five years into the EmPOWER Maryland program, utilities have only achieved

Figure ES-1. EmPOWER Utilities’ Energy Savings Through 2012 vs. 2015 Goal



about 40 percent of the energy savings needed to achieve EmPOWER Maryland goals. (See Figure ES-1.) Some of this shortfall is due to the shortage of innovative energy efficiency programs among EmPOWER Maryland utilities; however, existing programs have not attracted enough customer participation, nor delivered enough energy savings per customer.

Although Maryland’s utilities have fallen behind on delivering effective energy efficiency programs, they can still reach 2015 EmPOWER Maryland goals. Innovative energy efficiency programs have emerged across the country that can provide a model for success in Maryland. In general, these programs are successful because they:

- 1. Target whole buildings and systems for efficiency improvements** — The nation’s best new construction and retrofit programs focus on improving the overall energy performance of a building, rather than replacing individual inefficient appliances or pieces of equipment.
 - Some programs reward contractors with financial bonuses when installed measures achieve a certain level of energy savings. A Massachusetts program, for example, offers contractor incentives up to \$1,300 for completing comprehensive energy efficiency measures certified by Energy Star. In many cases, this motivates contractors to actively market stronger efficiency measures to customers.
- 2. Embrace the next wave of energy-efficient technology** — The best energy efficiency programs achieve deep energy savings by fostering widespread adoption of the next generation

of super-efficient products, technologies, building materials and design.

- Some appliance programs offer larger rebates for appliances that achieve greater energy savings than the last generation of energy-efficient products. Other programs are using smart meters and smart grid technology that allow ratepayers to track and manage their energy use. Several EmPOWER Maryland utilities have recently launched smart metering programs.

- 3. Reach out to new markets and populations** — Emerging programs are using new strategies to reach new customers.
 - Energy efficiency programs are beginning to address multifamily housing developments for the first time. In multifamily housing, tenants pay for energy costs, but they do not have control over capital improvements to the building that may save energy—resulting in split incentives that can make program design difficult. New programs tackle this problem by either addressing the needs of tenant and building owners separately, or by bringing these groups together with housing authorities, utilities or non-profit organizations to leverage resources.
- 4. Enlist allies and trade partners to expand program reach** — Making energy efficiency a visible and valued element in our economy requires support from manufacturers, distributors, contractors, retailers and consumers, and new programs supply these groups with tools and incentives to make them effective allies.

- Rather than attempt to develop their own marketing strategies, some utilities provide incentives for retailers who meet sales targets for more efficient appliances.
- Because of the personal contact that contractors have with customers, some programs offer specialized sales training and focus on improving contractors' awareness of utility energy efficiency programs, so that they can help sell more comprehensive measures.

Because Maryland's utility-run energy efficiency programs are failing to meet energy savings goals, ratepayers will miss out on key benefits of the EmPOWER Maryland Act. Utilities must pursue larger opportunities to save energy for the long term—and the Public Service Commission must hold them accountable. In order to put Maryland on track to a more efficient, clean energy economy, the state should:

- 1. Set clear standards for program approval** — The PSC's reluctance to establish and adhere to a clear standard for program approval has significantly slowed utility progress toward meeting EmPOWER Maryland energy savings goals. A clear standard would help utilities avoid wasting valuable time and resources on energy efficiency programs that the PSC will ultimately reject, and encourage utilities to pursue stronger programs.
- 2. Establish energy savings goals beyond 2015** — The state should establish an aggressive statutory goal for energy savings among utilities after the current cycle of EmPOWER Maryland programs ends in 2015.
- 3. Hold utilities accountable for their performance** — The state should work with the PSC to establish a structure of penalties and incentives to hold utilities accountable for failing to meet EmPOWER Maryland targets, and to drive them to do better.
- 4. Approve more utility programs with longer payback periods** — The PSC should approve utility programs that deliver cost-effective energy savings over several years—rather than approving only those that deliver savings in the short term at the lowest possible cost. Therefore, the PSC should define “cost effective” programs according to the anticipated payback period for each type of program, which can vary widely from sector to sector. All programs should not be required to become “cost-effective” over the same time period.
- 5. Recognize all the benefits of energy efficiency** — The PSC should follow the lead of states with successful energy efficiency programs and adopt a broader cost-effectiveness test for approving programs that captures other benefits of energy efficiency, such as avoided costs of building transmission lines and power plants, as well as public health benefits of using less energy, such as avoided air pollution.
- 6. Create a financing program for energy efficiency improvements** — The state should set up a loan program or other financing mechanism to help eliminate financial barriers for homeowners and business owners who want to make energy efficiency improvements. One-time incentives and rebates are very effective at reducing the up-front costs of these improvements, but a loan to cover

the remainder of these costs would both increase participation in energy efficiency programs and encourage customers to install more comprehensive measures. Loan programs can be particularly useful because they can increase the impact of limited government funds, allowing them to be recycled as they are repaid.

7. **Restore funding to energy efficiency programs** — While utility-run EmPOWER Maryland programs are funded through a surcharge on ratepayers' utility bills, non-utility energy efficiency programs have been supported with revenues from the sale

of carbon allowances in a regional cap-and-trade agreement designed to limit global warming pollution. Forty-six percent of this funding was originally allocated for energy efficiency programs, but since 2009 more than half of it has been diverted to direct bill-pay assistance. Bill-paying assistance provides a lifeline for consumers during difficult economic times, but diverting money from energy efficiency programs eliminates another important set of benefits for consumers while ensuring higher electricity consumption and more pollution in years to come. The state should restore all diverted energy efficiency funding.

Introduction

Energy efficiency is one of the best investments Maryland can make in its electricity system. Saving electricity through energy efficiency is far cheaper than producing it at a coal, nuclear, or natural gas-fired power plant, and saved energy is pollution-free.

The state has therefore directed Maryland’s utilities to make energy efficiency investments that will help keep our lights on without increasing our dependence on dirty power plants. Under the EmPOWER Maryland Act, utilities collect funds from ratepayers to run energy efficiency programs that will move the state toward an energy-efficient economy.

Unfortunately, the EmPOWER Maryland program has thus far failed to live up to its promise. Many of the utility energy efficiency programs have failed to deliver expected results because they were slow to start and were poorly implemented. In addition, the Public Service Commission’s early history of rejecting utility programs with longer payback periods strongly influenced utilities to focus almost exclusively on the “low-hanging fruit” of energy savings opportunities—those which deliver savings immediately and at low cost, but do not contribute to the lasting transformation that will be needed to

meet the goals of EmPOWER Maryland and put the state on a pathway to a clean energy future.

Due to slow progress by both utility-run energy efficiency programs and non-utility programs, the state is likely to miss its overall 2015 energy savings goal by about half.¹

Maryland needs a long-term solution to its energy challenges—and utilities will be unable to deliver if their programs continue to be limited to energy efficiency opportunities within easy reach. As the leading states in energy efficiency have shown, pursuing all cost-effective opportunities to save energy is critical to program success.

Maryland utilities have a responsibility to make the best possible use of ratepayer funds to maintain an electricity system that is reliable, keeps energy costs low and protects public health. Utilities can deliver such a system by aggressively pursuing the largest opportunities to save energy and meeting the goals of EmPOWER Maryland.

In this report, we review the ways that other energy efficiency programs in leading states are achieving success, and how Maryland utilities can follow their lead by adopting best practices and innovations for their own programs.

Energy Efficiency Is a Powerful Solution to Maryland's Energy Problems

Wasteful electricity use in Maryland presents serious challenges for our infrastructure, our economy, our health, and our environment. High electricity consumption strains the region's electricity grid and increases calls for expensive infrastructure upgrades—such as new transmission lines to import electricity—paid for by all ratepayers. It also exerts upward pressure on electricity prices, hurting businesses and consumers, and increases harmful air pollution emitted by power plants.

Energy efficiency addresses all of these problems. By ensuring that each kilowatt-hour of electricity is used to its maximum potential, energy efficiency reduces the overall amount of energy needed to power Maryland's homes and businesses. This alleviates pressure on system infrastructure, increases service reliability and reduces pollution that harms public health.

Energy efficiency is also the cheapest way to meet Maryland's electricity needs. Utilities charge about 12.7 cents per kilowatt-hour (kWh) to deliver electricity to Maryland residences; in comparison, it only costs Maryland utilities about 3 cents per kWh to save electricity through energy efficiency.² Adding the benefits

of avoided pollution and reduced grid congestion makes efficiency an even more attractive alternative to grid electricity.

Energy Efficiency Benefits Consumers

Energy Efficiency Protects Vulnerable Marylanders from High Energy Prices

Energy efficiency helps consumers save money on their power bills. After the deregulation of the state's electricity market in 1999, the state made virtually no investments in energy efficiency programs. For example, in 2004, Maryland utilities spent a paltry one cent per capita on efficiency (compared to Vermont's \$22.54 or California's \$10.60).³ As a result, electricity use in Maryland continued to grow—with per-capita electricity consumption increasing 9 percent between 1990 and 2010.⁴ This high energy use, together with a 30 percent increase in residential electricity prices during the same time frame, raised electricity costs by nearly \$700 per year for the typical Maryland household—from

\$1,190 per year in 1999 to \$1,880 per year in 2010, adjusted for inflation.⁵

To address this problem, the state adopted the EmPOWER Maryland Energy Efficiency Act of 2008, which set goals for reduced per-capita electricity consumption in Maryland. The targets set in the EmPOWER Maryland legislation include 15 percent reductions in per-capita consumption and in peak demand below 2007 levels by 2015. Maryland's five utility companies are key to achieving these goals, as they are responsible for at least two-thirds of the electricity savings targets and all of the peak demand targets outlined in the legislation.⁶ The remaining portion of the EmPOWER Maryland energy savings target may be achieved through a variety of non-utility programs, such as those run by Maryland Energy Administration (MEA), or through efficiency standards for appliances or buildings that are set by the state. (See text box on page 11.) Meeting the strong energy savings goals of the EmPOWER Maryland Act would help transform the way the state drives its whole economy, protecting consumers from high energy costs, grid instability, and air pollution.

As of early 2013, EmPOWER Maryland energy efficiency programs were saving more than 1,700 gigawatt-hours (GWh) of electricity annually—enough to power nearly 130,000 typical Maryland homes each year.⁷ Maryland consumers are avoiding about \$140 million in electricity costs annually due to these programs.⁸

Energy Efficiency Reduces the Cost of Power and Increases Grid Reliability

Energy efficiency also saves consumers money by lowering the overall cost of power—particularly during periods of peak demand when expensive, rarely used power plants must be brought on-line. The need for this additional supply on hot summer days when most residents run their air conditioners drives up the cost of electricity for all users. Improved energy efficiency can

reduce the size of those peaks, reducing the cost of providing power.

In addition, by lowering overall demand for electricity, energy efficiency helps reduce the need to build additional generation or transmission capacity and helps ensure reliability of service.

Demand for electricity varies widely over the course of the year and the course of any given day. On a hot summer day, demand for power can be two to three times as great as in the middle of the night during a time of moderate temperatures. These periods of peak demand may represent a tiny fraction of the time the electrical system must function, but millions of dollars of infrastructure must be in place to ensure reliability. Otherwise, demand for electricity may overwhelm supply, destabilizing the grid and increasing the risk of blackouts or brownouts.

By reducing demand for electricity, energy efficiency helps ratepayers avoid the need to pay for expensive additions to Maryland's power infrastructure. For example, in summer 2012, PJM, Maryland's regional grid operator, cancelled several major transmission line projects because of reduced forecasted electricity demand, including the MAPP and PATH projects, which were once deemed critical to maintaining grid reliability in the state.⁹ The cancellation of these projects reduced estimated costs for new high-voltage transmission infrastructure planned for the PJM service territory from \$6.6 billion to \$2.7 billion, according to the Federal Energy Regulatory Commission.¹⁰

To date, EmPOWER Maryland energy efficiency programs have reduced peak demand by 1,070 MW—a reduction equivalent to eliminating the need for two coal-fired power plants.¹¹

Energy Efficiency Boosts the Economy and Creates Jobs

Energy efficiency creates jobs in two ways: directly and indirectly. Jobs can be created

through new employment opportunities in the energy efficiency sector. Workers are needed to improve insulation and sealing of homes; skilled architects, engineers, and builders are required to perform energy-efficient new construction and remodeling; and trained manufacturing workers are needed to build energy-efficient appliances.

Energy efficiency can also create jobs indirectly by giving people extra money to spend, stimulating Maryland's economy. Because energy efficiency lowers electricity bills, Marylanders could reduce the amount of money they spend to import electricity every year (about \$1.9 billion) and instead spend it on in-state goods and services.¹²

Energy Efficiency Protects Public Health and the Environment

Energy Efficiency Protects Public Health

Energy efficiency can help the state avoid many of the worst environmental and health impacts associated with the generation of electricity—including the emission

of soot and smog-forming pollutants that cause asthma and other respiratory diseases.

The majority of the electricity in Maryland—including imported electricity—comes from dirty sources: In 2010, 43 percent of the electricity generated in Maryland came from coal-fired power plants, 36 percent from nuclear power, and 13 percent from natural gas.¹³ Coal-fired power plants are major contributors to Maryland's poor air quality. The majority of Marylanders live in areas with excessive levels of ground-level ozone pollution, or "smog," which damages lung tissue and causes short-term swelling. In 2013, 11 out of 14 Maryland counties evaluated by the American Lung Association for ground-level ozone pollution received "F" letter grades—two received "D" grades and one a "C" grade.¹⁴ Several of those counties also received poor grades for particulate matter, or soot, which contains hundreds of toxic chemicals, some of which cause cancer, irritate lung tissues, or cause changes in the function of the heart that increase the risk of heart attacks.¹⁵

By reducing the amount of electricity generated from dirty sources such as coal, EmPOWER Maryland programs have helped cut emissions of smog-forming nitrogen oxides by 1.5 million pounds per year—equivalent to that emitted by 75,000 of today's passenger vehicles.¹⁶

Large Opportunities to Save Energy Remain Untapped

While utility-run energy efficiency programs have delivered significant energy savings to the state, they are failing to deliver the energy savings required to meet the 2015 EmPOWER Maryland target of reducing the state's per-capita electricity consumption by 15 percent below 2007 levels. This goal is aggressive, but achievable. Meeting this goal is also essential to putting the state on a pathway to a clean energy future. It would have a significant impact on consumer power bills and the overall stability of the energy market. It would reduce harmful air pollution, improving public health and helping to curb the impact of global warming. It would help prevent a rise in electricity prices once the state's economy recovers and electricity demand increases, and support thousands of new jobs.

Maryland's five utility companies are key to achieving this goal—they have a thorough understanding of the energy sector and energy use patterns in their service territories, as well as valuable relationships with home builders, home energy raters, contractors, and energy service companies that can contribute to program success. Utilities are therefore

responsible for two-thirds of the electricity savings targets outlined in EmPOWER Maryland legislation.¹⁷ The remaining portion of the EmPOWER Maryland target may be achieved through a variety of non-utility programs, such those run by the Maryland Energy Administration or the Department of Housing and Community Development.

Unfortunately, as of March 2013—five years after the start of the EmPOWER Maryland program—utilities have only delivered 41 percent of the energy savings they must deliver to meet their 2015 targets.²⁰ (See Figure 1.)

By not achieving the energy savings required by EmPOWER Maryland, utilities are failing to move Maryland toward an energy-efficient economy.

There are three major reasons that utility programs are failing to achieve adequate results. First, utilities have designed and submitted program plans that are inadequate to meet EmPOWER Maryland targets. Second, utilities are not spending enough on their programs to achieve adequate results. Finally, utilities are failing to pursue energy savings opportunities beyond the “low-hanging fruit” of energy

Non-Utility Energy Efficiency Programs Contribute to EmPOWER Maryland

The state's five major utilities are not the only contributors to the EmPOWER Maryland program. State agencies also lead energy efficiency programs. The largest of these are run by the Maryland Energy Administration, which runs both energy efficiency and clean energy programs, and the Department of Housing and Community Development, which in 2012 took over the utilities' limited-income programs.

Maryland Energy Administration

The Maryland Energy Administration (MEA) administers a wide range of programs, from grant programs to help Marylanders install small-scale solar and wind energy systems, to loan and rebate programs for energy efficiency improvements for homes, businesses, local governments and schools. These programs are generally much smaller than utility-run programs, but several of them have been adopted and expanded by EmPOWER Maryland utilities. For example, the PSC ordered utilities to drastically increase incentives for comprehensive home retrofits after an MEA program offering 35 percent rebates on top of the utilities' 15 percent rebates attracted 1,100 participants within eight months—far more than the 200 participants in similar utility programs in all of 2010.¹⁸

MEA continues to pilot new programs and advise utilities on how to improve their progress toward EmPOWER Maryland goals.

Department of Housing and Community Development

The Department of Housing and Community Development (DHCD) assumed responsibility for all EmPOWER Maryland low-income home energy efficiency programs (LIHEEP) from utilities in 2012. The LIHEEP program covers low-income housing of all types, including public housing, apartment buildings, and single-family homes. Low-income programs are important because in most service territories, up to one-third of utility residential customers are low-income earners, according to EPA.¹⁹

Programs tailored to low-income customers help reach those who may not take advantage of traditional utility-run rebate or other programs because they are less likely to be purchasing new appliances or making home improvements. These customers usually live in older, less efficient housing with great energy saving potential. Additionally, because these customers spend a higher percentage of their income on energy, energy efficiency can reduce the financial burden of high energy bills.



Cynthia A. Sharon, MEA

Downtown Baltimore is reflected in the glass of the American Visionary Art Museum façade, which undertook an efficiency project with loan and grant funding from MEA.

efficiency measures that deliver short-term energy savings at a relatively low cost.

Utility Programs Are not Designed to Meet EmPOWER Maryland Targets

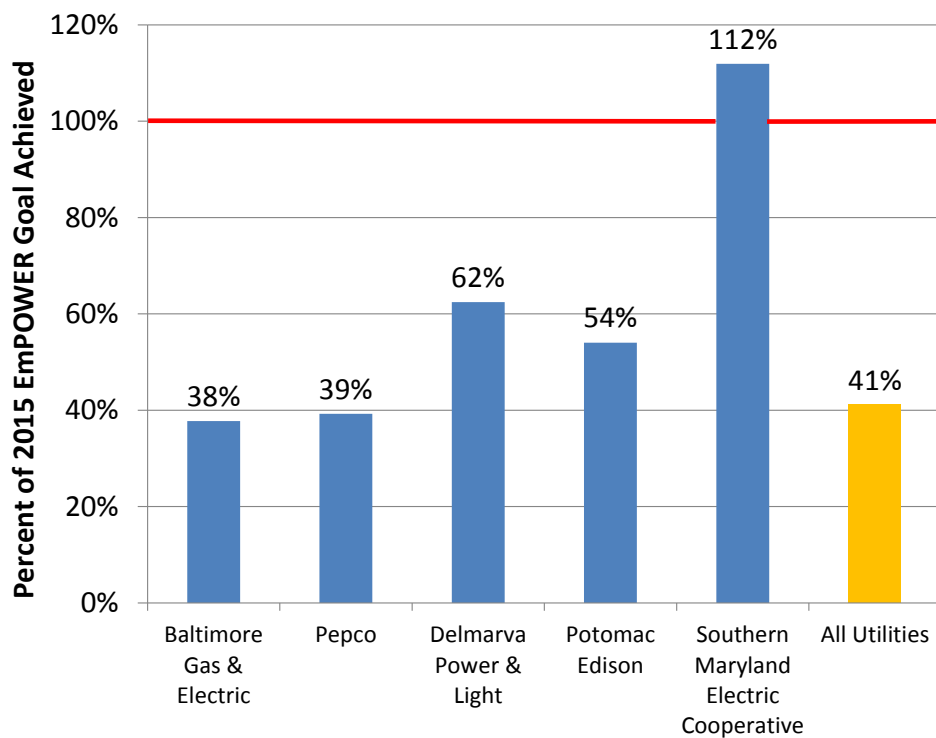
Utilities have never submitted energy efficiency program plans that were designed to hit EmPOWER Maryland goals. The utilities' initial 2009-2011 plans were only designed to achieve 63 percent of EmPOWER Maryland interim targets for 2011, and their plans for 2012-2014 are only expected to achieve 73 percent of 2015 targets for energy savings.²¹ The Public Service Commission approved utility plans with lowered energy savings goals for both periods. Unfortunately, utilities have also consistently failed to meet their own, reduced goals for energy savings. In 2011, utilities fell short of their interim EmPOWER Maryland targets for energy

savings by more than half.²² The Public Service Commission has not taken corrective action that would require utilities to make up these energy savings shortfalls by 2015.

Utilities Are Not Adequately Investing in Energy Efficiency

Utilities have also failed to adequately invest in their energy efficiency programs. Adequate spending on energy efficiency programs is necessary to achieve the critical mass of participation required to deliver meaningful energy savings. In comparison to other states with successful programs, Maryland's utilities spend far less per capita on energy efficiency. For example, in 2011 Vermont spent \$67 per capita on electric energy efficiency programs and achieved energy savings equivalent to 2 percent of its sales that year—among the highest energy

Figure 1. EmPOWER Utilities' Energy Savings Through 2012 vs. 2015 Goal



savings rates in the country.²³ In contrast, Maryland utilities spent about \$17 per capita and achieved an energy savings rate of about 0.7 percent.²⁴ (See Table 1.)

Table 1. Per-Capita Spending on Efficiency Programs, Maryland Utilities and Other Northeast States²⁵

State	2011 Per Capita Spending	2011 Energy Savings as a Percent of Retail Sales
Massachusetts	\$79	1.7%
Vermont	\$67	2.0%
Connecticut	\$41	1.4%
New York	\$39	1.3%
Maryland	\$17	0.7%

In order to achieve the annual energy savings necessary to reach 2015 EmPOWER Maryland goals, utilities will have to increase their per-capita spending on “advanced” programs that may be more expensive in the short run, but will achieve deeper, lasting energy savings, according to PSC Staff.²⁶

Utilities already have some funding available to boost spending on their programs. Due to lower-than-expected customer participation in their programs, utilities have spent less on customer incentives and rebates than anticipated. As a

result, several utilities have significantly under-spent their approved program budgets. Potomac Edison (PE), and Delmarva Power & Light (DPL) have under-spent their overall program budgets by about 25 and 40 percent, respectively.²⁷ (See Table 2.)

Utility Programs Focus too Narrowly on the Easiest Energy Saving Opportunities

Finally, utilities must reach beyond the “low-hanging fruit” of energy efficiency opportunities. For example, lighting measures have contributed more than three-quarters of utilities’ total EmPOWER portfolio savings to date, and utilities continue to rely heavily on lighting programs to deliver the majority of their planned energy savings for 2012-2014.²⁸ Lighting efficiency measures are relatively inexpensive and provide large energy savings almost immediately, but they do not provide energy savings that are as deep or as lasting as other measures, such as comprehensive home retrofits. Programs that promote these large energy efficiency measures incur higher up-front costs but achieve deeper savings over the long term. These programs are also more likely to create and sustain new markets for energy-efficient products and services required to transition the state to an energy-efficient economy.

Table 2. Budgeted Versus Reported Spending Through 2012, All Utilities (Millions)

Utility	Budgeted	Reported	Percent of Budget Spent
Potomac Edison	\$21	\$16	74%
Baltimore Gas & Electric	\$520	\$446	86%
Delmarva Power & Light	\$28	\$17	62%
Pepco	\$88	\$63	71%
Southern Maryland Electric Cooperative	\$23	\$21	90%
Total	\$681	\$562	83%

In Maryland, the utilities' reluctance to pursue transformative programs is partially due to a lack of guidance from the Public Service Commission. Early in the EmPOWER Maryland program, the PSC rejected several proposed utility programs that may have provided significant energy savings, but that did not pass the PSC's limited definition of cost-effectiveness. According to PSC staff:

The Utilities, adhering close to the limited guidance that they have been provided on cost-effectiveness, are essentially 'playing it safe' with proposing

the same best practice programs they did in 2008. Maintaining status quo in their 2012-2014 plans, most Utilities will be hard-pressed to reach the EmPOWER targets.²⁹

The PSC Staff have suggested giving the utilities more flexibility to pursue programs with a longer payback period, which would be a good first start to improving progress toward reaching EmPOWER Maryland goals. However, utilities must also step up efforts to properly finance and implement their existing programs. Utilities have several programs that

Defining "Cost-Effective" Programs Too Narrowly Impedes Progress Toward EmPOWER Maryland Goals

The EmPOWER Maryland Act directs the PSC to approve all "cost-effective" efficiency programs to move the state towards its goals to reduce energy consumption. In the last few decades, policymakers have devised several tests that weigh the costs of a particular efficiency program against its anticipated benefits.

These tests are now the industry standard and are an important tool for utilities trying to design energy efficiency programs that will be approved by regulators. Early in the EmPOWER Maryland Program, however, the PSC refused to adhere to any particular test and rejected utility programs that passed several of these nationally-recognized cost-effectiveness tests.³² This left utilities without a clear indication of how to design programs for PSC approval, resulting in major delays.³³

Realizing it would have to provide more guidance, the PSC indicated in August of 2008 a preference toward the relatively conservative total resource cost (TRC)—but even this test has been inconsistently applied.³⁴ Maryland utilities have reacted by designing programs to capture the easiest energy savings at the lowest cost—leaving many opportunities to save energy on the table.

One important step to getting EmPOWER Maryland back on track will be for the PSC to broaden and clarify its definition of "cost-effectiveness" and approve more programs. States that use broader definitions of cost-effectiveness have the best energy efficiency programs in the country. For example, five states currently use the Societal Cost Test as their primary test: Arizona, Maine, Minnesota, Vermont, and Wisconsin.³⁵ Of these, Maine, Minnesota, and Vermont were ranked among the top 12 states for energy efficiency in 2012 by the American Council for an Energy-Efficient Economy (ACEEE).³⁶

should be achieving greater energy savings—such as their Home Performance with Energy Star programs—but the programs lack proper funding. For example, in its 2012-2014 plans for home retrofit programs, Pepco only budgeted \$544 per participant for all implementation costs and incentives, indicating the utility never planned for significant participation in its comprehensive retrofit programs, according to the Vermont Energy Investment Corporation.³⁰

Getting Back on Track: Maryland's Next Steps

To achieve the 2015 energy savings goals of EmPOWER Maryland, utilities must troubleshoot their existing programs to improve implementation and performance;

however, they will also have to reach beyond the “low-hanging fruit” of energy efficiency opportunities on which they so heavily rely. This is especially true for utility lighting programs, since new federal lighting efficiency standards implemented in 2012 are likely to reduce energy savings attributable to lighting measures by as much as one-third compared to 2011, according to the American Council for an Energy-Efficient Economy.³¹

Utilities must broaden participation in their programs, while achieving deeper energy savings per participant. Fortunately, there are several models of successful energy efficiency programs in other states that can help Maryland utilities get back on track to meeting EmPOWER Maryland goals.

Improving EmPOWER Maryland with Best Practices and New Programs

To boost their progress toward 2015 EmPOWER Maryland energy savings goals, Maryland's utilities must fully commit to making their energy efficiency plans work. First, that means spending enough on programs to achieve sufficient participation and establish strong market footholds for energy-efficient products and services. Maryland utilities have only 83 percent of the funds available to them for EmPOWER Maryland programs, so there is room to grow these programs.³⁷ (See Table 2.) Research shows that investing in an energy efficiency program so that it develops economies of scale actually brings down overall program costs—ultimately delivering more “bang for the buck.”³⁸

Second, it means pursuing all opportunities to save energy, and not just the cheaper opportunities that provide savings in the short term. The best states in the country for energy efficiency, including Connecticut, Massachusetts, New York and Vermont, are achieving a minimum energy savings of one percent of their annual sales each year.³⁹ Programs in these states focus on most of the same customer segments

as Maryland's utilities: residential and commercial retrofit and new construction; heating, ventilation, and air conditioning (HVAC) retrofit or replacement; appliances programs; lighting programs; and financing programs. However, top performing states are doing more to reach out to new customers and increase energy savings per customer receiving assistance.

The following section highlights how the next wave of energy efficiency programs are achieving greater savings in both new and traditional program areas—and how Maryland can follow their lead. We based much of our analysis on energy efficiency programs highlighted in two ACEEE reports from 2013, *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings* and *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs*.⁴⁰ In general, these programs show that Maryland utilities should:

- 1. Target whole buildings and systems for efficiency improvements, rather than parts** — The nation's best new construction and retrofit programs

focus on improving the overall energy performance of a building, rather than replacing individual inefficient appliances or pieces of equipment.

- 2. Embrace the next wave of energy-efficient technology** — The best energy efficiency programs achieve deep energy savings by fostering widespread adoption of the next generation of super-efficient products.
- 3. Reach out to new markets and populations** — Achieving and maintaining high participation in energy efficiency programs among customers is critical to program success. Emerging programs are using new outreach strategies to reach new customers, such as those living in multifamily housing units.
- 4. Enlist allies and trade partners to expand program reach** — Making energy efficiency a visible and valued element in our economy requires support from manufacturers, distributors, contractors, retailers and consumers, and new programs supply these groups with tools and incentives to make them effective allies.

Residential Retrofit

As ACEEE describes in its *Frontiers of Energy Efficiency* report, the “next generation” of residential retrofit programs are designed to encourage improvements that lead to high overall household energy performance—not just single upgrades.⁴¹ Maryland utilities have two residential retrofit programs that are meant to drive customers to these comprehensive retrofits, but they are failing to deliver projected energy savings.

These programs, the Quick Home



Earl Millett, Civic Works

Civics Works volunteers perform energy efficiency upgrades.

Energy Check-up program and the Home Performance with Energy Star program, are closely linked. Both programs offer energy audits and allow customers to install certain energy efficiency measures at the time of the audit, such as more efficient shower heads, hot water heater blankets or pipe insulation. However, whereas the Quick Home Energy Check-up program provides a non-comprehensive energy audit for free, the Home Performance with Energy Star program requires customers to have a more comprehensive audit at a \$100 charge before they are eligible for Home Performance with Energy Star rebates, such as duct sealing, adding insulation or installing new windows.⁴²

The Quick Home Energy Check-up program is a low-cost way to achieve immediate energy savings. However, the potential energy savings through Home Performance with Energy Star improvements are much greater, and by ensuring that participation in Quick Home Energy Check-ups translates into comprehensive audits and retrofits, utilities can both increase savings achieved per participant and develop the economies of scale that reduce the cost of the program.

In 2012, the utilities succeeded in enlisting large numbers of customers to undergo the initial energy audit, but did not succeed in getting most of those consumers to undergo the detailed audit or implement major energy efficiency improvements.⁴³

There are a number of ways utilities can convince customers who participate in audits to install all of the recommended energy efficiency improvements. Across the country, the most successful energy efficiency programs are doing this with more financing options or free audits to remove financial barriers for homeowners, and by improving contractor education and performance.

Removing Financial Barriers for Homeowners

The primary reason that homeowners avoid comprehensive retrofits is the high up-front cost, which means that it can take a long time for homeowners to begin to see financial rewards from their energy efficiency investments. Innovative financing programs, such as allowing customers to pay off the efficiency improvements on their utility bills, zero-interest loans, or energy efficiency mortgages can enable consumers to begin to reap financial rewards from comprehensive retrofits right away.

The Maryland Energy Administration runs the state's only residential financing program for energy efficiency improvements. The Maryland Home Energy Loan Program (MHELP) has leveraged \$1.5 million in ARRA funding to attract more than \$15 million in private capital for loans to homeowners interested in making energy efficiency improvements.⁴⁴ Because the utilities have no residential financing programs of their own, several utilities have suggested using EmPOWER Maryland funds to expand the reach of MHELP to assist more homeowners, but this proposal was recently rejected by the PSC.⁴⁵ As ARRA funds run out, MEA is working to restructure MHELP to keep the program open, but without a stable funding source, it is likely to expire.⁴⁶

Give Contractors Tools to be Effective Salespeople for Energy Efficiency

Utilities should also focus on improving

contractors' knowledge of utility energy efficiency offerings, so that they can help their customers better understand the benefits of energy-efficient buildings and equipment. For example, after providing sales training to its contractor base, Efficiency Maine saw its rates for completed home performance jobs jump from 20 percent to 60 percent.⁴⁷ Utilities should also standardize program offerings and program branding; this would help contractors avoid having to learn multiple participation requirements and incentive levels in different service territories. Hearing a consistent message from contractors and utilities may increase customer confidence and increase the likelihood that they will purchase retrofit measures.

Structure Incentives to Reward Contractor Performance

Utilities can also improve the performance of their residential retrofit programs by structuring contractor incentives to reward high energy savings per job. Some programs reward building contractors with financial bonuses when installed measures achieve a certain level of energy savings after they are evaluated by a home energy rater. In Massachusetts, the Mass Save Home Energy Services (HES) Program offers contractor incentives up to \$1,300 for completing a four-step air flow testing and duct sealing process certified by Energy Star.⁴⁸ In many cases, this motivates contractors to actively market stronger efficiency measures to customers.

It's also important to retain good contractors for the long-term success of home retrofit programs. To encourage good contractor performance, utilities in other states assign work to contractors based on merit; each job is evaluated and scored, and contractors with the highest scores are the first selected to fulfill new requests for energy efficiency improvements.⁴⁹ Qualified contractors will help boost customer confidence in the program.

Expand Multi-Family Housing Retrofits

Even though 15 percent of all electricity consumed in the residential sectors is consumed by multi-family housing, these households are usually overlooked by energy efficiency programs.⁵⁰ This is largely because the renters who pay for energy costs are not the same people responsible for capital investments and upkeep, resulting in a problem of “split incentives” that is difficult for utilities to address.

Some utilities have overcome these barriers by keeping the needs of multifamily building owners in mind as they design their programs. In Chicago, for example, the CNT Energy and Community Investment Corporation Energy Saver program strives to keep participation as simple as possible for multifamily building owners. The program offers a free energy audit and helps building owners secure low-cost loans (usually at half the market rate), take advantage of other energy efficiency incentives and grants, and choose and supervise qualified contractors.⁵¹ In the last four years, the program has resulted in energy audits for buildings containing more than 32,000 apartment units in the Chicago area, and energy efficiency improvements to buildings containing about 10,000 units.⁵²

Other programs, such as the California Statewide Multifamily Rebate Program, focus on making improvements to individually metered tenant dwellings. The program offers incentives for qualified, permanent measures inside tenants’ dwellings and in common areas of residential apartment buildings, as well as in mobile home parks and condominium complexes of two or more units.⁵³ According to ACEEE, this program served 410,000 housing units in its first three years, resulting in 141,000 MWh of electricity savings annually.⁵⁴

Lighting

The millions of light bulbs Marylanders use to power their homes and businesses use tremendous amounts of energy. Changing inefficient light bulbs is therefore a great source of potential energy savings that Maryland utilities have begun to tap. Utility lighting programs have helped customers install hundreds of thousands of efficient compact fluorescent light bulbs (CFLs), cutting electricity costs.

However, there are even greater opportunities to save energy through lighting programs. Energy efficiency programs in leading states are getting more savings by broadening participation and switching to new lighting technologies that save even more energy than CFLs, such as light-emitting diodes (LEDs).

Reach Out to Underserved Markets

While energy-efficient light bulbs such as CFLs are becoming more commonplace in the market for lighting products, not everyone has access to them. Reaching out to those customers can therefore help utilities achieve greater energy savings from their existing lighting programs. Some utilities are reaching out to new customers that don’t normally shop at the stores that participate in existing lighting programs. For example, according to an analysis by the Vermont Energy Investment Corporation (VEIC) for the Maryland Office of People’s Counsel (OPC), most Maryland utilities focus on partnering with “Big Box” retail chains, leaving opportunities to reach out to hardware stores, independent grocery, and local store chains untapped.⁵⁵ Efficiency Vermont started partnering with food banks and pantries to provide compact fluorescent light bulbs (CFLs) to low-income customers in 2009 and has distributed more than 500,000 CFLs.⁵⁶ Utilities can also work directly with CFL manufacturers to negotiate a bulk lighting promotion that would allow them to enroll

stores that don't receive CFLs from their regular distributors.

Incorporate New Efficiency Technologies

Utilities should also promote new highly efficient lighting technologies, such as solid-state lighting (SSL) or light-emitting diode (LED) bulbs. In comparison to incandescent light bulbs, which only convert about 5-10 percent of the electricity they consume into light, wasting the rest as heat, LEDs convert about 60 percent of electricity to light—more than the 50 percent achieved by typical compact fluorescent

light bulbs (CFLs).⁵⁷ LED bulbs also last 25 times longer than incandescent light bulbs, and three times as long as compact fluorescent light bulbs (CFLs).⁵⁸ They can also turn on to full brightness immediately and are dimmable, which make them more attractive to some consumers than CFLs.⁵⁹

These lights are now available in more sizes and lamp styles and have significantly dropped in price, making them accessible to more consumers.⁶⁰ In California, to promote these more efficient light bulbs, utilities will no longer offer incentives for standard bare spiral CFLs after 2013, opt-

Not Just Deeper, But Wider

The Importance of High Customer Participation to Program Success

There are two ways to increase the performance of energy efficiency programs: by achieving more energy savings per participant, and by increasing the number of participants. Increased energy savings per participant can be achieved by convincing customers who are thinking of purchasing an efficient light bulb or appliance to purchase the most efficient versions available, and to convince customers thinking of retrofitting their homes to install all the comprehensive measures they can. However, while increasing the energy savings per customer generally makes programs more cost-effective and improves overall performance, opportunities to save large amounts of energy from an existing customer base are relatively limited—not everyone will choose to fully retrofit their homes or businesses—making it necessary to reach out to new markets.

So, the next generation of efficiency programs is increasing participation by using improved data about customers to tailor their marketing approaches and direct resources to customers who are most likely to participate. For example, customers who apply for quick home energy audits may actually be good candidates for a full home retrofit program, and targeting marketing resources specifically at those customers—rather than to the public at large—may increase the total number of comprehensive home retrofits completed.

Another approach is to use traditional mass outreach methods—such as mass mailings—more effectively to achieve small energy savings over a large and diverse customer base. Some utilities are mailing their customers home energy reports, for example, which compare customers' energy use with that of their neighbors to motivate them to alter their behavior to save energy. These programs achieve small savings per customer, but participation is broad.

ing instead to offer them for “advanced” CFLs and LEDs.⁶¹

In Maryland, utilities have made small increases to incentives for LED light bulbs.⁶² To reach more customers, utilities can scale LED incentives so that larger, more expensive lamps with larger bulbs that save more energy receive the highest incentives.

Appliances

As with lighting, new technologies are increasing the efficiency of household appliances beyond that of the last wave of Energy Star efficient products, which have already achieved a fairly high market penetration in Maryland.⁶³ These appliances achieve much greater savings per unit than base-level Energy Star efficient products. Therefore, by leveraging resources to support adoption of only new, super-efficient appliances, utilities can increase the overall energy savings of their appliance programs.

For example, while it had funding from the American Recovery and Reinvestment Act, Maryland Energy Administration ran a very successful appliance rebate program that distributed more than 34,000 rebates to Marylanders statewide for super-efficient appliances such as electric heat pump water heaters, clothes washers, and refrigerators, “proving that there is significant demand for appliances that are even more efficient than Energy Star,” according to MEA.⁶⁴

Adding “Market Lift” Programs

Maryland utilities could also try “upstream” approaches that encourage retailers to sell more super-efficient products. These programs, also known as “market lift” programs, are a recent innovation to increase purchases of energy-efficient appliances by rewarding retailers—or even individual

salespeople—with financial incentives when they boost sales of a particular energy-efficient product above an established baseline. While this strategy is still in the pilot program phase in most parts of the country, one clear advantage has been that it eliminates the need for utilities to figure out how to promote and market products—a task that retailers can already perform well—according to ACEEE.⁶⁵

Heating, Ventilation and Air Conditioning

Efficient heating, ventilation and air conditioning (HVAC) equipment can cut down on the energy wasted to heat and cool buildings—particularly in the commercial and industrial sectors. However, achieving high energy savings from HVAC programs requires high participation not only from customers who wish to install the equipment, but also from product distributors, retailers and installation contractors. Distributors and retailers must be convinced to stock and promote efficient HVAC equipment, and installers need special training to install efficient HVAC systems.

Maryland took an important first step to get these critical trade allies on board by standardizing HVAC programs in 2011.⁶⁶ Standardization eliminates confusing variances in rebate levels or participation requirements across utility service territories, making it easier for contractors, distributors, and retailers to promote efficient HVAC equipment to customers. However, utilities should actively cultivate relationships with these groups through upstream marketing approaches, such as offering incentives to retailers for achieving high sales. Utilities could also work with manufacturers to negotiate bulk discounts for retailers and distributors who agree to stock energy-efficient HVAC equipment.

Residential New Construction

The most opportune time to make major improvements in the energy efficiency of a home is at the time it is being built. By ensuring that new homes are built to the highest possible energy efficiency standards, these programs achieve deep, long-term energy savings and help standardize high-efficiency homes in the marketplace.

To achieve high energy savings from new construction, next generation energy efficiency programs are structured to increase the number of super-efficient homes on the market—and the number of contractors qualified to build them. To achieve this, they reward contractors for overall building energy performance—rather than for installing individual measures—and boost incentives for super-efficient homes to make them more attractive to prospective homebuyers.

Reward Contractors for Constructing High-Performance Buildings

Instead of requiring homebuilders to install a specific package of energy efficiency improvements when they build new homes, new programs offer a performance-based path to incentives, allowing contractors to use their creativity to figure out how best to hit energy savings goals. For example, the Rocky Mountain Power “wattsmart” New Homes program, a 2013 ACEEE “exemplary” residential new construction program, scales cash incentives for efficient homes according to the energy performance they achieve when evaluated by a home energy rater.⁶⁷

These programs encourage homebuilders to explore new ways to implement energy efficiency measures and familiarize themselves with the requirements of building super-efficient homes. A contractor who uses creative design strategies to build a super-efficient home once will have the skills to do it again for other clients who may have different

needs. The ultimate goal of these programs is to increase the pool of qualified contractors that customers can access to make their new homes more efficient.

Net-Zero Energy Homes

As with new lighting and appliance technologies, new high-efficiency homes are capable of achieving far greater energy savings than base-level Energy-Star homes—sometimes saving up to 80 percent of a typical home’s annual energy use.⁶⁸ These “net-zero” energy homes have super-insulated, air-tight envelopes that prevent heating and cooling losses, energy-efficient electrical, plumbing and ventilation systems, and orientation and sizing to maximize natural light and heat from the sun. They don’t require very much electricity, and the electricity they do need can often be supplied by small-scale wind or solar energy systems.

As with lighting and appliance programs, the best way to maximize the “bang for the buck” of new homes programs is to focus incentives to support the purchase of super-efficient homes—rather than the last generation of Energy Star homes. In addition, although the slightly higher up-front cost to homeowners of purchasing a super-efficient home is offset by lower operating costs over time, utility incentives can bring down these up-front costs even further, making them even more attractive to prospective homebuyers.⁶⁹

Commercial Retrofit and New Construction

Commercial retrofit and new construction programs present large opportunities to save energy. In Maryland, 47 percent of all electricity is consumed by the commercial sector.⁷⁰ However, the state’s utilities have so far failed to engage commercial customers in transformative energy effi-

ciency programs that deliver deep energy savings. For example, 90 percent of the energy savings in BGE and SMECO's Small Business Programs came from lighting retrofits.⁷¹

To strengthen their current commercial programs, utilities will have to add new technological and design elements that emphasize efficiency improvements to mechanical systems—rather than individual pieces of equipment—and elevate overall building energy performance as a key property asset on the commercial market. According to ACEEE, “next generation” commercial programs use the following strategies, among others, to achieve these results:

Use Integrated Design and Controls

Using new design approaches and control technologies can help commercial building owners achieve significant savings. Energy efficiency improvements in this category can range from major, custom renovations to increase the efficiency of entire industrial processes to installing motion detectors for lighting systems or placing cooling equipment on a timer. For example, commercial buildings that are constructed with more insulation and a tighter energy envelope from the start require smaller HVAC systems, which save energy and money over the long term. Integrated lighting design and effective use of daylight can also save energy. By covering the up-front cost of bringing in a professional lighting designer, the Efficiency Vermont RELIGHT program helped more customers install comprehensive lighting efficiency measures, achieving up to 40 percent deeper savings over changing individual light bulbs or fixtures.⁷²

Because design changes are most easily made when commercial buildings are first being constructed or are undergoing major renovation, successful energy efficiency programs offer strong incentives for building owners to incorporate energy

efficiency as early as possible in their planning processes, and some even offer design assistance.

For businesses not planning major renovations, utility programs that focus on improving overall building energy management can also help increase energy savings. These programs can help “retro-commission” or “re-commission” commercial buildings, which means that mechanical systems are evaluated or re-evaluated to ensure they are functioning as originally intended, and if necessary are altered according to the way the building is actually being used. Sometimes, these programs also train building owners to monitor energy use on an ongoing basis, often paying for special real-time monitoring equipment and automated controls, such as motion detectors or timers.

Focus on Improvements to Mechanical Systems and the Building Envelope

New programs focus both on increasing the use of emerging, highly efficient technologies and on making those technologies work together to form a more efficient system. According to ACEEE, some emerging technologies that can significantly impact commercial consumption include variable refrigerant flow systems, ground-source heat pumps and radiant heating systems, condensing gas boilers, and variable-speed, high-efficiency rooftop heating and cooling systems.⁷³ These technologies can improve the performance of mechanical systems such as HVAC systems, but they won't deliver their full energy savings potential without accompanying improvements to the whole building energy envelope.

New York State Energy Research & Development Authority's Existing Facilities Program was named an exemplary commercial comprehensive program by ACEEE in early 2013.⁷⁴ This program offers incentive packages of up to \$60,000 for pre-qualified electricity and natural

gas efficiency improvements in HVAC, lighting or refrigeration systems; however, business owners can receive up to \$2 million in performance-based incentives for implementing larger-scale efficiency improvements that meet minimum energy savings thresholds.⁷⁵

Whole-Building Approach to New Construction

To encourage designers and builders to start thinking about high energy performance at the outset of a project, new programs structure incentives based on achieving high performance—giving them the flexibility to achieve the high standard and encouraging experimentation. The goal of these programs is to expand the market for building performance services, which would help make high-performance buildings possible across a wide range of building types—rather than just office buildings and institutional buildings, which are typically served by these programs.⁷⁶

For new construction and renovation projects, design assistance programs can help achieve significant energy savings. For example, the Xcel Energy Design Assistance Program in Minnesota is targeted at small and large businesses and architecture and design firms, encouraging them to implement integrated energy efficiency strategies in HVAC, lighting, or building envelope improvements. Projects larger than 50,000 square feet receive custom design consulting; for smaller projects, the programs offer plan review in addition to standard incentives.⁷⁷ Xcel Energy's Self-Direct Custom Efficiency Program, also listed among ACEEE's 2013 exemplary programs, allows business owners to design and engineer their own energy efficiency projects, and to perform their own measurement, evaluation, and reporting work.⁷⁸ The utility then awards rebates for each kilowatt-hour of electricity saved as a result of the improvements.⁷⁹

Behavioral Programs

Behavioral programs focus on getting customers to consciously monitor and alter their energy use, such as turning down a thermostat or turning off a light. These programs are important because even the most airtight, energy-efficient building will not deliver energy savings if its occupants have habits that waste energy; in addition, behavioral programs can be a key part of reducing energy use in homes that cannot easily be weatherized—such as homes with leaky roofs or other maintenance issues that must be addressed first. Maryland has some non-profit programs, such as the Baltimore Energy Challenge, that seek to change resident behavior through grassroots outreach and education about energy stewardship.

New behavioral programs among utilities are applying social science research for the first time to better understand customer motivations and behavior. Behavior programs are becoming more common among utilities across the country because they have proven in recent years to deliver high energy savings.

The Public Service Commission approved a request by utilities to incorporate behavioral programs into their portfolios in the first half of 2012.⁸⁰ As of the second half of 2012, BGE, Pepco, and Potomac Edison have launched their own behavior programs, while SMECO and Delmarva expect to launch their programs in the beginning of 2013.⁸¹ The utilities have yet to report on the energy savings of their behavioral programs, but the PSC should ensure that they follow the best practices established in other states.

In the residential sector, new behavior-based programs are taking advantage of established modes of communication, such as word of mouth, smart phones, websites, and mailers to provide customers with timely information about energy use, financial incentives and ways to increase

savings that are tailored to individual households—rather than using a one-size-fits-all approach.

For example, Opower is a “software as a service” company that reaches about 10 million households through 70 utility partners in the United States and the United Kingdom with monthly Home Energy Reports, which provides historical data on customers’ energy use and comparisons of their energy use to that of their neighbors.⁸²

According to ACEEE, “The design of the Home Energy Reports incorporates research on social norming that suggests that people’s actions are influenced both by how they compare to their past selves (historical context) and how they compare to their “peer group” (social context).”⁸³ Average energy savings estimated from utility pilot projects using Opower Home Energy Reports range from 1.25 percent to 2.89 percent.⁸⁴ BGE partnered with Opower to provide Home Energy Reports in a pilot program in 2011, and participants achieved an average energy savings of 1.2 percent.⁸⁵ In early 2013 the other Maryland utilities launched Opower programs, as well.⁸⁶

Other programs use new technologies, such as smart meters and home energy displays to motivate customers to make investments that save energy. Smart meters collect data on energy use at individual homes and business and send it to utilities several times throughout the day. Utilities use this information to bill customers more accurately, such as during times of “peak” demand when the cost of power is high. Utilities also share this data with customers, helping them locate opportunities to save energy. Smart meter data is either shared on customers’ power bills or sent directly to a home energy display, which displays the usage information in real time. In Maryland, BGE, Pepco, and Delmarva Power and Light have had smart metering programs approved, but the results of these programs have yet to be reported.⁸⁷

Combined Heat and Power

Several top-performing states in energy efficiency have introduced combined heat-and-power (CHP) programs into their program portfolios. Combined heat-and-power technologies, also known as cogeneration, help capture heat generated by electricity production and use it to heat or cool water for a facility. CHP systems are basically on-site, gas-fired power plants that supply a facility with both electricity and hot water at the same time—reducing the need to draw electricity from the grid. According to MEA, CHP systems are 35 percent more energy efficient, on average, than traditional power generation systems.⁸⁸

As of June 2012, Maryland joined Massachusetts, Texas, and Ohio in allowing CHP to count toward energy efficiency goals.⁸⁹ CHP has great potential to reduce the need for investments in new power generation or transmission infrastructure in Maryland, and all utilities should continue to take steps to foster its development in their service territories.

Demand Response Programs

Demand response programs allow Maryland’s utilities to reduce peak demand by paying some customers in their service territories not to use electricity during periods of high consumption. For example, homeowners in BGE’s service territory that participate in the utility’s PeakRewards Program receive a rebate for allowing their air conditioners to be switched off on hot summer days.⁹⁰ Similarly, DPL has a commercial program in which businesses agree to turn off energy-intensive equipment when high demand for electricity strains the grid.⁹¹

As of 2013, Maryland utilities are about halfway toward achieving the 2015 EmPOWER Maryland goal for peak demand

reduction, but they must continue to work to broaden participation in their demand response programs. For example, SMECO has installed demand reduction devices on 50 percent of eligible properties in its service territory, but it has recently had trouble attracting new program participants, according to PSC Staff.⁹² In response, SMECO altered its outreach strategy, hiring a three-person door-to-door sales team in January 2012. These salespeople contacted an additional 3,105 customers and successfully enrolled 75 percent of them.⁹³ Utilities

can also try diversifying participation in demand response programs, particularly by reaching out to more commercial and industrial customers.

Demand response is an important part of reducing peak demand; the bulk of EmPOWER Maryland peak demand reductions have come from these programs. However, energy efficiency provides up to 24 percent of peak demand savings for all utilities, so they should continue to drive deep electricity savings from energy efficiency programs.⁹⁴

Policy Recommendations

Energy efficiency is one of the best possible investment Maryland can make to secure its energy future. It is the most inexpensive energy resource the state has; it is also pollution-free and ensures long-term reliability of electricity service for consumers.

However, utilities are failing to make adequate investment in enough energy efficiency programs, and in so doing failing to meet their obligation under the EmPOWER Maryland Act to reduce per-capita energy consumption. As a result, ratepayers will miss out on key benefits promised in the EmPOWER Maryland Act.

Utilities must pursue larger opportunities to save energy for the long term—and the Public Service Commission (PSC) must hold them accountable. In order to get Maryland back on track to a more efficient, clean energy economy, the state should:

1. **Set clear standards for program approval** — The PSC’s reluctance to establish and adhere to a clear standard for program approval has significantly slowed utility progress toward meeting EmPOWER

Maryland energy savings goals. A clear standard would help utilities avoid wasting valuable time and resources on designing energy efficiency programs that the PSC will ultimately reject, and encourage utilities to pursue stronger programs.

2. **Establish energy savings goals beyond 2015** — The state should establish an aggressive statutory goal for energy savings among utilities after the current cycle of EmPOWER Maryland programs ends in 2015.
3. **Hold utilities accountable for their performance** — The state should work with the PSC to establish a structure of penalties and incentives to hold utilities accountable for failing to meet EmPOWER Maryland targets, and to drive them to do better.
4. **Approve more utility programs with longer payback periods** — The PSC should approve utility programs that deliver cost-effective energy savings over several years—rather than approving only those that

deliver savings in the short term at the lowest possible cost. Therefore, the PSC should define “cost effective” programs according to the anticipated payback period for each type of program, which can vary widely from sector to sector. All programs should not be required to become “cost-effective” over the same time period.

5. **Recognize all the benefits of energy efficiency** — The PSC should follow the lead of states with successful energy efficiency programs and adopt a broader cost-effectiveness test for approving programs that captures other benefits of energy efficiency, such as avoided costs of building transmission lines and power plants, as well as public health benefits of using less energy, such as avoided air pollution.
6. **Create a financing program for energy efficiency improvements** — The state should set up a loan program or other financing mechanism to help eliminate financial barriers for homeowners and business owners who want to make energy efficiency improvements. One-time incentives and rebates are very effective at reducing the up-front costs of these improvements, but a loan to cover the remainder of these costs would both increase

participation in energy efficiency programs and encourage customers to install more comprehensive measures. Loan programs can be particularly useful because they can increase the impact of limited government funds, allowing them to be recycled as they are repaid.

7. **Restore funding to energy efficiency programs** — While utility-run EmPOWER Maryland programs are funded through a surcharge of ratepayers’ utility bills, non-utility energy efficiency programs were supported with revenues from the sale of carbon allowances in a regional cap-and-trade agreement designed to limit global warming pollution. Forty-six percent of this funding was originally allocated for energy efficiency programs, but since 2009 more than half of it has been diverted to direct bill-pay assistance.⁹⁵ Bill-paying assistance provides a lifeline for consumers during difficult economic times, but diverting money from energy efficiency programs eliminates another important set of benefits for consumers while ensuring higher electricity consumption in the years to come. The state should restore all funding back to energy efficiency programs that has been diverted in recent years to help consumers pay their electricity bills.

Notes

1 Maryland Energy Administration, *Report to the Senate Finance Committee and House Economic Matters Committee to Discuss Whether to Modify EmPOWER Maryland Targets Beyond 2015*, 16 January, 2013.

2 The current average retail price of electricity for Maryland ratepayers is 12.76 cents per kWh, per U.S. Energy Information Administration, *Maryland Electric Power Monthly—Table 5.6.A. Average Retail Price of Electricity Profile 2010 to Ultimate Customers by End-Use Sector, by State*, released 30 January 2012; Cost of EmPOWER Programs to residential ratepayers, per Vermont Energy Investment Corporation, *EmPOWER Maryland Programmatic 2012 Q3-Q4 Semi-Annual Report Comments*, prepared for Office of People’s Counsel, 21 March 2013 (and corrections filed 29 March 2013).

3 Walt Auburn, Maryland Energy Administration, EmPOWER Maryland, *Our “Potential” Energy Future* (presentation), 13 March 2008.

4 U.S. Energy Information Administration, *Maryland Electricity Profile, 2010*, 30 June 2012; U.S. Census Bureau, *Time Series of Maryland Intercensal Population Estimates by County: April 1, 1990 to April 1, 2000*, 17 April, 2012, and *Vintage 2011: State Tables—Table 1. Annual Estimates of the Population for the United States,*

Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2011, December 2011.

5 Calculating 30 percent increase in electricity prices: U.S. Energy Information Administration, *State Energy Data System, Table ET3. Residential Sector Energy Price and Expenditure Estimates, Maryland*, 29 June 2012. Corrected for inflation using the U.S. Bureau of Labor Statistics, Consumer Price Index; \$700 increase in household energy bills: Calculated by dividing total residential retail electricity sales revenue (in 2010 dollars) in 1999 and 2010, per U.S. Energy Information Administration (see note 4), by the number of residential customers in Maryland in 1999 and 2010, per U.S. Energy Information Administration, *Electric Power Annual, State Historical Tables for 2011*, released 1 October 2012.

6 Maryland General Assembly, *Senate Bill 205*, 26 March 2008.

7 Typical household energy consumption calculated by dividing total 2010 residential energy consumption of 28,934,000 MWh, per U.S. Energy Information Administration (see note 4) by 2,128,377 households in Maryland, per U.S. Census Bureau, *State and County Quickfacts*, downloaded from quickfacts.census.gov/qfd/states/24000.html on 14 May 2013.

8 Calculation assumes that these energy savings are spread out evenly over the lifetime of the efficiency investments and does not account for inflation or the time-value of money. Calculated by subtracting the average levelized cost of energy efficiency 4.6 cents per kWh (per Katherine Friedrich et al., American Council for an Energy-Efficient Economy, *Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs*, September 2009) from the current average retail price of electricity for Maryland ratepayers, 12.76 cents per kWh (see note 2) The difference, 8.1 cents per kWh—or \$81 per MWh—represents what consumers could save over the lifetime of efficiency investments by purchasing efficiency over electricity (assuming steady electricity prices).

9 See note 9; PJM, *PJM 2012 Regional Transmission Expansion Planning (RTEP) in Review*, 28 February 2013.

10 U.S. Federal Energy Regulatory Commission, *Order on Rehearing: Docket No. EL05-121-008*; 22 March 2013, available at www.ferc.gov/whats-new/comm-meet/2013/032113/E-9.pdf.

11 Assumes a coal-fired power plant to be 500 MW. Peak demand reduction: Staff of the Public Service Commission, *Comments of the Public Service Commission Staff: 2012 Semi-Annual EmPOWER Maryland Programmatic Report for the Third and Fourth Quarters—Case Nos. 9153-9157*, 21 March 2013; Vermont Energy Investment Corporation, see note 2. Note: About three-quarters of this peak demand reduction came specifically from “demand response” programs, in which utilities compensated customers for agreeing not to use energy-intensive appliances or equipment during periods of high electricity demand; the remainder came from the energy savings achieved through other energy efficiency programs.

12 Maryland imports about 33 percent of its electricity, retail sales of electricity in Maryland in 2010 was 65,335,498 MWh per year, and the average retail price of electricity is 12.7 cents/kWh, see note 2; transmission and distribution costs estimated at 2.7 cents

per kWh, per Jay Hancock, “Welcome BGE Number Crunchers,” *The Baltimore Sun*, 8 June 2007.

13 U.S. Energy Information Administration, see note 4.

14 American Lung Association, *State of the Air 2013, Report Card: Maryland*, 2013.

15 Poor grades: see note 14; health effects: J. Pekkanen et al., “Daily Variations of Particulate Air Pollution and ST-T Depressions in Subjects with Stable Coronary Heart Disease: The Finnish ULTRA Study,” *American Journal of Respiratory Critical Care Medicine* 161: A24, 2000.

16 Maryland utilities have achieved 1,733,999 MWh of annual savings as of the end of 2012, per staff of the Public Service Commission, see note 11. To calculate nitrogen oxides avoided, we used the annual NO_x total output emissions rate for the RFCE subregion in U.S. Environmental Protection Agency, *eGRID2012 Version 1.0*, downloaded from www.epa.gov/cleanenergy/energy-resources/egrid/index.html, 15 May 2013. Vehicles Equivalent, per Environmental Protection Agency, *Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks*, October 2008.

17 See note 6.

18 Maryland Public Service Commission, *Order No. 84569 Order. Case Nos. 9153, 9154, 9155, 9156 and 9157*, 22 December 2011; Maryland Energy Administration, *Comments on EmPOWER Maryland 2012-2014 Plans—Cases 9153, 9154, 9155, 9156, 9157*, 5 October 2011.

19 U.S. Environmental Protection Agency, *National Action Plan for Energy Efficiency, July 2006*.

20 As of the fourth quarter in 2012, utilities had saved 2,251,510 MWh (gross wholesale level), per Maryland Energy Administration, *Comments on Semi-Annual Reports for the period from July 1, 2012 through December 31, 2012*, 21 March 2013.

21 Maryland Energy Administration, see note 18; Vermont Energy Investment Corporation, *EmPOWER Maryland 2012-2014 Proposed Plans, Written Comments, Case Nos. 9153, 9154, 9155, 9156, 9157*, 5 October 2011.

22 Maryland Energy Administration, *Comments Regarding Efforts to Meet the EmPower Act's 2015 Statutory Goals, Case Nos. 9153, 9154, 9155, 9156, and 9157 (ML 137484)*, 1 March 2012; Maryland Energy Administration, see note 18.

23 Northeast Energy Efficiency Partnerships, *New England Energy Efficiency Snapshot: Energy Efficiency Policy By the Numbers*, Spring/Summer 2013; Maryland Energy Administration, *Report to the Senate Finance Committee and House Economic Matters Committee to Discuss Whether to Modify EmPOWER Maryland Targets Beyond 2015*, 16 January, 2013. Note: Energy efficiency programs in all states listed are run by utilities, with the exception of Vermont. Vermont's energy efficiency programs are run by Efficiency Vermont, a statewide non-profit organization.

24 Ibid.

25 Ibid.

26 Maryland utilities have achieved 2,251,510 MWh of annual savings to date, and to reach the 2015 EmPOWER Maryland goal of 5,475,409 MWh in annual savings, utilities will have to achieve at least 1,074,633 MWh per year in 2013-2015—a 35 percent increase over what they achieved in 2012 (793,219 MWh). See Potomac Edison, Baltimore Gas & Electric, Potomac Electric Power Company, Delmarva Power & Light and Southern Maryland Electric Cooperative, Inc., *Q3/Q4 Semi-Annual EmPOWER Maryland Reports, Case Nos. 9153, 9154, 9155, 9156 and 9157* (respectively), 31 January 2013. Note: The Public Service Commission reduced the original EmPOWER Maryland electricity savings target of 7,268,540 MWh by 2015 in August 2011 based on updated population and electricity demand forecasts from the Department of Planning and PJM, respectively. See Maryland Public Service

Commission, *Notice of Revised EmPOWER Maryland Plan Consumption and Demand Reduction Target. Case Nos. 9153, 9154, 9155, 9156 and 9157 (ML 133363)*, 9 August 2011.

27 Potomac Edison, Baltimore Gas & Electric, Potomac Electric Power Company, Delmarva Power & Light and Southern Maryland Electric Cooperative, Inc., see note 26.

28 Crissy Godfrey and Calvin Timmerman, Staff of the Public Service Commission, *2012-2014 EmPOWER Maryland Plans: General Staff Overview and Comments*, 5 October 2011.

29 Ibid.

30 Vermont Energy Investment Corporation, see note 21.

31 American Council for an Energy-Efficient Economy, *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings*, January 2013.

32 Maryland Public Service Commission, *Letter Order 08-18-08, Case No. 9154*, 18 August 2008; Jordan Schneider and Elizabeth Ridlington, Frontier Group, Johanna Neumann, Maryland PIRG Foundation, *Falling Behind on Energy Efficiency: Maryland Risks Missing Its Electricity Savings Goals*, March 2011.

33 Jordan Schneider and Elizabeth Ridlington, Frontier Group, Johanna Neumann, Maryland PIRG Foundation, see note 32.

34 Ibid.

35 Energy and Environmental Economics, Inc. and Regulatory Assistance Project, *Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers*, prepared for U.S. Environmental Protection Agency National Action Plan for Energy Efficiency, November 2008.

36 American Council for an Energy-Efficient Economy, *The 2012 State Energy Efficiency Scorecard*, October 2012.

- 37 See note 27.
- 38 Synapse Energy, Economics, Inc., *Costs and Benefits of Electric Utility Energy Efficiency in Massachusetts*, August 2008.
- 39 See note 23.
- 40 American Council for an Energy-Efficient Economy, see note 31, and *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs*, June 2013.
- 41 See note 31.
- 42 Vermont Energy Investment Corporation, see note 2.
- 43 Ibid.
- 44 Maryland Energy Administration, *Recommendations for Enhancing Utility Energy Efficiency Program Performance: EmPOWER Maryland Plans for 2012 to 2014*, 1 September 2011.
- 45 Maryland Public Service Commission, *Order No. 85589*, 14 May 2013.
- 46 Lauren Urbanek, Maryland Energy Administration (personal communication), 25 June 2013.
- 47 Vermont Energy Investment Corporation, see note 21.
- 48 Mass Save, COOL SMART Incentives for Energy Star Quality Installations, downloaded from www.masssave.com/professionals/incentives/cool-smart-esqi on 17 May 2013.
- 49 See note 31.
- 50 U.S. Department of Housing and Urban Development, *Evidence Matters: Transforming Knowledge Into Housing and Community Development Policy*, Summer 2011.
- 51 CNT Energy, *Energy Savers*, downloaded from www.cntenergy.org/buildings/energysavers/ on 17 May 2013.
- 52 Mary Ellen Podmolik, "Apartments Get Energy Makeovers," *Chicago Tribune*, 1 February 2013.
- 53 American Council for an Energy-Efficient Economy, *Multifamily and Manufactured Housing Energy Efficiency Program*, downloaded from aceee.org/files/pdf/fact-sheet/multifamily.pdf on 26 June 2013.
- 54 See note 31.
- 55 Vermont Energy Investment Corporation, see note 2.
- 56 Ibid.
- 57 Typical efficiency of LEDs and incandescent light bulbs: David Pogue, "New Reasons to Change Light Bulbs," *New York Times*, 20 March 2012; typical efficiency of CFLs: Cleveland Public Power, *CPP LED Fact Sheet*, downloaded from www.cpp.org/LEDfacts.html on 17 May 2013.
- 58 David Pogue, see note 57.
- 59 Ibid.
- 60 Vermont Energy Investment Corporation, see note 21.
- 61 See note 31.
- 62 Maryland Public Service Commission, *Order No. 84849*, 26 April 2012; see note 46.
- 63 Vermont Energy Investment Corporation, see note 2.
- 64 See note 44.
- 65 See note 31.
- 66 Public Service Commission, see note 18.
- 67 Rocky Mountain Power, *Builder Incentives*, downloaded from www.rockymountainpower.net/res/sem/epi/utah/esnh/bi.html on 19 June 2013.
- 68 See note 31.
- 69 Ibid.
- 70 Energy Information Administration, see

note 4.

71 Staff of the Public Service Commission, see note 11.

72 See note 31.

73 Ibid.

74 See note 40.

75 New York State Energy Research & Development Authority, *Performance Based Incentives for Existing Facilities Program*, 21 February 2013, available at www.nysersda.ny.gov.

76 See note 31.

77 See note 19.

78 See note 40.

79 Xcel Energy, *Self-Direct Custom Efficiency* (fact sheet), downloaded from www.xcelenergy.com/staticfiles/xcel/Marketing/Managed%20Documents/co-bus-self-direct-info-sheet.pdf on 17 May 2013.

80 Vermont Energy Investment Corporation, see note 2.

81 Ibid.

82 See note 31.

83 Ibid.

84 Ibid.

85 Calvin Timmerman and Crissy Godfrey, Staff of the Public Service Commission, *Second Progress Report on New EmPOWER Maryland Programs, Measures, and Strategies*, 22 March 2012.

86 See note 46.

87 Maryland Public Service Commission, *Order No. 83532, Case No. 9207*, 13 August 2010; *Order No. 84890, Case No. 9207*, 8 May 2012; *Order No. 83531, Case No. 9208*, 13 August 2010.

88 See note 44.

89 See note 31.

90 Staff of the Public Service Commission, see note 11.

91 Ibid.

92 Ibid.

93 Ibid.

94 Vermont Energy Investment Corporation, see note 2.

95 Department of Legislative Services, Department of Human Resources Office of Home Energy Programs, *Operating Budget Data*, 9 March 2009; Department of Legislative Services, Office of Policy Analysis, *Budget Reconciliation and Financing Act of 2011 (HB 72/SB 87): Budget Summary, Provisions, and Recommendations*, March 2011.