Addendum to BEPS Technical Report

Analysis of Maryland Utility Incentives on Case Studies

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DEPARTMENT OF
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ICF

BACKGROUND AND PURPOSE OF THIS DOCUMENT

The Metropolitan Washington Council of Governments, in partnership with Montgomery County Department of Environmental Protection, contracted with ICF Consulting ("ICF") to prepare this overview of financial incentives for previously completed case studies included in the *Building Energy Performance Standards Development – Technical Analysis* report prepared by Steven Winter Associates, Inc., in support of the County's Building Energy Performance Standards (BEPS) legislation. ICF was tasked with evaluating the previously completed case studies of selected buildings from various property groups which identified examples of target calculations and energy measure packages to meet potential performance standards. These case studies evaluated paths to achieve target EUI reductions and the associated costs for implementing efficiency measures. The cost estimates developed for the case studies did not account for grants, rebates, or other incentives available to subsidize energy efficiency projects. This addendum provides analysis of potential utility rebates through the EmPOWER Maryland 2021-2023 program cycle.

OVERVIEW

Throughout Maryland, there are a variety of sources of funds to subsidize energy efficiency project costs including federal tax deductions and credits, state grants and low-interest loans, and other local tax and grant offerings. The most common and widely available source of incentives is through ratepayer-funded EmPOWER Maryland programs offered by each of the three electric utilities (Pepco, Potomac Edison, BGE) and Washington Gas operating in Montgomery County. These programs offer cash rebates for eligible energy efficient equipment and retrofits in 3-year program cycles. The programs claim energy savings for measures that exceed minimum state and municipal energy code, and typically only claim savings for the amount that they exceed above minimum code requirements.

This addendum estimates the incentive potential for nine case studies, each with three target package scenarios: A Zero Net Carbon-Compatible (ZNC) target package, an Energy Efficiency (EE) target package, and a Less-Than-Five-Year Payback (5-year payback) target package. The ZNC target is a technically feasible limit on building performance which would be reached by efficient electrification of all fossil fuel end uses using market-ready technology in an energy efficient building. The EE target evaluated measures for each building case study typology to reach the building's efficiency target**.** The <5-Year Payback target considered more moderate reduction of end uses from a typical audit assumed a moderate reduction of end uses for each building case study typology. In developing rebate estimates for each of the nine case studies, there were several key aspects of this analysis that are worth noting:

First, when developing assumptions and criteria for utility incentive programs, the first step is to determine eligibility, based on the 2021-2023 program structure. Most of the incentives described in this analysis are available for customers with active commercial accounts in Maryland, with the exception of multifamily buildings. Tenant and end-unit spaces in multifamily buildings will be eligible for commercial programs if they are on the commercial meter for that building. If they are individually metered, they are typically excluded from commercial incentive offerings, but they may qualify for residential incentives for measures such as high-efficiency aerators, smart thermostats, or high-efficiency domestic hot water systems.

Second, under 2021-2023 program standards and goals, no incentives are available for fuel-switching projects. Thus, no energy savings can be counted in the EmPOWER savings goals for transitioning to electric equipment from natural gas. However, in the circumstance of an electrification project, incentives are available for ensuring that the new electric equipment is as efficient as possible, such as providing incentives for ENERGY STAR® certified kitchen equipment.

Finally, incentives are not currently available for distributed or renewable energy systems through utility programs. Utility incentive programs are focused on offering incentives for measures considered to be energy efficiency or conservation. Therefore, under the ZNC and EE Target packages, the solar PV measure is not eligible for incentives through the utilities. Grants and rebates for solar PV are available through state and some local programs, along with federal and state tax credits and deductions.

The incentive estimates described for each case study below are based on assumptions and site-specific analysis. They should not be used as the basis for establishing incentive expectations as many projects depend on site- and equipment-specific variables. Furthermore, utility incentive programs are subject to frequent changes and adjustments over time. Thus, many of the estimates provided below are based on a snapshot in time that may change in 2024 and beyond. Also, incentives and program standards may differ among each of the utilities. The estimates below are best understood as offering the incentive potential for each building assuming projects adhere to all technical and performance criteria of the utility programs. It is highly recommended that stakeholders engage with representatives of utility programs to verify eligibility and evaluate incentive potential for their specific projects.

EXECUTIVE SUMMARY

This addendum evaluates the incentive potential for nine building case studies considering three different target packages of efficiency and distributed energy measures. The analysis estimates incentives available through EmPOWER Maryland programs operated by investor-owned utilities in Maryland. Individual measure and total target package costs are calculated before and after incentives are applied. Across the case studies, incentives defray the largest share of costs through the <5-Year Payback target packages, covering an average of 40% of the total package costs with a range of 21-100% depending on building type and measures. The EE target package, the minimum to achieve each building's efficiency targets, is eligible for incentives covering an average of 10% of total costs, with a range of 2-28%. The most aggressive package, the ZNC target, exhibits the highest total incentive potential but lowest share of the total costs. The ZNC target package defrays an average of 7% of total costs, ranging from 4-10% of cost depending on building type.

Table 1: Summary of Case Studies

Case Study	ZNC Incentive Share	EE Incentive Share	<5-Year Payback Incentive Share
1: Class A Office	5% - 6%	5% - 6%	52% - 58%
2: Older Mixed Fuel Office	6% - 7%	6% - 7%	34% - 40%
3: Older All-Electric Office	7% - 8%	7% - 8%	36% - 40%
4: New High-Rise Mixed-Use Multifamily	5% - 6%	5% - 6%	95% - 100%
5: Old High-Rise Affordable Multifamily	7% - 9%	16% - 19%	22% - 26%
6: Garden-Style Multifamily	4% - 7%	2% - 4%	21% - 29%
7: Mid-Sized Hotel w/ Conference Space	8% - 9%	21% - 24%	36% - 40%
8: Standard Hotel w/ Extra Space	8% - 10%	25% - 28%	32% - 51%
9: Worship/Education Mixed-Use	4% - 5%	6% - 8%	48% - 57%
WEIGHTED AVERAGE	**7%**	**10%**	**40%**

The dollar amount that incentives covered varied depending on the type of measure. High efficiency faucet aerators, for example, typically covered for 100% of cost through residential direct install programs. Additionally, retro-commissioning (RCx) and Building Tune-up project measures tend to benefit the most from incentives. This is in part due to the design of those program, which are intended to cover up to 75% of the cost of audits and implementation of any identified measures. The next most attractive measures tend to be plug load management and lighting retrofit measures. Depending on the baseline condition and building type, incentives often cover 30-40% of the cost to implement. Variable frequency drive retrofit projects are also attractive for incentives, covering around 20-25% of the cost.

Many of the HVAC conversion and electrification recommendations tended to benefit the least from incentives as currently designed. This is due in large part to the sizeable price tags for implementing whole-building electrification renovations. While the total value of incentives for such measures may be substantial, they still often represent less than 10% of the total cost. The electrify space heating measure benefited least from incentives, with estimates defray only 2-6% of the total cost in most cases. This addendum provides a brief review of utility incentive programs, local, state, and federal tax and grant opportunities, and other sources of financing and funds to help building owners and managers implement energy efficient improvements.

MEASURE CATEGORIZATION

Most utilities offer incentives according to one of three basic commercial program designs: Prescriptive measures, Custom measures, and Building Tune-up measures. There are also several measures that would qualify through residential paths. Solar PV, fuel-switching, and submetering are not eligible for incentives under current EmPOWER Maryland goals, but future program cycles may enable a path for new measures including renewable, distributed energy generation, and fuel-switching.

Prescriptive incentives are available for retrofit projects based on pre-determined incentive and savings calculations with prescribed equipment and operating assumptions. Custom incentives are available for retrofit projects that require site and project-specific analysis to determine energy savings and incentives are provided based on the project's costs and savings achieved. In many circumstances, incentives for both Prescriptive and Custom projects evaluate savings based on an incremental basis. Rather than using the existing equipment and performance baseline, incentives are only offered for savings beyond code-compliant replacement equipment. A lighting or HVAC retrofit are common examples of Prescriptive projects, while an energy management system upgrade or building envelope upgrade are common Custom projects.

Building Tune-up projects typically consist of retro-commissioning and other operations and maintenance improvements. These projects evaluate measures based on existing equipment and performance as the baseline. However, measures are typically restricted to what are considered "low cost/no cost" opportunities: Those with a simple payback of ~2 years or less. More importantly, these measures are not typically available through Prescriptive or Custom paths. HVAC tune-up and maintenance, monitoring-based commissioning, or low-cost envelope and weatherization measures are examples of common Building Tune-up measures.

One final category of measures are those installed in residentially metered spaces, primarily for tenant units in multifamily buildings. There are incentive offerings through residential programs, including for tenants. These include direct-install measures such as high-efficiency faucet aerators or incentives for devices such as thermostats. As noted above, eligibility for either commercial or residential programs depends on whether the account in question is a residential or commercial account through the respective utility.

This overview utilizes the delineated ZNC, EE, and 5-Year Payback target packages used in the original study. The EE Target package evaluated measures for each building case study typology to reach the building's EE target. The ZNC Target package is a technically feasible limit on building performance which would be reached by efficient electrification of all fossil fuel end uses using market-ready technology in an energy efficient building. The <5-year payback target package considered more moderate reduction of end uses from a typical audit. Many of the measures overlapped for each of the three packages across the nine case studies. To better understand the program and assumptions for analysis, it is best to first categorize each measure based on the incentive path for which it would most likely be eligible.

Table 2: Measure Categorization

Commercial Prescriptive	Commercial Custom	Commercial Building Tune-up	Residential	No Utility Incentives
LED lighting retrofit and replacement	Convert HVAC to VRF	Retro-commissioning	Efficient water/high-efficiency aerators*	Solar PV
Lighting controls retrofits	Install DOAS and/or ERV	Wider deadbands	Smart thermostats*	Submetering
Plug load management	Pneumatic conversion to DDC	Programmable thermostats		Fuel-Switching
Electrify cooking/kitchen equipment	Free cooling heat exchanger	General air sealing		
Electrify space heating* and HVAC replacement	Electrify space heating* and HVAC replacement	HVAC schedule adjustments		
Electrify domestic or service hot water		Efficient water/high-efficiency aerators*		
Smart thermostats*		Monitoring-Based Commissioning		
Hotel guest room HVAC and receptacle controls				
Retrofit pumps and fans with VFDs				

*Denotes a measure that may qualify under a different category depending on project scope details

Many measures may depend on project specifics to determine the category in which they fall. For example, thermostats installed in tenant units in an individually metered multifamily property would be eligible under residential offerings, while the same thermostat installed in an office for a single-zone system would qualify as a commercial Prescriptive measure. Many Building Tune-up measures may potentially qualify under a Custom approach if they are a component of a larger scope of work, such as schedule adjustments in connection with an HVAC system replacement or EMS upgrade.

Through utilization of utility incentives, most packages are able to recover at least 5% of their estimated costs, with many packages able to recover more than 20% of the estimated cost. Currently, the 5-year payback packages had a higher percentage of cost recovery than the other packages, due to the exclusion of solar incentives, which may change in future EmPOWER program iterations. Some Prescriptive measures like plug-load management, retrofit lighting, and hotel guest-room controls represented solid opportunities across many of the case studies.

CASE STUDY ANALYSIS

The following section reviews each of the nine case studies and evaluates the estimated minimum and maximum incentives based on the measures in each of the target packages introduced. The incentive estimates described for each case study are based on assumptions and site-specific analysis and should not be used as a basis for establishing incentive expectations.

CASE STUDY 1: CLASS-A OFFICE

Table 3. Class-A office package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC/EE Target Package	$5,280,000	$261,950 - $294,000	$4,986,000 - $5,018,050	5% - 6%
<5yr Payback Package	$96,000	$49,950 - $55,500	$40,500 - $46,050	52% - 58%

The first case study considers a class-A office space that is 200,000 – 225,000 GSF. The ZNC and EE target packages were identical, both consisting of five measures. The tables below depict the ZNC/EE package and the <5-year payback package.

Table 4. Class-A office ZNC/EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
VRF System	Custom	$4,682,000	$200,000 - $225,000	$4,457,000 - $4,482,000	4% - 5%
Electrify Cooking	Prescriptive	$24,000	$4,000 - $4,500	$19,500 - $20,000	17% - 19%
Plug-Load Management		$38,000	$8,000 - $9,000	$29,000 - $30,000	21% - 24%
RCx	Building Tune-up	$74,000	$49,950 - $55,500	$18,500 - $24,050	68% - 75%
TOTAL, EFFICIENCY MEASURES		**$4,818,000**	**$261,950 - $294,000**	**$4,524,000 - $4,556,050**	**5% - 6%**
Solar PV	N/A	$462,000	N/A	$462,000	N/A
TOTAL, ALL MEASURES		**$5,280,000**	**$261,950 - $294,000**	**$4,986,000 - $5,018,050**	**5% - 6%**

The ZNC/EE target package, if fully implemented, would generate an estimated incentive of between $261,000 and $394,000. This would lower the estimated project costs by ~6%.

Table 5. Class-A office <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Plug-Load Management	Prescriptive	$22,000	$8,000 - $9,000	$13,000 - $14,000	36% - 41%
RCx	Building Tune-up	$74,000	$49,950 - $55,500	$18,500 - $24,050	68% - 75%
TOTAL, ALL MEASURES		**$96,000**	**$49,950 - $55,500**	**$40,500 - $46,050**	**52% - 58%**

The <5-year payback scenario would see incentives covering between 52-58% of the cost of the project. The largest component of the cost would be the RCx measure, which would earn a potential incentive through the Building Tune-up, and so the overall incentive would typically depend on the scope and cost of the RCx measure. Typical RCx projects for buildings of this type and size produce a greater incentive, but the Building Tune-up program is also capped at 75% of the measure cost.

CASE STUDY 2: OLDER MIXED FUEL OFFICE

Table 6. Older mixed fuel office package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC/EE Target Package	$4,831,000	$309,975 - $352,700	$4,478,300 - $4,521,025	6% - 7%
<5-year Payback Package	$475,000	$162,975 - $191,000	$284,000 - $312,025	34% - 40%

The second case study features an older mixed fuel office that is 250,000-275,000 GSF. As previously stated, no incentives currently exist for fuel switching explicitly. However, the electrification measures could still earn incentives if the equipment installed meets enhanced efficiency thresholds established by the program, such as ENERGY STAR certified cooking appliances. Most of the measures described would likely classify as Prescriptive measures, though space heating electrification may potentially have a Custom path. RCx and HVAC schedule adjustments are covered as a single Building Tune-up package. Electric submetering and PV are not eligible for incentives.

Table 7. Older mixed fuel office ZNC/EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Electrify Space Heating	Prescriptive	$3,730,000	$142,750 - $157,025	$3,572,975 - $3,587,250	3% - 4%
Electrify Cooking		$12,000	$4,250 - $4,675	$7,325 - $7,750	35% - 39%
Plug-load management		$27,000	$10,000 - $11,000	$16,000 - $17,000	37% - 41%
Lighting with Daylight/Occupancy Controls		$154,000	$60,000 - $66,000	$88,000 - $94,000	39% - 43%
Garage LED Lighting		$48,000	$27,500 - $41,250	$6,750 - $20,500	57% - 86%
RCx	Building Tune-up	$97,000	$65,475 - $72,750	$24,250 - $31,525	68% - 75%
HVAC Schedule Adjustment					
TOTAL, EFFICIENCY MEASURES		**$4,068,000**	**$309,975 - $352,700**	**$3,715,300 - $3,758,025**	**8% - 9%**
Electric Submetering	N/A	$149,000	N/A	$149,000	N/A
Solar PV		$614,000		$614,000	
TOTAL, ALL MEASURES		**$4,831,000**	**$309,975 - $352,700**	**$4,478,300 - $4,521,025**	**6% - 7%**

The joint ZNC/EE target package is just over $4.8 million. The estimated incentives would cover approximately 6% to 7% of the total cost of the project. Because the project involves some fuel switching, it limits the overall savings and incentive potential of the building based on utility evaluation protocol.

Table 8. Older mixed fuel office <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Plug-load management	Prescriptive	$27,000	$10,000 - $11,000	$16,000 - $17,000	37% - 41%
Lighting with Daylight/Occupancy Controls	Prescriptive	$154,000	$60,000 - $66,000	$88,000 - $94,000	39% - 43%
Garage LED Lighting	Prescriptive	$48,000	$27,500 - $41,250	$6,750 - $20,500	57% - 86%
RCx	Building Tune-up	$97,000	$65,475 - $72,750	$24,250 - $31,525	68% - 75%
HVAC Schedule Adjustment					
TOTAL, EFFICIENCY MEASURES		**$326,000**	**$162,975 - $191,000**	**$135,000 - $163,025**	**50% - 58%**
Electric Submetering	N/A	$149,000	N/A	$149,000	N/A
TOTAL, ALL MEASURES		**$475,000**	**$162,975 - $191,000**	**$284,000 - $312,025**	**34% - 40%**

The <5-year payback target package is estimated to cover between 34% to 40% of the total projects. When discounting the submetering measure, since it doesn't provide energy savings directly, incentives cover between 50% to 58% of the project costs.

CASE STUDY 3: OLDER ALL-ELECTRIC OFFICE

Table 9. Older all-electric office package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC/EE Target Package	$6,215,000	$455,850 - $506,500	$5,708,500 - $5,759,150	7% - 8%
<5-Year Payback Package	$811,000	$292,615 - $325,130	$485,870 - $518,385	36% - 40%

The third case study examines an older all-electric building that is 225,000-250,000 GSF. The older electric office represents one of the most attractive opportunities for EmPOWER incentives. Because all baseline systems, including heating equipment, is electric, the electric savings and incentive potential could be higher through the electric utility programs compared to other office types. , The higher potential includes more defined Custom opportunities with the VRF and ERV systems, both of which would represent significant opportunities to earn substantial incentives.

Table 10. Older all-electric office ZNC/EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
VRF System	Custom	$5,169,000	$225,000 - $250,000	$4,919,000 - $4,944,000	4% - 5%
ERV System		$470,000	$192,825 - $214,250	$255,750 - $277,175	41% - 46%
Lighting	Prescriptive	$207,000	$27,000 - $30,000	$177,000 - $180,000	13% - 14%
Plug-load management		$23,000	$9,000 - $10,000	$13,000 - $14,000	39% - 43%
HVAC Schedule Adjustment	Building Tune-up	$3,000	$2,025 - $2,250	$750 - $975	68% - 75%
TOTAL, EFFICIENCY MEASURES		**$5,872,000**	**$455,850 - $506,500**	**$5,365,500 - $5,416,150**	**8% - 9%**
Solar PV	N/A	$343,000	N/A	$343,000	N/A
TOTAL, ALL MEASURES		**$6,215,000**	**$455,850 - $506,500**	**$5,708,500 - $5,759,150**	**7% - 8%**

The ZNC/EE target package estimated cost is over $6.2 million but may earn incentives covering nearly 8% of the cost. The VRF system alone represents over 40% of this opportunity, due in part to the savings associated with this measure.

Table 11. Older all-electric office <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ERV System	Custom	$470,000	$192,825 - $214,250	$255,750 - $277,175	41% - 46%
RCx	Building Tune-up	$85,000	$57,375 - $63,750	$21,250 - $27,625	68% - 75%
HVAC Schedule Adjustment					
Chilled Water Pump VFD	Prescriptive	$7,000	$1,724 - $1,915	$5,085 - $5,276	25% - 27%
Condenser Water Pump VFD		$19,000	$4,692 - $5,213	$13,787 - $14,308	25% - 27%
Lighting		$207,000	$27,000 - $30,000	$177,000 - $180,000	13% - 14%
Plug-load management		$23,000	$9,000 - $10,000	$13,000 - $14,000	39% - 43%
TOTAL, ALL MEASURES		**$811,000**	**$292,615 - $325,130**	**$485,870 - $518,385**	**36% - 40%**

The <5-year payback package also delivers healthy incentives. As a share of the cost, incentives would cover between 36% to 40% of the total project costs.

CASE STUDY 4: NEW HIGH-RISE MIXED-USE MULTIFAMILY

Table 12. New high-rise mixed-use multifamily package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC/EE Target Package	$1,435,000	$72,967 - $86,874	$1,348,126 - $1,362,033	5% - 6%
<5-Year Payback Package	$5,000	$4,739 - $5,000	$0 - $261	95% - 100%

The fourth case study covering a new high-rise multifamily building between 125,000 and 150,000 GSF presents some of the fewest savings opportunities. This case study represents the smallest incentive potential of any considered due to its age and the few relative measures considered under the ZNC/EE target package. The multifamily tenant end units are also residentially metered, and so incentives for any measures in those spaces is required to qualify through a residential incentive program. The Residential Appliance Rebate Program (ARP) and Quick Home Energy Check-up (QHEC) programs are considered below.

Table 13. New high-rise mixed-use multifamily ZNC/EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Electric DOAS	Custom	$323,000	$53,625 - $64,350	$258,650 - $269,375	17% - 20%
Electrify Retail and Restaurant		$15,000	$4,945 - $5,934	$9,066 - $10,055	33% - 40%
Programmable Thermostats	Residential ARP	$67,000	$9,658 - $11,590	$55,410 - $57,342	14% - 17%
Efficient Water Aerators	Residential QHEC	$5,000	$4,739 - $5,000	$0 - $261	95% - 100%
TOTAL, EFFICIENCY MEASURES		**$410,000**	**$72,967 - $86,874**	**$323,126 - $337,033**	**18% - 21%**
Solar PV	N/A	$1,025,000	N/A	$1,025,000	N/A
TOTAL, ALL MEASURES		**$1,435,000**	**$72,967 - $86,874**	**$1,348,126 - $1,362,033**	**5% - 6%**

The total project costs are estimated to be $1,435,000. Thus, the potential incentives would cover 5% to 6% of the total cost. Some measures, such as water aerators through QHEC program, are direct install measures and may be obtained at no out-of-pocket cost to the building owner or tenants.

Table 14. New high-rise mixed-use multifamily <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Efficient Water Aerators	Residential QHEC	$5,000	$4,739 - $5,000	$0 - $261	95% - 100%
TOTAL, ALL MEASURES		**$5,000**	**$4,739 - $5,000**	**$0 - $261**	**95% - 100%**

The <5-year payback scenario only considers the efficient water aerators. As mentioned above this measure could be obtained at no out-of-pocket cost and so this target package could be covered 100% by incentives.

CASE STUDY 5: OLD HIGH-RISE AFFORDABLE MULTIFAMILY

Table 15. New high-rise mixed-use multifamily package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC Target Package	$2,221,000.00	$166,525 - $198,908	$2,022,092 - $2,054,475	7% - 9%
EE Target Package	$1,294,000.00	$208,755 - $249,583	$1,044,417 - $1,085,245	16% - 19%
<5yr Payback Package	$68,000.00	$15,265 - $17,398	$50,602 - $52,735	22% - 26%

The fifth case study also considers a 125,000–150,000 GSF multifamily property, but older than the fourth case study building. Therefore, the property exhibits more efficiency opportunities and higher incentive potential. The building has a central plant, and so all heating and cooling equipment is on a commercially metered account. Thus, all measures considered for this property would qualify under commercial incentive programs, including small measures such as water aerators which may be captured through a Building Tune-up project.

Table 16. Old high-rise multifamily ZNC target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Electrify Space Heating	Prescriptive	$1,294,000	$71,375 - $85,650	$1,208,350 - $1,222,625	6% - 7%
Electrify Domestic Hot Water		$625,000	$86,365 - $103,638	$521,362 - $538,635	14% - 17%
Central Plant Pump VFD		$8,000	$2,665 - $3,198	$4,802 - $5,335	33% - 40%
Booster Pump VFD	Custom	$5,000	$1,184 - $1,421	$3,579 - $3,816	24% - 28%
Efficient Water Aerators	Residential QHEC	$5,000	$4,935 - $5,000	$0 - $65	99% - 100%
TOTAL, EFFICIENCY MEASURES		**$1,937,000**	**$166,525 - $198,908**	**$1,738,092 - $1,770,475**	**8% - 10%**
Solar PV	N/A	$284,000	N/A	$284,000	N/A
TOTAL, ALL MEASURES		**$2,221,000**	**$166,525 - $198,908**	**$2,022,092 - $2,054,475**	**7% - 9%**

The ZNC target package is $2,221,000 for the overall cost. Thus, the estimated incentives would cover between 7% and 9% of the total cost. An important distinction in this case: Because the efficient aerators are eligible through the commercial Building Tune-up program, the cost for this measure would likely be capped at 75% of total cost.

Table 17. Old high-rise multifamily EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Electrify Domestic Hot Water	Prescriptive	$625,000	$86,365 - $103,638	$521,362 - $538,635	14% - 17%
Central Plant Pump VFD		$8,000	$2,665 - $3,198	$4,802 - $5,335	33% - 40%
CW Pump VFD		$6,000	$1,481 - $1,777	$4,223 - $4,519	25% - 30%
ERV System	Custom	$317,000	$107,125 - $128,550	$188,450 - $209,875	34% - 41%
Booster Pump VFD		$5,000	$1,184 - $1,421	$3,579 - $3,816	24% - 28%
RCx	Building Tune-up	$44,000	$5,000 - $6,000	$38,000 - $39,000	11% - 14%
Efficient Water Aerators	Residential QHEC	$5,000	$4,935 - $5,000	$0 - $65	99% - 100%
TOTAL, EFFICIENCY MEASURES		**$1,010,000**	**$208,755 - $249,583**	**$760,417 - $801,245**	**21% - 25%**
Solar PV	N/A	$284,000	N/A	$284,000	N/A
TOTAL, ALL MEASURES		**$1,294,000**	**$208,755 - $249,583**	**$1,044,417 - $1,085,245**	**16% - 19%**

The EE target package resembles the ZNC package, excluding the space heating electrification measure. Instead, this measure is replaced with the introduction of an ERV system, a Custom measure that often achieves significant savings and incentives. Therefore, this case study is unique in that the EE package has a higher incentive potential than the ZNC package. The efficiency package would cost nearly $1.3 million, with incentives covering between 16% to 19% of the total cost.

Table 18. Old high-rise multifamily <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
RCx	Building Tune-up	$44,000	$5,000 - $6,000	$38,000 - $39,000	11% - 14%
Central Plant Pump VFD	Prescriptive	$8,000	$2,665 - $3,198	$4,802 - $5,335	33% - 40%
CW Pump VFD		$6,000	$1,481 - $1,777	$4,223 - $4,519	25% - 30%
Booster Pump VFD	Custom	$5,000	$1,184 - $1,421	$3,579 - $3,816	24% - 28%
Efficient Water Aerators	Residential QHEC	$5,000	$4,935 - $5,000	$0 - $65	99% - 100%
TOTAL, ALL MEASURES		**$68,000**	**$15,265 - $17,398**	**$50,602 - $52,735**	**22% - 26%**

The <5-year package eliminates the electrification measures and introduces a more general retro-commissioning measure. Based on this package, estimated to cost $68,000, incentives would cover 22-26% of the project. However, because of the nature of Building Tune-up applications, it's possible that the incentive for the RCx measure could be higher and therefore earn a more generous incentive.

CASE STUDY 6: GARDEN-STYLE MULTIFAMILY

Table 19. Garden-style multifamily package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC Target Package	$1,621,000	$72,620 - $108,357	$1,512,643 - $1,548,380	4% - 7%
EE Target Package	$1,261,000	$30,930 - $45,827	$1,215,173 - $1,230,070	2% - 4%
<5yr Payback Package	$30,000	$6,200 - $8,732	$21,268 - $23,800	21% - 29%

This case study focuses on a garden-style multifamily site from 50,000-75,000 GSF. These building types are typically eligible for incentives through residential incentive programs. However, because the site has a central hot water plant for space heating and domestic hot water and the account is master-metered, it can earn commercial incentives. Similar properties must be careful to consider their account types and program requirements. While some common area spaces may be commercially metered, tenant end units and all equipment in them including HVAC and water heating systems would be required to pursue incentives through a residential program. Residential incentive programs include measures for space conditioning and water heating equipment, but the incentive per-square-foot estimates below may be different.

Table 20. Garden-style multifamily ZNC target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Space Heating	Prescriptive	$745,000	$28,550 - $42,825	$702,175 - $716,450	4% - 6%
Domestic Hot Water		$360,000	$41,687 - $62,531	$297,469 - $318,313	12% - 17%
Efficient Water Aerators	Residential QHEC	$3,000	$2,382 - $3,000	$0 - $618	79% - 100%
TOTAL, EFFICIENCY MEASURES		**$1,108,000**	**$72,619 - $108,356**	**$999,644 - $1,035,381**	**7% - 10%**
Solar PV	N/A	$513,000	N/A	$513,000	N/A
TOTAL, ALL MEASURES		**$1,621,000**	**$72,620 - $108,357**	**$1,512,643 - $1,548,380**	**4% - 7%**

The cost of the ZNC target package is estimated to be $1,621,000. The incentives would cover between 4% to 7% of the project cost.

Table 21. Garden-style multifamily EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Space Heating	Prescriptive	$745,000	$28,550 - $42,825	$702,175 - $716,450	4% - 6%
Efficient Water Aerators	Residential QHEC	$3,000	$2,382 - $3,000	$0 - $618	79% - 100%
TOTAL, EFFICIENCY MEASURES		**$748,000**	**$30,930 - $45,827**	**$702,073 - $717,000**	**4% - 6%**
Solar PV	N/A	$513,000	N/A	$513,000	N/A
TOTAL, ALL MEASURES		**$1,261,000**	**$30,930 - $45,827**	**$1,215,173 - $1,230,070**	**2% - 4%**

The EE target package is estimated to be $1,261,000. The incentives would cover 2-4%.

Table 22. Garden-style multifamily <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
RCx	Building Tune-up	$21,000	$2,000 - $3,000	$18,000 - $19,000	10% - 14%
Hot Water Pump VFDs	Prescriptive	$6,000	$1,820 - $2,730	$3,270 - $4,180	30% - 45%
Efficient Water Aerators	Residential QHEC	$3,000	$2,382 - $3,000	$0 - $618	79% - 100%
TOTAL, ALL MEASURES		**$30,000**	**$6,200 - $8,732**	**$21,268 - $23,800**	**21% - 29%**

The <5-year payback period package consists of just a handful of potential measures, with a total cost of $30,000. Incentives cover between 21% and 29% of the cost of this package.

CASE STUDY 7: MID-SIZED HOTEL WITH CONFERENCE AND OTHER HIGH-USE SPACES

Table 23. Mid-sized hotel with conference and other high-use spaces package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC Target Package	$5,959,000	$478,791 - $554,188	$5,404,812 - $5,480,209	8% - 9%
EE Target Package	$1,708,000	$398,396 - $460,393	$1,247,607 - $1,309,604	21% - 24%
<5yr Payback Package	$323,000	$115,581 - $130,448	$192,552 - $207,419	36% - 40%

The seventh case study evaluates a mid-sized hotel that is 150,000-175,000 GSF. It offers a diverse range of measures across multiple programs, and the incentive potential reflects these opportunities. Most measures would qualify as Prescriptive offerings, but several are packaged together as part of a Building Tune-up project.

Table 24. Mid-sized hotel with conference and other high-use spaces ZNC target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Space Heating	Prescriptive	$3,804,000	$85,650 - $99,925	$3,704,075 - $3,718,350	2% - 3%
Water Heating		$1,270,000	$154,240 - $179,947	$1,090,053 - $1,115,760	12% - 14%
Electrify Cooking		$11,000	$4,200 - $4,900	$6,100 - $6,800	38% - 45%
Guest Room Controls		$88,000	$79,200 - $88,000	$0 - $8,800	90% - 100%
CW Pump VFD		$27,000	$3,123 - $3,643	$23,357 - $23,877	12% - 13%
Partial LED Conversion		$38,000	$6,000 - $7,000	$31,000 - $32,000	16% - 18%
Plug-load management		$17,000	$1,304 - $1,522	$15,478 - $15,696	8% - 9%
ERV System	Custom	$432,000	$128,571 - $150,000	$282,000 - $303,429	30% - 35%
Wider Deadbands	Building Tune-up	$44,000	$16,500 - $19,250	$24,750 - $27,500	38% - 44%
Efficient Water Aerators					
Air Sealing					
TOTAL, EFFICIENCY MEASURES		**$5,731,000**	**$478,791 - $554,188**	**$5,176,812 - $5,252,209**	**8% - 10%**
Solar PV	N/A	$228,000	N/A	$228,000	N/A
TOTAL, ALL MEASURES		**$5,959,000**	**$478,791 - $554,188**	**$5,404,812 - $5,480,209**	**8% - 9%**

The estimated cost of the ZNC target package is $5,959,000. Potential utility incentives would cover $478,791–$554,187, representing 8-9% of the cost of the package.

Table 25. Mid-sized hotel with conference and other high-use spaces EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Partial Water Heating	Prescriptive	$953,000	$154,240 - $179,947	$773,053 - $798,760	16% - 19%
Guest Room Controls		$88,000	$79,200 - $88,000	$0 - $8,800	90% - 100%
CHW Pump VFDs		$23,000	$2,776 - $3,239	$19,761 - $20,224	12% - 14%
CW Pump VFDs		$27,000	$3,123 - $3,643	$23,357 - $23,877	12% - 13%
HW Pump VFDs		$8,000	$1,561 - $1,822	$6,178 - $6,439	20% - 23%
Air Handling Unit VFDs		$48,000	$5,118 - $5,971	$42,029 - $42,882	11% - 12%
Partial LED Conversion		$38,000	$6,000 - $7,000	$31,000 - $32,000	16% - 18%
Plug-load management		$17,000	$1,304 - $1,522	$15,478 - $15,696	8% - 9%
ERV System	Custom	$432,000	$128,571 - $150,000	$282,000 - $303,429	30% - 35%
RCx	Building Tune-up	$74,000	$16,500 - $19,250	$54,750 - $57,500	22% - 26%
Wider Deadbands					
High-Efficiency Aerators					
General Sealing					
TOTAL, EFFICIENCY MEASURES		**$1,708,000**	**$398,396 - $460,393**	**$1,247,607 - $1,309,604**	**23% - 27%**
Solar PV	N/A	$228,000	N/A	$228,000	N/A
TOTAL, ALL MEASURES		**$1,936,000**	**$398,396 - $460,393**	**$1,475,607 - $1,537,604**	**21% - 24%**

The EE target package includes all measures from ZNC except for the electrify space heating recommendation. The cost of this package is significantly reduced at $1,936,000, while the incentives are still quite generous. In this package, incentives would cover 21–24% of the cost.

Table 26. Mid-sized hotel with conference and other high-use spaces <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Guest Room Controls	Prescriptive	$88,000	$79,200 - $88,000	$0 - $8,800	90% - 100%
CHW Pump VFDs		$23,000	$2,776 - $3,239	$19,761 - $20,224	12% - 14%
CW Pump VFDs		$27,000	$3,123 - $3,643	$23,357 - $23,877	12% - 13%
HW Pump VFDs		$8,000	$1,561 - $1,822	$6,178 - $6,439	20% - 23%
Air Handling Unit VFDs		$48,000	$5,118 - $5,971	$42,029 - $42,882	11% - 12%
Partial LED Conversion		$38,000	$6,000 - $7,000	$31,000 - $32,000	16% - 18%
Plug-load management		$17,000	$1,304 - $1,522	$15,478 - $15,696	8% - 9%
RCx	Building Tune-up	$74,000	$16,500 - $19,250	$54,750 - $57,500	22% - 26%
Wider Deadbands					
High-Efficiency Aerators					
General Sealing					
TOTAL, ALL MEASURES		**$323,000**	**$115,581 - $130,448**	**$192,552 - $207,419**	**36% - 40%**

The <5-year payback scenario has a cost of $323,000. The incentives are estimated to cover between 36% and 40% of the total cost.

CASE STUDY 8: STANDARD HOTEL WITH EXTRA USE SPACES

Table 27. Mid-sized hotel with conference and other high-use spaces package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC Target Package	$7,170,000	$608,561 - $682,893	$6,487,107 - $6,561,439	8% - 10%
EE Target Package	$2,105,000	$519,070 - $582,213	$1,522,787 - $1,585,930	25% - 28%
<5yr Payback Package	$751,000	$243,406 - $385,499	$365,501 - $507,594	32% - 51%

Case study 8 features a standard hotel with extra use spaces that is 200,000-225,000 GSF. The efficiency recommendations include several Custom opportunities with significant savings and incentive potential, including converting the energy management system from a pneumatic to DDC system. There are also a number of Prescriptive measures with incentive potential.

Table 28. Standard hotel with extra spaces ZNC target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Space Heating	Prescriptive	$4,844,000	$114,200 - $128,475	$4,715,525 - $4,729,800	2% - 3%
Water Heating		$1,370,000	$174,860 - $196,718	$1,173,282 - $1,195,140	13% - 14%
Electrify Cooking		$11,000	$4,200 - $4,725	$6,275 - $6,800	38% - 43%
Guest Room Controls		$112,000	$100,800 - $112,000	$0 - $11,200	90% - 100%
Cooling Tower Fan VFDs		$12,000	$2,907 - $3,270	$8,730 - $9,093	24% - 27%
Plug-load management		$22,000	$1,739 - $1,957	$20,043 - $20,261	8% - 9%
Pneumatic Conversion to DDC	Custom	$440,000	$190,000 - $213,750	$226,250 - $250,000	43% - 49%
Remission Heat Recovery		$22,000	$9,900 - $11,000	$11,000 - $12,100	45% - 50%
Efficient Water Aerators	Residential QHEC	$11,000	$9,956 - $11,000	$0 - $1,044	91% - 100%
TOTAL, EFFICIENCY MEASURES					
Solar PV	N/A	$326,000	N/A	$326,000	N/A
TOTAL, ALL MEASURES		**$7,170,000**	**$608,561 - $682,893**	**$6,487,107 - $6,561,439**	**8% - 10%**

The ZNC package is estimated to have a cost of nearly $7.2 million. The incentives are estimated to cover between 8% and 10% of the overall cost.

Table 29. Standard hotel with extra spaces EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Water Heating	Prescriptive	$1,028,000	$174,860 - $196,718	$831,282 - $853,140	17% - 19%
Guest Room Controls		$112,000	$100,800 - $112,000	$0 - $11,200	90% - 100%
Cooling Tower Fan VFDs		$12,000	$2,907 - $3,270	$8,730 - $9,093	24% - 27%
Air Handling VFDs		$25,000	$2,907 - $3,270	$21,730 - $22,093	12% - 13%
Plug-load management		$22,000	$1,739 - $1,957	$20,043 - $20,261	8% - 9%
Pneumatic Conversion to DDC	Custom	$440,000	$190,000 - $213,750	$226,250 - $250,000	43% - 49%
Free Cooling HX		$107,000	$26,000 - $29,250	$77,750 - $81,000	24% - 27%
Remission Heat Recovery		$22,000	$9,900 - $11,000	$11,000 - $12,100	45% - 50%
High-Efficiency Aerators	Residential QHEC	$11,000	$9,956 - $11,000	$0 - $1,044	91% - 100%
TOTAL, EFFICIENCY MEASURES		**$1,779,000**	**$519,070 - $582,213**	**$1,196,787 - $1,259,930**	**29% - 33%**
Solar PV	N/A	$326,000	N/A	$326,000	N/A
TOTAL, ALL MEASURES		**$2,105,000**	**$519,070 - $582,213**	**$1,522,787 - $1,585,930**	**25% - 28%**

Exclusion of the electrify space heating measure reduces the package to $2,105,000. However, substantial incentives still cover 25-28% of the cost.

Table 30. Standard hotel with extra spaces <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
Guest Room Controls	Prescriptive	$112,000	$100,800 - $112,000	$0 - $11,200	90% - 100%
Cooling Tower Fan VFDs		$12,000	$2,907 - $3,270	$8,730 - $9,093	24% - 27%
Air Handling VFDs		$25,000	$2,907 - $3,270	$21,730 - $22,093	12% - 13%
Plug-load management		$22,000	$1,739 - $1,957	$20,043 - $20,261	8% - 9%
Free Cooling HX	Custom	$107,000	$26,000 - $29,250	$77,750 - $81,000	24% - 27%
Pneumatic Conversion to DDC		$440,000	$190,000 - $213,750	$226,250 - $250,000	43% - 49%
Remission Heat Recovery		$22,000	$9,900 - $11,000	$11,000 - $12,100	45% - 50%
High-Efficiency Aerators	Residential QHEC	$11,000	$9,956 - $11,000	$0 - $1,044	91% - 100%
TOTAL, ALL MEASURES		**$751,000**	**$243,406 - $385,499**	**$365,501 - $507,594**	**32% - 51%**

The <5-year payback scenario maintains the controls and EMS projects, and so the incentive potential continues to be high. The overall package is estimated to be $751,000, with incentives covering between 32-51% of the cost.

CASE STUDY 9: WORSHIP/EDUCATION MIXED-USE

Table 31. Worship/education mixed-use package summary

Package	Est. Package Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ZNC Target Package	$3,063,000	$111,390 - $143,720	$2,919,280 - $2,951,610	4% - 5%
EE Target Package	$1,401,000	$89,790 - $115,721	$1,285,279 - $1,311,210	6% - 8%
<5yr Payback Package	$53,000	$25,504 - $30,006	$22,994 - $27,496	48% - 57%

The ninth and final case study is unique due to the difference in age of the old building and subsequent additions, between 75,000 and 100,000 GSF. The case study also includes two target ZNC packages. The first considers measures for both the old building and new addition, while the second considers measures for only the old building. This analysis focuses on incentives for the first option covering both the old and new buildings.

Table 32. Worship/education mixed-use ZNC target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ERV System	Custom	$114,000	$64,286 - $85,714	$28,286 - $49,714	56% - 75%
RCx	Building Tune-up	$32,000	$21,600 - $24,000	$8,000 - $10,400	68% - 75%
Space Heating	Prescriptive	$978,000	$21,000 - $28,000	$950,000 - $957,000	2% - 3%
Loop Pump VFDs	Prescriptive	$21,000	$4,504 - $6,005	$14,995 - $16,496	21% - 29%
TOTAL, EFFICIENCY MEASURES		**$1,145,000**	**$111,390 - $143,720**	**$1,001,280 - $1,033,610**	**10% - 12%**
Solar PV	N/A	$1,918,000	N/A	$1,918,000	N/A
TOTAL, ALL MEASURES		**$3,063,000**	**$111,390 - $143,720**	**$2,919,280 - $2,951,610**	**4% - 5%**

The ZNC option 1 target package is estimated to have a cost of $3,063,000. The incentives would cover between 4–5% of the costs.

Table 33. Worship/education mixed-use EE target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
ERV System	Custom	$114,000	$64,286 - $85,714	$28,286 - $49,714	56% - 75%
RCx	Building Tune-up	$32,000	$21,000 - $24,000	$8,000 - $11,000	66% - 75%
Loop Pump VFDs	Prescriptive	$21,000	$4,504 - $6,005	$14,995 - $16,496	21% - 29%
TOTAL, EFFICIENCY MEASURES		**$167,000**	**$89,790 - $115,721**	**$51,279 - $77,210**	**54% - 69%**
Solar PV	N/A	$1,234,000	N/A	$1,234,000	N/A
TOTAL, ALL MEASURES		**$1,401,000**	**$89,790 - $115,721**	**$1,285,279 - $1,311,210**	**6% - 8%**

The EE package excludes the electrify space heating measure from the ZNC option 1 package. The overall cost is estimated to be $1,401,000. Thus, incentives are estimated to cover 6-8% of the overall cost.

Table 34. Worship/education mixed-use <5-year payback target package

Measure	Program	Est. Measure Cost	Incentive Range	Cost Range After Incentives	% Paid by Incentives
RCx	Building Tune-up	$32,000	$21,000 - $24,000	$8,000 - $11,000	66% - 75%
Loop Pump VFDs	Prescriptive	$21,000	$4,504 - $6,005	$14,995 - $16,496	21% - 29%
TOTAL, ALL MEASURES		**$53,000**	**$25,504 - $30,006**	**$22,994 - $27,496**	**48% - 57%**

The final package consists primarily of VFD retrofits through Prescriptive and an RCx project through Building Tune-up. This package is estimated to cost $53,000, with incentives covering 48-57% of the package.

ADDITIONAL FUNDING, INCENTIVE AND FINANCIAL SUPPORT RESOURCES

There are a variety of incentive, grant, and other programs to promote energy efficiency in both commercial and residential buildings. This analysis focused primarily on the incentive available through electric utility programs, especially the Pepco Energy Savings for Business Program. Properties in the county may also have accounts through Potomac Edison, BGE, and Washington Gas for electric or natural gas service. Links for each of these programs are below:

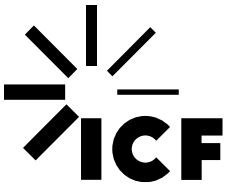
- Pepco Energy Savings for Business Program
- BGE Smart Energy Savers Program®
- Potomac Edison Energy Savings for Business
- Washington Gas

Commercial facilities are also eligible for state grants through the Maryland Energy Administration (MEA). MEA grants are usually competitive and more limited than utility incentives and so weren't considered for this analysis. However, they can also be an important source of funds for select projects, covering up to 50% of the out-of-pocket costs after incentives. There are also specialized incentive programs for data centers, low-interest loans, and other offerings through MEA. More information about MEA commercial, industrial, and agricultural grant and loans programs is below:

- MEA Business grant and loan programs
- MEA State and Local Government grant and loan programs

An additional and important source of funds are tax credits and deductions available through county, state and federal government. The federal 179D tax deduction for efficient buildings was made permanent in 2021. Montgomery County also provide an energy-efficient building real property tax credit for both new and existing buildings. Lastly, the Montgomery County's Green Bank provides a range of financing programs that support energy efficiency, renewable energy, and electrification measures. Links for these resources are below:

- Federal 179D tax deduction
- Montgomery County Energy-Efficient Buildings property tax credit (Existing Buildings)
- Montgomery County Green Bank



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