Martin O'Malley
Governor

Incentivizing Energy Efficiency in State Buildings

Achieving Greater Energy Reduction Goals with a Shared Savings Model

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Governor's Summer Internship Program 2014

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Executive Summary

Maryland has proven to be a leader in sustainability in its multiple initiatives, strategic goals, and overall attitude toward environmental stewardship and natural resources. Specifically, the EmPOWER Maryland Act promotes electricity demand and consumption reductions, but does not mention state agencies or their facilities. The O'Malley/Brown Administration, as a nation wide leader in sustainability, has endorsed a goal of 15% total energy reduction in state facilities by 2015.

We recommend instituting:

- A state facility goal of 20% energy reduction by 2020 legislated in the 2015 session.
- A shared savings model for small energy efficiency projects as an incentive for agencies.

A 20% reduction goal by 2020 creates a new challenge for Maryland that would motivate state agencies to maximize their energy efficiency. A shared savings model fiscally incentivizes that energy efficiency. In the current system, state agencies are not permitted to keep their savings from energy efficiency improvements; savings are used to pay off initial capital investments and then recuperated by the State.

A shared savings model should be created. Initially, state agencies select an energy project, implement it, and realize a certain amount of savings. The model allows savings to be retained by the agency, which serves as a reward for implementing an energy project. This savings model would reach agencies not already engaged in energy efficiency projects, engaging a higher proportion of state buildings in energy reduction, and creating a financially and environmentally sustainable cycle of innovation for the State of Maryland.

Context

To accomplish Maryland's energy reduction goals, state agencies report their utility bills to the Department of General Service's Office of Energy Performance and Conservation (Energy Office) for tracking and reporting, and draft Agency Energy Plans (AEPs). Through Energy Performance Contracts (EPCs) completed by Energy Service Company Organizations (ESCOs), agencies can retrofit their buildings to make them more energy efficient. The combination of surveying agency facilities for large EPC opportunities and completing EPCs promotes safer, cleaner, and more sustainable technologies, ultimately saving the state operational utility expenses in the long run.

State Agency Energy Reduction Goals

In 2006, the Maryland General Assembly passed Senate Bill 267, which established the current energy reduction goals for Maryland state agencies. This bill updated certain dates and percentages of standing law, which directed the Department of General Services, in cooperation with the Maryland Energy Administration, to set energy performance standards requiring certain reductions in energy consumption by state buildings. The updated reduction mandates were, from a 2006 baseline, 5% in energy consumption by 2009 and 10% reduction by 2010. Agencies were mandated to analyze their energy usage and examine methods to achieve energy savings. The law further directed agencies to submit and to act on energy conservation plans aimed at achieving those reductions.[1]

In 2008, the Maryland General Assembly passed House Bill 347, known as the "EmPOWER Maryland Energy Efficiency Act of 2008," (EmPOWER Maryland Act) which set a statewide target reduction of 15% in per capita electricity consumption and demand by

[1] Senate Bill 267. http://energy.maryland.gov/incentives/state-local/sbeeca/SB267.pdf

2015 from a 2007 baseline. The State's regulated electric utilities, excluding electric cooperatives, are charged with achieving these reductions through various initiatives, such as rebate programs for their customers. The act further directs the Maryland Energy Administration to determine whether electricity consumption and peak demand reduction targets should be set beyond 2015.[2] This initiative is aimed at helping residents adopt energy-saving measures to meet state energy reduction targets, but does not mandate goals for state agencies.[3] Thus, The EmPOWER Maryland Act, as used internally, is generally interpreted to suggest that state government should actively seek out and implement energy efficiency projects.

The Maryland Energy Database and Agency Energy Plans

The Energy Office oversees state government energy efficiency measures, the Maryland Energy Database, and deregulated electricity procurement for state entities. The Database contains information on all 58 state agencies that pay for their own utility bills in the State's name, including electricity, natural gas, water, sewer, steam, chilled water, propane, gas and renewable energy. The Energy Office collects this information by requesting bills from agencies and by requesting digital information from utility companies. The Database tracks utility costs, utility use, greenhouse gas emissions, longitudinal trends in data, gaps in data, and meter, building, and agency information. This Database is used to track energy usage to report to the Governor's office, as well as for competitions such as the 16 Agency Energy Competition launched in 2011[4] and the Energy Cup, which premiered successfully this year.[5] The Database

[2] Maryland Energy Administration. "EmPOWER Maryland Planning." Last modified May 19th, 2014. http://energy.maryland.gov/empower3/
[3] H.B.347. http://mlis.state.md.us/2008rs/billfile/hb0374.htm
[4] 16 State Agency Energy Competition, DGS website. http://www.dgs.maryland.gov/Energy/AgencyCharts/index.html
[5] Department of General Services. "Governor O'Malley and DGS Secretary Collins Present Maryland Energy Cup Awards to Winners of State Agency Energy Competition" last modified February 6, 2014. https://news.maryland.gov/dgs/2014/02/06/governor-omalley-and-dgs-secretary-collins-present-maryland-energy-cup-awards-to-winners-of-state-agency-energy-competition/

supports all functions of the Energy Office: EPCs, Measurement and Verification, energy purchasing, and energy events and competition reporting.

The Department of General Services' Energy Office is also charged with collecting Agency Energy Plans from state entities included in the Maryland Energy Database. Each agency has an Agency Energy Coordinator (AEC) who will be required by their job description to compile and submit these plans. This title and responsibility will soon be officially added to a current position within an agency. StateStat, Maryland's executive branch insurance for agency transparency and accountability, has made Agency Energy Coordinator positions top priority in the Department of General Services' goals,[6] and is still looking to motivate AECs to invest more time in energy efficiency, specifically citing the need for motivation to get AECs interested in this addition to their job.[7]

DGS provides support for agencies and information on how to complete plans by working with each AEC.[8] These Energy Plans include a breakdown of how much energy is used, how it is used, and what plans are in place to reach Governor Martin O'Malley's and Lt. Governor Anthony Brown's endorsed 2015 goal of 15% energy reduction in state facilities.[9] This plan breaks down the Energy Consuming Entities (ECEs) for each agency.[10] This allows DGS to plan and to suggest projects that may otherwise go unnoticed.

Energy Performance Contracts (EPCs)

Energy Performance Contracting is also managed by the Energy Office. Energy Performance Contracting is a process that retrofits state buildings to be more energy efficient.

[6] Statestat. "About Statestat". http://www.statestat.maryland.gov/about.html
[7] DGS StateStat Meeting, July 22, 2014.
[8] Barry Powell, Department of General Services' Energy Office. Notes provided to author.
[9] Statestat. "Energy Efficiency Strategic Goal". https://data.maryland.gov/goals/energy-efficiency
[10] Agency Energy Plan Instruction Manual. http://www.dgs.maryland.gov/Energy/Planning/index.html.

These retrofits can include anything from LED lights to solar panel installations to chiller and boiler replacements. Seven pre-approved ESCOs compete on these performance contracts, where they must come up with a creative plan to reach a guaranteed utilities savings. Maryland is rather unique in its proposal requirements, in that the projected cash flow must be mapped out year-by-year.[11] After an ESCO is approved to do a project, a loan is taken out from the Maryland Treasury to pay for construction or the ESCO funds the project privately. The energy savings will then pay back this loan in annual installments. In effect, utility appropriation during the construction period will not decrease, but be split into paying for actual utilities used in the building and for the loan taken out. After the project is paid off, the utility budget of that agency is then adjusted to decrease.[12]

The Energy Office completes a Measurement and Verification (M&V) process to be sure that a project has reached guaranteed savings for the duration of the guaranteed savings period (10-15 years). If the project is not meeting projected savings, the ESCO is contractually obligated to pay for the portion it guaranteed but did not achieve.[13]

As it stands, EPCs have boasted significant effectiveness in project implementation and energy savings. As can be seen in the table below (Figure 1), energy performance contracting has yielded the completion of substantial energy savings projections, from hospital to university system projects, and have essentially boasted as high as an a 47.9% annual return on energy use.

EPCs have increased quality and value of Maryland's energy initiatives with sound structural processes that ensure implementation success. Inherently, there are incentives for

[11] Lionel Hill, Department of General Services' Energy Office, notes provided to authors.
[12] Maryland Department of Budget and Management. "FY2016 Operating Budget Submission Requirements." Last modified July 29th, 2014. http://dbm.maryland.gov/agencies/operbudget/Pages/OperatingBudgetInstructions.aspx
[13] Barry Powell, Department of General Services' Energy Office, notes provided to authors.

ESCOs to provide thorough project commissioning, effective technology, and tap into private sector knowledge on energy efficiency and sustainability.

Agency	No. Of Buildings	Project Cost	BPW Approval	Anticipated Annual Operational Savings	Annual % Energy Savings	Anticipated Annual kWh Reduction	Overall Annual MMBTU Reduction	CO2 reduction (tons)
Department of Mental Health and Hygiene	Spring Grove Hospital	$19,672,595	FY08	$2,774,363	47.90%	3,111,713	208,046	38,043
Agriculture	2 buildings	$2,315,496	FY09	$259,711	31.60%	2,171,861	7,413	1,346
Department of Public Safety and Correctional Services	62 buildings	$14,000,000	FY10	$1,664,000	30.30%	4,388,109	144,392	9,929
University System of Maryland	7 buildings	$8,085,898	FY09	$700,000	30.00%	3,718,521	12,691	2,694
Maryland State Department of Education	2 buildings	$2,214,650	FY10	$312,314	30.00%	1,547,559	18,675	1,313
University System of Maryland	1 building	$1,761,959	FY11	$158,578	27.70%	999,763	5,846	700
University System of Maryland	4 buildings	$2,602,435	FY09	$250,000	27.00%	1,420,477	13,659	2,090

Figure 1: Maryland EPCs and associated energy savings[14]

Nationwide, EPCs are successfully used by federal, state, and local governments to promote energy efficiency.[15] The Maryland EPC process ensures that agencies can properly facilitate large scale energy savings and water use reduction projects without fiscal waste. EPCs have produced significant utility savings for agencies with little risk to the taxpayer.

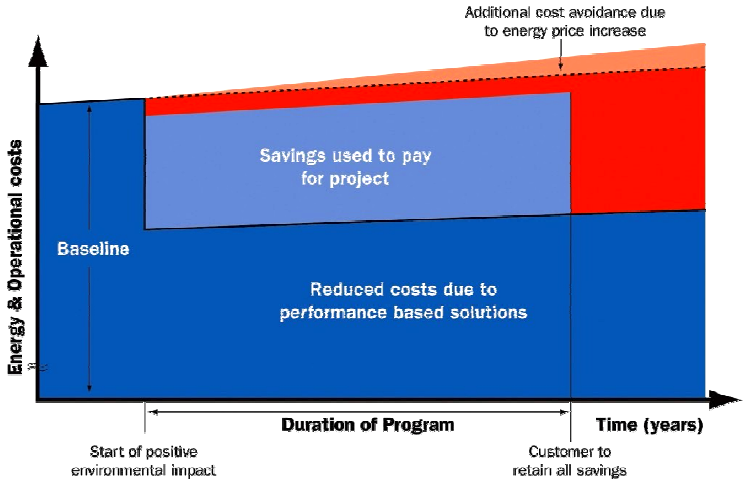

Figure 2: EPC Return on Investment[16]

[14] DGS StateStat Report. July 2014. http://www.statestat.maryland.gov/reports.html
[15] Introduction to Energy Performance Contracting. Energystar.gov. http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf
[16] Citelum. http://www.citelum.com.au/wp-content/uploads/2011/12/chart1-1024x658.jpg

Problem

Goals Not Updated and Smaller Projects Undone

As previously mentioned Senate Bill 267 mandates state agency energy reduction but only sets specific goals through 2010. Thus, while agencies continue to retrofit their buildings through EPCs, there is no longer any statutory backing for their energy reduction initiatives. The current goal is not backed by any law, executive order, or directive, making it difficult at times to gain cooperation from agencies to reduce energy and to incentivize an investment in energy saving technologies.

While larger agencies are cooperating in undergoing energy efficiency projects, some agencies not already motivated by EPCs or saving money on utility bills are not participating in these energy reduction projects. Several state agencies have inquired about the distinction between the law and the internal initiative, and some recognize that there is in fact no legal basis to what they are being asked to achieve. Without any statutory backing for the initiative in relation to state agencies, they are instead suggested to "lead by example" in order to achieve the targeted energy reduction goals.[17] There are no public plans for the O'Malley/Brown Administration to solidify this goal into long-standing legislation to be used after this current elected term.

An executive order recently proposed by the Department of General Services and Maryland Energy Administration called for an updated goal of 20% reduction in energy usage by state agencies by 2020.[18] The Agency Energy Plans in this executive order provided backing for the start of smaller energy efficiency projects not covered by larger EPC projects.

[17] Lionel Hill, notes provided to authors
[18] David St. Jean, Maryland Energy Administration, notes provided to authors on his "Roadmap to Maryland State Agency Energy Efficiency"

This executive order was not finalized, so the 2010 goals remain Maryland State Agencies' most up to date benchmark.

While EPCs have been proven to be effective tools through which local, state, and federal governments can promote energy efficiency, the ESCOs participating in them are generally not incentivized to focus on smaller projects. They frequently choose to work on larger scale projects, which yield a greater payout and take more time. As such, many small-scale energy saving projects, which often don't require construction, a large staff, or very much capital investment, go undone by ESCOs. A mechanism to incentivize completion of small-scale projects would not only contribute towards increasing energy savings, but would help state agencies meet their energy reduction goals.

Database and Agency Energy Plans

Maryland has one of the most extensive energy databases in the country, and is working diligently to have agencies complete their Agency Energy Plans. However, these initiatives are currently part of an unfunded mandate, which requires change within agencies without any funding coming from the State, and without the ability to repurpose other funds towards these initiatives. This leads to varied efforts across the board from Agency Energy Coordinators, who have had their title added onto to their existing duties. An across the board incentive is needed to motivate staff within these agencies, along with their Agency Energy Coordinator, to actively pursue data completion in the database, a complete Agency Energy Plan, and energy efficiency projects in their own buildings.

Solution

Updating Goals

As a first solution to the dual issue of outdated energy reduction goals and smaller projects going undone, we propose the drafting of legislation updating Maryland's goals for state agencies to 20% by 2020. Such legislation would provide the statutory motivation for agencies to seek out and to implement energy efficiency projects. It also must ensure that smaller agencies have an avenue to explore implementing projects other than EPCs. The particular method we advocate is the shared savings model, which builds off the success of the EPC model while better incentivizing the completion of small-scale projects.

Building a Shared Savings Model

Shared savings is a payment strategy that provides incentives for agencies to reduce energy expenditure by undertaking energy efficiency projects. It is so-named because the savings is "shared" with the agency for a predetermined amount of time before being recuperated by the state. In this way, the agencies benefit directly as a result of their efforts and the state reduces long run energy costs.

It is important to differentiate the previously discussed Energy Performance Contracting from a shared savings model. Whereas Energy Performance Contracts financially guarantee the performance of a specific installation, a shared savings model provides no such direct assurances from the ESCO. There is no ESCO with a contractual obligation to make up any difference between a project's proposed and actual savings.

The shared savings model complements and builds on the success of the Energy Performance Contracting model. The EPC model has been successful, but limited to large projects. Specifically, ESCOs are not incentivized to focus on smaller projects and choose larger scale projects that yield greater returns on investment.

A shared savings model would provide a more general, open-ended framework to approaching energy efficiency projects, by removing the large-scale constraint of EPCs especially the long timescale required to implement a contract. Rather than processes involved in assigning and preparing specific projects between agencies and contractors, a shared savings model shifts responsibility to members within the agency, incentivizes them to actively seek any project that will improve energy efficiency, and promises a share of the future savings. Effectively, this includes any small-scale project, of any type, and degree of energy reduction—tailored to the specific agencies' preferences.

Such a model can be implemented in the State of Maryland in four stages, as described below: initial capital funding, implementation of the project, measurement of the savings, and reinvestment of the savings.

Initial Capital Funding

The current energy project financing models in Maryland utilize the realized energy savings to pay for the initial capital investment. For EPCs, the projected savings is used to pay off large loans over a certain time period and the ESCO will make up the difference on any savings not achieved. The current funding model presents a challenge for the shared savings model. If the savings is to be redirected to the agency for further investment, then a new source of funds must be found for the initial capital investment or the redirection of savings must be postponed until the initial loan obligations are met.

Below are several ideas for funding, each with varying effects on how the model will need to be implemented. The individual benefits and tradeoffs are discussed in greater detail in the "Challenges" section.

- Federal Energy Efficiency Grant Programs

- State Energy Efficiency Grant Programs from future Regional Greenhouse Gas Initiative (RGGI) auction proceeds
- General Obligation (GO) Bonds for Capital Projects
- State Agency Loan Program (SALP)
- EPC Shortfalls

The best option as far as incentives and investments go would be an initial grant to the agency for a project through MEA. By granting the money to the agency, MEA allows the agency to immediately (next fiscal year) reinvest the savings. This would also allow agencies to keep money for longer periods before the utilities line item is eventually reduced to reflect greater energy efficiency.

Implementation of the Project

Implementation of the model will need to balance careful oversight of the program with enough freedom for the agencies to implement them more quickly and efficiently than EPCs.

In all cases, this will require the assistance and guidance of the DGS Energy Office. DGS will be responsible primarily for two phases of the project: pre-construction planning and post- construction measurement and verification. The involvement of DGS in pre-construction planning is necessary to ensure that the proposed project is sufficiently energy-efficient to yield potential savings over a reasonable payback period. Post-implementation measurement and verification is a natural extension of responsibility for DGS, as it is already involved in the M&V of the EPCs it oversees.

After DGS approval of plans, there are two options for implementation of projects: completion by Small Energy Service Company Organizations (SESCOs) or self-implementation.

The contracting mechanism for SESCOs is relatively new and untested, though initial stages of a pilot project have gone smoothly. The first such project is currently underway at Sandy Point and has the potential to make the park a net-zero facility. However, the timeline for implementing a SESCO project is still relatively long (about one year from project proposal to beginning of construction).[19]

There are other factors that make this option less attractive than self-implementation. First, there are only two companies bidding on these contracts compared to seven for large EPCs. This presents a competitive procurement problem, as less competition implies less creativity and incentive for cost reduction when implementing the project. Secondly, they have far less incentive to perform well since the savings are not guaranteed and the agency is responsible financially. Still, this may be a good way to implement the smaller projects that still require outside engineering expertise. It also may be beneficial to explore the idea of having these SESCOs guarantee the savings for a short period of 1-2 years. Unfortunately, relatively little data is available from other states regarding the use of smaller non-guaranteed savings contracts.

Self-implementation presents two significant advantages over SESCO implementation: time and financial risk. The time between conceptions of the project to the beginning of construction is significantly reduced by eliminating a third-party bidding process. It is possible that DGS could assist in getting a project started in as little as one or two months. The financial risk is lessened since the agency is managing the project and responsible for the financing. It is incumbent upon the agency to realize the savings that it projected in order to have future funding for capital projects within this model. Essentially, this solves the problem of the non-

[19] "Timeline for Implementing an energy contract with a Small ESCO." Akrem Awad. 2014.

guaranteed contract by placing the construction and financial responsibility on the agency. It is possible that the Legislature would need to authorize this self-implementation mechanism officially as North Carolina did with NC HB 200 in 2011.[20]

Measurement of the Savings

The savings from the initial capital project would not be realized for at least one year from the completion of the project. The M&V process generally must be conducted annually to normalize for weather variables.

After the "savings-sharing period" begins, the agency will retain the savings by a reallocation of the verified amount to a specific sub-object in the agency's operating budget. In effect, this creates a separate fund for reinvestment in future energy projects.[21] Eventually, the state can consider an "end date" for the "shared savings period" on which the savings from a project is not added to the energy efficiency reinvestment subobject but is recuperated by the state. This provides a financial incentive for the State to support the agencies to allow them to realize the most savings.

For DGS to successfully complete the M&V process, the agency must have sufficient baseline energy use data, either in the database or to be provided to DGS by official sources (i.e. submeters or utility bills not currently in the database).

The verification method involves using meter data (if building is on an independent meter) or submeter data (if available from the agency). Utility meter data on independently-metered buildings would be the simplest way to verify the savings, since the State EnergyCap Database already weather-normalizes the data to calculate savings. The greatest concern here is data completion. DGS would require a sufficient level of data on the buildings or structures

[20] NC House Bill 200 http://www.ncga.state.nc.us/Sessions/2011/Bills/House/PDF/H200v7.pdf
[21] Carissa Ralbovsky, Department of Budget Management.

involved in the project to accurately measure energy usage. Submetered data presents a challenge, as it is not currently imported into the database for easy weather normalization. However, DGS has M&V agents capable of receiving that data from the agency and calculating the savings from it.

Reinvestment of the Savings

The reinvestment of the savings efficiently is the key to this proposal's success. A compromise between investing in physical capital and investing in human capital represents the best utilization of the savings and improves upon steps taken by other states.

Based on the North Carolina legislation discussed below, 60% of savings should be reinvested in further energy efficiency capital projects. This will create further capital flow from the initial investment. Instead of one capital project from an initial investment, the state may see the implementation of several capital projects over the life of the shared-savings period. Furthermore, each of these projects will produce savings of its own. The cycle of investment in energy efficiency measures will be an excellent mechanism to improve Maryland's environmental impact and reduce long-term costs.

In addition to the investment cycle in physical capital, "human capital" can be improved with the savings. The remaining 40% should be used for energy awareness and training initiatives. One option is to use the funding to train Agency Energy Coordinators (AEC) for each agency or groups of agencies. Furthermore, each agency is not fortunate enough to have dedicated engineers and facilities managers to appoint as its AEC. Thus this would aid those who may otherwise have little knowledge of energy efficiency methods, goals, and projects. Another option could be to train staff on how they could be more energy efficient at home and in the workplace. With this step, Maryland would become a leader in using successful projects to

create awareness and educate about the importance and methods of energy efficiency in our society.

Evidence

The Right Size Project

To be very specific, the goal of this policy is to focus in on projects that would require little more than a building's own maintenance staff to implement. A prime example comes from a Green St. Mary's Revolving Fund (GSMRF) proposal for a small energy efficiency project at St. Mary's College of Maryland. GSMRF funds green projects on the St. Mary's campus that have an eventual payback, which subsequently gets put back into the fund for future projects. This funding mechanism is similar to our proposal, in that utility savings may be funneled back into future energy efficiency projects. The project proposed installing motion sensors called "vending misers" on all vending machines on campus, which control temperature and lighting of machines based on room occupancy.[22]

To retrofit the 39 drink and snack vending machines on campus would cost the College $2,631 up front. These vending misers are predicted to save the College $5,554.22 annually, considering an average price of $.10 per kWh.[23] In other words, St. Mary's can pay for this project almost two-fold with the savings it generates in one year. Even if a limited shared savings model was used: 50% of savings shared for only 2 years, St. Mary's would be able to keep almost double their initial investment. The State will receive over $5,000 in savings.

[22] VendingMiser Advertising Materials. http://vendingmiser.com/downloads/EM_sell_sheet_gen-mar2012.pdf
[23] Savings Calculation from Vending Miser. http://www.thevendingmiser.com/calculator.php, using information collected by Katelynne Cowart in GSMRF proposal (2014) and EnergyCAP electricity data.

Motion Sensors on Vending Machines at St. Mary's College of Maryland

	Year 1	Year 2	Year 3	Year 4	Year 5
Cost With Miser	$4,608.53	$9,217.07	$13,825.60	$18,434.13	$23,042.66
Cost Without Misers	$10,162.76	$20,325.51	$30,488.27	$40,651.03	$50,813.78
Aggregate savings	$5,554.22	$11,108.44	$16,662.68	$22,216.90	$27,771.12
50% shared savings	$2,777.11	$5,554.22	$8,331.34	$11,108.45	$13,885.56

This figure shows the cost comparison between running St. Mary's 39 vending machines without Vending Misers and with, how much St. Mary's is saving total throughout 5 years, and shows how much St. Mary's would be able to retain from a 50% shared savings model, represented as an aggregate figure.
VendingMiser prices reflect bulk incentives for the school. More information can be found in Appendix D.

This example truly shows how sustainability will pay off if agencies begin to actively pursue small energy efficiency projects. This snowball effect of savings turning into larger funds for more energy efficiency projects seems a very positive incentive that benefits both the State and the agency.

North Carolina University System

In 2009, North Carolina put into effect legislation that allows savings realized by the implementation of energy-efficiency projects in the University of North Carolina system to be retained by the university system for reinvestment in additional energy conservation projects. The legislation allows credit balances in the General Fund related to utility purchases to be carried forward one-time for use on operational and capital related expenditures. It also prevents the Budget Director from decreasing the continuation budget by the amount of energy savings.[24]

To facilitate the savings-sharing model, North Carolina set goals and reporting requirements in the legislation. The goals included a reduction of energy consumption per gross square foot in state buildings by 20% in 2010 and 30% in 2015 based on a 2003 baseline. The reporting requirements included an annual update to each agency or institutions energy

[24] NC House Bill 1292 page 1 http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1292v5.pdf

management plan and an annual report of utility consumption and costs.[25] In order to get credit for energy savings, campuses must hire third-party engineering services to verify the savings generated by the energy conservation measures.[26] Facilities are allowed up to 15 to 20 years to realize their savings before their budgets are adjusted for their energy efficiency measures.[27]

The University of North Carolina has had difficulty with measurement of the savings, however. To realize monetary energy savings, UNC law requires University entities to hire a third-party engineering service to measure and verify savings. This added requirement may further deter agencies from investing in energy efficiency projects, even with an added incentive of retaining energy savings.[28]

This same difficulty will not be a problem in Maryland. As mentioned earlier, Maryland already has an extensive database to track energy savings, as well as experience with measurement and verification processes through Energy Performance Contracting.

The UNC system also identifies initial funding as a main issue. They have been relying on non-recurring funds and donations from multiple sources to perpetuate energy efficiency projects. In one case, UNC Wilmington started a project of constructing a data warehouse from a one-time source of the president's budget reserve, but had no further idea on where other funding will come from after 2013.[29] A possible initial capital investment model that will avoid this problem may be seen through various grants or loans in the State of Maryland, as discussed below.

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[25] NC House Bill 1292 page 2 http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1292v5.pdf
[26] "The UNC System Needs a More Comprehensive Approach and Metrics for Operational Efficiency", by the Program Evaluation Division North Carolina General Assembly http://www.ncleg.net/PED/Reports/documents/UNC/UNC_Report.pdf
[27] Ibid.
[28] "The UNC System Needs a More Comprehensive Approach and Metrics for Operational Efficiency", by the Program Evaluation Division North Carolina General Assembly http://www.ncleg.net/PED/Reports/documents/UNC/UNC_Report.pdf
[29] NC State University's Annual Sustainability Report, 2012 - 2013 http://sustainability.ncsu.edu/wp-content/uploads/2013/11/2013-NC-State-Annual-Sustainability-Report.pdf

North Carolina State University has cited a project paid for by this retained savings in the NC State University 2013 Sustainability report and has cited other possible projects that could be funded in the same way. The university's energy savings from the previous year funded an automation system that allows for digital controls for increased energy efficiency in NC State's library.[30]

The University System as a whole realized about $450,000 in energy savings in the last year, and has found the incentive of sharing savings to be very successful. The North Carolina University System is currently considering removing the 40% opportunity for discretionary spending, in turn for reinvesting all energy savings into more energy projects. This decision was made ultimately to keep energy efficiency savings in a closed loop for other projects in the future, as energy efficiency projects are usually the last thing funded when budgets get cut. The current model of 60% of the savings going to energy efficiency projects and 40% to discretionary spending works to motivate facilities in the University System, and no problems are anticipated in updating energy efficiency investments to 100%.[31]

Other States' Legislation

Retained energy savings legislation has been promoted and passed before on both the state and federal level. In 1999, Bill Clinton signed Executive Order 13123, an Order focused on energy and greenhouse gas emissions reductions. It also cited retaining energy savings as a tactic for agencies to buy into energy efficiency, specifically recommending buildings that reduce their energy consumption to keep those savings "to provide greater incentive for that facility and its site managers to undertake more energy management initiatives, invest in

[30] http://sustainability.ncsu.edu/wp-content/uploads/2013/11/2013-NC-State-Annual-Sustainability-Report.pdf
[31] Mary-Ann Ibeziako, M.S, M.B.A, PEM, Director- Energy Services and Sustainability, North Carolina A&T State University.

renewable energy systems, and purchase electricity from renewable energy sources."[32] The Order in totality greatly resembles legislation brought up in Maryland recently, calling for state agencies to update agency goals and name agency energy coordinators.[33] By 2007, this section of energy efficiency legislation was removed from Code 8256.[34] This legislation was put into effect at the beginning of an energy reform. Our plan differs, in that we would want to use this tactic to engage the last of Maryland's agencies in energy efficiency efforts.

South Carolina also has legislation to allow for state agencies to retain energy savings, which is current through the 2013 session. Section 48-52-635, first passed in the 1995 Act 105, calls for state agencies to use leftover utility budget from a prior fiscal year to first pay off any capital related to energy projects already taken on, and then on any other energy efficiency measures they see fit.[35] Oregon passed their retained energy savings for state agencies legislation in 1992, allowing state agencies to retain 50% of their energy savings to use on more energy efficiency projects.[36]

Shared Savings Model Case Studies

A shared savings model is not a newly devised incentive mechanism. Under the recent wave of health reform that responds to high healthcare costs, and the institution of the Affordable Care Act (ACA), policymakers have been investigating any solution that may provide cost efficiencies while maintaining positive outcomes. Just this year, the Center for Medicare and Medicaid Services (CMS) has been carrying out two studies to identify the efficacy of a shared savings model. Specifically, the Medicare Shared Savings Program (MSSP)

[32] "Executive Order 13123 of June 3, 1999." Federal Register 64.109 (1999): 1-29. https://www1.eere.energy.gov/femp/pdfs/eo13123.pdf
[33] "Roadmap to Maryland State Agency Energy Efficiency", DGS and MEA legislation suggestion.
[34] Cornell University Law School Legal Information Institute. "42 U.S. Code § 8256 - Incentives for agencies." Accessed July 25th, 2014. http://www.law.cornell.edu/uscode/text/42/8256
[35] South Carolina Code of Laws, 2013 session. http://www.scstatehouse.gov/code/t48c052.php
[36] Department of Energy, State Energy Savings Program http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_330/330_118.html

and the Pioneer Accountable Care Organization (ACOS) both aim to incentivize operational efficiencies through retainment of the savings achieved by change affected. A new, independent evaluation of the ACOS program reported the program saved Medicare $147 million in the first year—higher than CMS initially expected. Among the 23 total Pioneer participants who continued with the program into its second year, 9 reported significant reductions in health care expenditure, relative to Medicare fee for service rates. While these participants reported substantial success in delivering higher quality of care with lower costs, just over a third reduced spending enough to qualify for the shared savings part of the model.[37]

Outcomes for the 114 participants in the MSSP program mirror Pioneer outcomes, with substantial reductions with many not substantial enough to reap the savings of the model. 54 of the MSSP ACOs in the study reported spending below budget benchmarks, but only 29 reported savings low enough to qualify for shared savings. 60 ACOs reported spending above their benchmark. In total, the participating ACOs reported $126 million in savings over the year (Figure 3).[38]

Table 2: Pioneer ACOs with Significant Differences in Spending Growth Relative to Their Local Markets, Per Beneficiary Per Month Differences, 2011-2012

Pioneer ACO	Local Market Spending Difference	Separate Market Spending Difference
Significantly lower growth than local market		
I040	**-$104.29*** *(95% CI, -$145.21 to -$64.32)*	**-$201.28*** *(95% CI, -$244.89 to -$158.69)*
I013	**-$94.91*** *(-151.79 to -39.71)*	-$70.32 *(-163.09 to 18.02)*
I095	**-$57.97*** *(-94.26 to -22.64)*	-$27.80 *(-70.69 to 13.72)*
I048	**-$50.57*** *(-68.70 to -32.73)*	-$19.79 (-51.10 to 10.66)
I002	**-$46.49*** *(-68.56 to -24.80)*	**-$74.48*** *(-104.63 to -45.05)*
I099	**-$45.11*** *(-67.36 to -23.20)*	$5.47 *(-19.88 to 30.36)*
I026	**-$37.60*** *(-58.34 to -17.36)*	-$12.26 *(-43.94 to 18.21)*
I029	**-$32.87*** *(-59.67 to -6.62)*	-$5.22 *(-35.56 to 24.39)*
Significantly higher growth than local market		
I063	**$34.05*** *(11.64 to 55.98)*	$24.56 *(-2.59 to 51.00)*

Source: Analysis of Medicare claims data from the Chronic Condition Warehouse Master Beneficiary Summary File

*Note: Spending is per beneficiary per month Medicare expenditures for Part A and Part B services. A negative number indicates savings resulting from lower spending growth for the Pioneer ACO relative to the comparison group. ***Bold** numbers indicate that the estimate is statistically significant. The 95 percent confidence interval (CI) is shown under the point estimate.*

Figure 3

[37] Brookings Institute. "Year One Results from Medicare Shared Savings Program: What it Means Going Forward."
[38] "Evaluation of CMMI Accountable Care Organization Initiatives ." http://innovation.cms.gov/Files/reports/PioneerACOEvalReport1.pdf (accessed July 25, 2014).

Cost reduction in health care is more complicated than the simple implementation of greater energy efficiency projects within state agencies. Yet it does show significant promise in a shared savings model incentivizing facilities to eliminate inefficiencies themselves; our model could do the same for energy efficiency projects. These studies highlight the importance of setting proper parameters, in the form of effective savings percentages and maximum or minimum reduction values, to ensure higher savings and better energy performance.[39]

Beyond the realms of health care, a shared savings model has even been employed by public school systems to eliminate any operational energy inefficiencies. Chicago public schools have employed sharing savings programs in 141 schools, a fifth of its total 675 schools. In sum, the program yielded a savings of $500,000 in fiscal year 2012. Each individual school was given the opportunity to earn a maximum of $10,000 a year in shared savings, to be applied to energy upgrades, operational needs, and other uses. The schools were required to submit a brief application to the "Energy Shared Savings program" in order to determine eligibility. If energy use were reduced by 5% or more from the prior year's baseline (a value normalized for variations such as weather), savings would be retained. Schools reaped $.04 per kW of electricity and $.10 per Therm of natural gas saved beyond the baseline.[40]

A snapshot of applications employed by the program to determine school eligibility is included in Appendix C. A simple worksheet is enough to lay the foundation for an energy savings program and gauge a school's capacity to implement energy savings projects.[41]

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[39] Ibid.
[40] Justis, Cleveland. "APPROACHES TO FINDING SAVINGS: CASE STUDY RESEARCH IN ENERGY EFFICIENCY AND SCHOOLS." APPROACHES TO FINDING SAVINGS, 2013. Accessed July 25th, 2014. http://eec.ucdavis.edu/files/03-21-2013-Approaches-to-Finding-Savings-Efficiency-in-Schools-1.pdf.
[41] Chicago Public Schools. "Energy Shared Savings: Earn Money for Your School." Accessed July 25th, 2014. http://www.cps.edu/GoGreen/documents/Energy_Shared_Savings.pdf.

Challenges

Initial Capital Funding

The model that exists currently with the EPC program lacks the need for an initial funding source since the ESCO is guaranteeing the savings. The ESCO simply submits a cash flow outlay to DGS and receives a loan from the Treasury or private sources. It is that simple because it is a loan that is guaranteed to be repaid.

Thus this proposal faces the major problem of not having a secure initial funding mechanism as EPCs do. Since the agency and not the ESCO is faced with the risk of the loan, it becomes much harder for the State to secure a loan for a project. Furthermore, any initial funding mechanism structured as a loan will weaken the incentive for this program as the agency will need to use initial savings to pay back the initial loan.

The authors of this paper do not underestimate this problem. In an ideal world, the agency would be granted the initial capital investment and would be free to immediately reinvest savings. Since no fund exists for this idea as of yet, the authors have provided past and current examples of funds that could be investigated below.

Federal Grant Programs

In 2009, Congress created the Energy Efficiency and Conservation Block Grant (EECBG) as part of the American Recovery and Reinvestment Act. This program provided $3.2 billion in block grants for use at all government levels to be invested in energy-efficiency projects.[42] In Maryland, this program provided $52.2 million in grants to the state, cities, and counties.[43] This was one of many grants administered through the Maryland Energy

[42] Energy Efficiency and Conservation Block Program. Energy.gov. http://energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program
[43] MD Distribution Maps. Energy.gov. http://www1.eere.energy.gov/wip/project_map/projects_by_state.aspx?state=MD

Administration. Though this grant is no longer current, it is a great example of what to look for in a funding source for this model. While grant funding may be difficult to obtain, they represent the best option for starting the initial funding of this program. Financing the initial investment in the form of the grant allows the model to solve the problem of redirected savings that are no longer being used to pay off the initial capital loan.

Regional Greenhouse Gas Initiative (RGGI) Funds

Maryland participates in the Regional Greenhouse Gas Initiative (RGGI)—a cap and trade program designed to limit carbon emissions. Funds are raised through this program by the sale of carbon credits. From 2009-2012, Maryland raised $197 million through the auctioning of carbon credits. Of this sum, 23% has been invested in energy efficiency programs administered by MEA through its Strategic Energy Investment Fund (SEIF).[44] The RGGI auctions provide a great stream of income that could be used to fund this shared savings program.

General Obligation Bonds

General obligation debt is issued by the Maryland Treasurer's Office. These bonds are backed by Maryland's AAA credit rating and provide the funding for capital projects throughout the state.[45] The bonds are often issued semi-annually. However, the list of capital projects in the queue for GO Bond funding is long and this may present an issue.[46] Despite this, the benefit of prioritizing capital projects through the shared savings energy efficiency program proposed is beneficial, as the initial capital investment will not be a one-time expenditure with a one-time payoff. Instead, it provides the opportunity to create a cycle of investment that will keep paying off for taxpayers.

[44] 2012 Investment Report. Regional Greenhouse Gas Initiative. http://www.rggi.org/docs/Documents/2012-Investment-Report.pdf
[45] General Obligation Bonds. Maryland Treasurer's Office. http://www.treasurer.state.md.us/debtmanagement/general-obligation-bonds.aspx
[46] Jonathan Ferguson, Office of Capital Budgeting, Department of Budget Management, notes provided to author.

State Agency Loan Program (SALP)

The Maryland Energy Administration (MEA) also offers a loan to state agencies through the State Agency Loan Program (SALP). State agencies can borrow money for energy efficiency projects and pay only a 1% administration fee.[47] As this fund is designed to support small energy projects, it is a tempting source of funds for the initial capital investment. However, since the loan is paid back by the energy savings produced by the project, it would require a restructuring of this shared savings model to allow for an initial payback period.

Energy Performance Contract Shortfalls

Finally, it is tempting to use money paid back by ESCOs for EPC shortfalls (guaranteed savings not realized) as seed money for this investment proposal. The "EPC shortfall" as designated here and throughout the paper is defined as the check that the ESCO writes to the State if the projected savings were not realized. The upside is that this option does not need to ever be paid back and would be supporting future investment in energy efficiency. The downside is that that it may create a culture that expects and supports EPC shortfalls. In reality, an EPC shortfall represents opportunities missed on previous projects and should not be encouraged. In addition, the situation is so rare it would likely be a one-time fund if used.

Measurement and Verification of Savings

Besides initial funding concerns, the M&V process could present a challenge for agencies with incomplete data in the Maryland Energy Database. The Energy Database and the Measurement and Verification process used by Energy Performance Contracting closely track energy savings in Maryland.[48] This is a unique advantage, as other states, such as the North Carolina University System, have had difficulties in tracking actual energy savings to calculate

[47] State Agency Loan Program. http://energy.maryland.gov/Govt/stateLoan.html
[48] Department of General Services. "2013 Annual Report."

retained savings. If more state agencies are motivated to do energy efficiency projects, this means more agencies undergoing the M & V process. This will help a lot of agencies reach 100% data completion, as data would need to be complete for all years agencies want to share savings. This reflects well on Maryland's ability to verify savings, and provides an opportunity for even more complete data in the Database.

Financial Risk to the Taxpayers

As with any endeavor in state government, it is important to ensure that the initiative benefits the public good and does not mismanage the taxpayers' money. While the benefits of performing energy efficiency projects are clear, the concerns of fiscal waste always need to be addressed.

In this case, the risk to the taxpayer is largely mitigated by two factors: DGS approval of the initial capital project and direct agency involvement in the work. DGS is responsible for ensuring the quality of the plan and implementation, a role that it has successfully served with respect to the large EPCs. The agency acts with the knowledge that savings will benefit them through continual reinvestment and losses will result in little future investment.

Agency Energy Planning

An additional requirement could include agencies submitting an up-to-date Agency Energy Plan, so that the Energy Office and its team of energy engineers could identify smaller energy projects. This would also have a positive effect on the number of AEPs, an internal goal within the Energy Office.

Alternatives

When considering the alternatives to the model as proposed above, policymakers should be careful to balance the concerns of the State with the intention of the model. Any reduction in savings flowing to the agency will likely reduce its desire to participate in the model. The two parameters of the model most likely to vary are the length that the agency is allowed to keep recuperating savings and the mandated allocation structure of those savings.

Length of Retention of Savings

The savings generated by an initial capital project are recuperated by the agency in the first year that it has no financial obligations related to the initial investment. That is to say, if the initial investment was paid for by a grant, the agency can recuperate the savings immediately year over year.

Eventually, the savings need to be recuperated to the general fund. The question of how many years should pass after the initial project before this occurs is difficult to answer. North Carolina has adopted a model that allows for a 15-20 year shared savings period. Limiting the benefits by an end date is one method of shifting benefits to the State as a whole. Another is limiting the agency-retained savings to a certain percentage of the initial capital investment.

The "shared savings period" cannot be unlimited. The State must eventually see the benefits of funding this program. However, the agencies must be allowed to "share" the savings they generate for a reasonably long time.

Reallocation of the Savings for Reinvestment

A lesson learned from the North Carolina legislation is that any savings used purely for discretionary spending likely will just plug holes in the agency's budget. Since this undercuts the goals of this program to inspire awareness and reduce energy consumption, no discretionary

spending should be allowed outside of energy initiatives. This does not mean that agencies cannot be creative with the money they save, only that it should go to energy efficiency.

Thus, the only way to reallocate savings would be to adjust the percentage split between physical capital projects and training and support for employees. There is no easy answer to this. The 60/40 split proposed above is taken in large part from the original NC legislation. It should be evaluated to ensure efficient use of resources as the savings is reinvested.

Conclusion

Maryland is a leading force in sustainability in the United States; the proposal of updated agency goals and integrating a shared savings model for state agency efficiency projects would complement our already progressive energy goals. The shared savings model is an effective process to aid in reaching more stringent energy reduction goals and is an incentive for many areas in the Energy Office: data completion in the State Energy Database, Agency Energy Plan completion, as well as an incentive for agencies to complete smaller energy efficiency projects on their own. This model gradually gives utility savings back to the State, first in a continuing investment in energy efficiency projects, and eventually in the form of a lower utility budget for state agencies, while benefiting state infrastructure by continually encouraging energy efficiency improvements.

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Appendices

Appendix A. Glossary of Terms

ECEs: Energy Consuming Entity. Any facility that consumes energy within an agency.

ECMs: Energy Conservation Mechanisms. Any project implemented through an EPC that saves energy. (ie, LED lights or motion sensors)

Energy Office: Within the Department of General Services, this Office oversees Energy Performance Contracts, the Energy Database, Demand Response, and other projects dealing with energy use of the state.

EPCs: Energy Performance Contracts. A Department of General Services program run to perform energy reducing projects on state owned facilities. EPCs use a Treasury loan guaranteed by the ESCO doing the job as upfront funding. This loan is paid back in installments of the energy savings realized each year due to the EPC measures. If the EPC projects do not provide the savings guaranteed by the ESCO, the ESCO must pay back the difference to the loan payment.

ESCOs: Energy Service Contractor Organization. Contracted companies the Energy Office solicits to to complete EPCs.

Measurement and Verification: A process used to confirm energy savings from energy efficiency projects; needed for small energy efficiency projects and currently used in the Energy Office to confirm savings from EPCs in Maryland.

Shared-savings period: The period beginning when the first savings is measured that is not used to pay off the initial capital investment and ending with the recuperation of the savings by the State General Fund. During this period, the Agency retains the savings for the purpose of reinvesting it in future energy initiatives.

Reinvestment Act Energy Log

General Statute 143-64.12(a)

Project Data

Project ID:			**Fiscal Year:**	
Building Number:				
Building Name:			**Total Cost:**	
Contract Date:			**Total**	
Completion Date:		Actual or		

ECM	ECM Description	Utility	Verification

Project Description:

Summary of Work:

Baseline Consumption:

Post Project Consumption:

Form Completed	
Department:	
Date:	

FY2012 Energy Conservation Measures (ECMs) for HB1292 / General Statute 143-64.12(a)

Revised: 4/2/12

						FY 2010/2011			FY 2011/2012 (Actual)			FY 2012/2013 Forecast			
Unit	**ECM/Item #**	**Building Name**	**ECM Description**	**Commencement or Contract Date**	**Completion Date**	**Actual/Projected**	**ECM or Project Cost ($)**	**ECM Savings ($)**	**Actual/Projected**	**ECM or Project Cost ($)**	**ECM Savings ($)**	**ECM Cost ($)**	**ECM Savings ($)**	**Verification Method**	**Comments/Assumptions**
BMO	11-04		HVAC Upgrade	May-11	Jun-11	Projected	$3,900	$20	Projected	$0	$230	$0	$230	Utility Meters	Project complete
UE/BMO	11-10		Building Scheduling	Jan-11	Mar-11	Projected	$1,176	$1,750	Projected	$0	$22,012	$0	$23,000	Utility Meters	Ongoing program. Actual savings up to Dec 2011; projected savings from Jan 2012 - Dec 2012.
BMO	11-13		HVAC Upgrades	Apr-11	Jun-11	Projected	$10,927	$400	Projected	$0	$1,812	$0	$1,800	Utility Meters	Project complete. Item #11-18 has been combined with item # 11-13.
BMO	11-14		ARRA Replace chiller	Aug-10	Jun-11	Projected	$164,254	$0	Projected	$0	$17,000	$0	$17,000	M&V Option B	Project complete
BMO	11-19		Replace Cooling Tower and install VFD	Feb-11	Jun-11	Projected	$25,000	$0	Projected	$0	$6,000	$0	$6,000	Utility Meters	Project complete
BMO	11-20		Replace Cooling Towers and install VFDs	Mar-11	Jun-11	Actual	$226,000	$0	Projected	$0	$104,044	$0	$100,000	Utility Meters	Actual savings from Jul 2011 - Dec 2011 was 20%; this percentage was used to project savings from Jan 2012 - Jun 2012.
BMO	11-21		Replace 10 ton air-cooled chiller	Jan-11	Mar-11	Projected	$15,000	$425	Projected	$0	$1,700	$0	$1,700	M&V Option B	Project complete
BMO	11-22		Replace Deaerator for Boiler Feedwater	Mar-11	Jun-11	Projected	$140,649	$0	Projected	$0	$7,875	$0	$7,875	Utility Meters	Project complete
UE/BMO	11-23		Intersession Setback	Sep-11	Dec-11	Actual	$1,200	$166,271	Actual	$1,200	$290,830	$0	$300,000	Utility Meters	Intersession setback during Winter Break. Normalized for campus growth, not weather.
UE	11-24		Rain Water Harvesting	Jul-10	Aug-10	Actual	$5,000	$4,371	Projected	$0	$3,100	$0	$3,000	Utility Meters	Project complete. Actual savings up to Dec 2011; projected savings from Jan 2012 - Jun 2012.
UE	11-25		ARRA Retrocommission	Aug-10	Nov-11	Projected	$21,611	$6,947	Projected	$64,832	$60,167	$0	$60,000	Utility Meters	Project complete
UE/BMO	11-26		Peak Shaving	Feb-11	Jun-12	Projected	$12,000	$135,800	Projected	$12,000	$175,000	$12,000	$175,000	Utility Meters	On-going program. Actual savings up to Dec 2011; projected savings from Jan 2012 - Jun 2012.
DCS	11-29		Fume Hood Replacement - Room 3600	Oct-10	Dec-10	Projected	$25,217	$1,000	Projected	$0	$2,000	$0	$2,000	M&V Option B	Project complete
DCS	11-30		Renovation - Convert Labs to Offices	Oct-10	Feb-11	Projected	$57,471	$1,500	Projected	$0	$3,000	$0	$3,000	Utility Meters	Project complete
DCS	11-32		Lab Renovation	Nov-10	Jan-11	Projected	$209,807	$1,500	Projected	$0	$3,000	$0	$3,000	M&V Option B	Project complete
UE	11-38		ARRA Lighting Upgrades	Aug-10	Dec-11	Projected	$249,185	$2,327	Projected	$256,453	$197,064	$0	$250,000	M&V Option A	Project complete
UE	11-39		Time of Use Progress Energy Accounts	Feb-11	Jun-12	Actual	$1,200	$278,119	Projected	$1,200	$492,000	$0	$500,000	Utility Meters	On-going program. Actual savings up to Dec 2011; projected savings from Jan 2012 - Jun 2012.
UE	11-40		Natural Gas Tariff vs. Transport Rate Negotiations	Apr-11	Jun-12	Actual	$1,200	$505,278	Actual	$1,200	$0	$0	$0	Utility Meters	On-going program. During FY 2012 money was lost as a result of an 77% increase in the marketing fee from the 3rd party natural gas markerter.
OIT	12-101		Computer Power Management	May-11	Jul-11				Projected	$1,700	$6,632	$0	$8,000	Utility Meters	On-going program that will be expaned to other computer labs on campus.
BMO	12-103		Lighting Upgrades	Jun-11	Jan-12				Projected	$14,544	$2,744	$0	$3,580	M&V Option A	Project complete
BMO	12-104		HVAC Thermostat Setback Schedule	Nov-11	Dec-11				Projected	$2,352	$83,921	$0	$143,868	Utility Meters	Project complete
BMO	12-105		Fume Hood Removal	Sep-11	Oct-11				Projected	$100	$4,500	$0	$6,000	M&V Option B	Project complete
BMO	12-106		Mechanical Equipment Upgrades	Nov-11	Jun-12	Projected	$175,391	$0	Projected	$61,000	$506	$0	$6,066	Utility Meters	Work in progress. Item 11-27 has been combined with this project.
CPM	12-107		Mechanical Equipment Upgrades	Mar-11	Mar-12				Projected	$1,300,000	$13,784	$0	$41,351	Utility Meters	Exact savings will be verified for at least a year post installation and testing of the new mechanical equipment.
BMO	12-108		Chiller Replacement	Sep-11	Dec-11				Projected	$104,000	$4,840	$0	$8,297	Utility Meters	Project complete
BMO	12-109		Air Flow Improvements	Mar-11	Sep-11				Projected	$5,000	$89,681	$0	$107,617	M&V Option B	Project complete
BMO	12-110		Mechanical Equipment Upgrades	Feb-12	Jun-12				Projected	$30,000	$0	$0	$1,863	Utility Meters	Work in progress. Savings will be claimed in FY 2013.
BMO	12-111		AHU Motor Replacement	Jan-12	Jan-12				Projected	$1,112	$702	$0	$1,404	M&V Option B	Project complete
BMO	12-112		Boiler Modifications	Aug-11	Nov-11				Projected	$121,535	$3,888	$0	$5,832	Utility Meters	Project complete
BMO	12-113		Mechanical Equipment Upgrades	Mar-11	Jun-12	Actual	$35,000	$0	Projected	$55,000	$2,100	$0	$25,731	Utility Meters	Item 11-11 has been combined with this project. Item 12-113 is a work in progress, therefore, savings for this item will be claimed FY 2013.
BMO	12-114		Mechanical Equipment Upgrades	Jun-11	Nov-11				Projected	$28,800	$3,168	$0	$5,398	M&V Option B	Project complete
UE	12-115		Utility Surplus ECMs	Mar-12	Jun-12				Projected	$490,000	$0	$0		TBD	Work in progress. Savings will be claimed in FY 2013.
UE	12-116		Ultra-Low Freezer Rebate Program	Feb-12	Jun-12				Projected	$50,000	$0	$0	$3,900	M&V Option A	Work in progress. Savings will be claimed in FY 2013.
RR	12-117		Roof Replacement	Feb-12	May-12				Actual	$194,197	$0	$0	$2,000	Utility Meters	Project complete. Savings will be claimed FY 2013.

Appendix C. Chicago Public School Energy Savings Application

CHICAGO PUBLIC SCHOOLS | CPS

CPS Environmental Action Plan
Energy Shared Savings

CHICAGO CLIMATE ACTION PLAN

REGISTRATION - complete and submit by **September 23, 2011**

Schools can earn up to $3,000 for saving energy through CPS Energy Shared Savings. *Schools must register and provide any requested follow-up documentation to be eligible for savings. To earn Energy Shared Savings, schools must use 5 percent less energy than their three-year average and have a Recycling Score of 80 or above. Schools earn $0.02 kWh and $0.10 for each therm saved, which could mean $250 to $3,000. For more information about Energy Shared Savings, visit www.cps.edu/gogreen, select "Energy" then "Energy Shared Savings."*

School Name: _____ Address: _____

Energy Savings Manager: _____ Email: _____
(coordinating staff leader) Phone: _____

Student Leaders: _____
(e.g. student council, Room 204, science club, etc.)

What is your school's current Energy Star Score? _____
(go to www.cps.edu/gogreen, select "School Environmental Scorecard")

List three specific actions your school will take to save energy.
(look to the CPS Energy Policy and Smart Power Planning worksheets for ideas)

-
-
-

Briefly describe how school leadership will communicate and engage staff and students:

How does the school plan to spend Energy Shared Savings earned?
(In 2010-2011, Energy Shared Savings ranged from $250-$3,000. Money will be awarded in May 2012)

Principal's signature: _____ Engineer's signature: _____

Please email this form to energy@cps.k12.il.us, fax it to (773)553-3110, or send via mail run to GSR 125, 17th Floor, Attn: Steve Clark

3

Discuss each energy saving practice below. Determine your school's level of participation and whether the practice will be further implemented.

Lighting	Not Doing This At All	Need Major Improvement	Need Minor Improvement	Doing This Very Well
Lights are turned off on nights and weekends				
"Lights off" signs are placed in rooms to remind staff and students				
Daylight is used to light classrooms and other areas, and lights are turned off when daylight is sufficient				
Lights are turned off in unoccupied areas of the building. Gym lights are only on when gym is in use.				
All exterior lighting is turned off during the day				
Light fixtures and lenses are clean to allow maximum light output (Dirt and dust can reduce your lamp output by as much as 20% with in a year)				
Incandescent light bulbs are changed out to compact fluorescents where possible				
High efficiency lamps and ballasts (T-8 lamps, electronic ballast) have replaced old inefficient lamps (T-12 lamps)				

Based on your answers above, list three specific actions your school will take to save energy used for lighting.

-
-
-

5

Appendix D: St. Mary's Vending Miser Project Savings Calculations

St. Mary's Vending Miser Savings Calculations

Input Variables	
Energy Costs ($0.000 per kwh)	$ 0.100
Facility Occupied Hours per Week	60
Number of Cold Drink Vending Machines	24
Number of Uncooled Snack Machines	15
Power Requirements of Cold Drink Machine (avg watts)	427
Power Requirements of Snack Machine (avg watts)	90
VendingMiser Sale Price (for cold drink machines)	79
SnackMiser Sale Price (for snack machines)	49

Typical Office or School in Missouri
1 VendMisers $179 less $100 incentive
1 SnackMiser $79 less $30 incentive

Savings Analysis

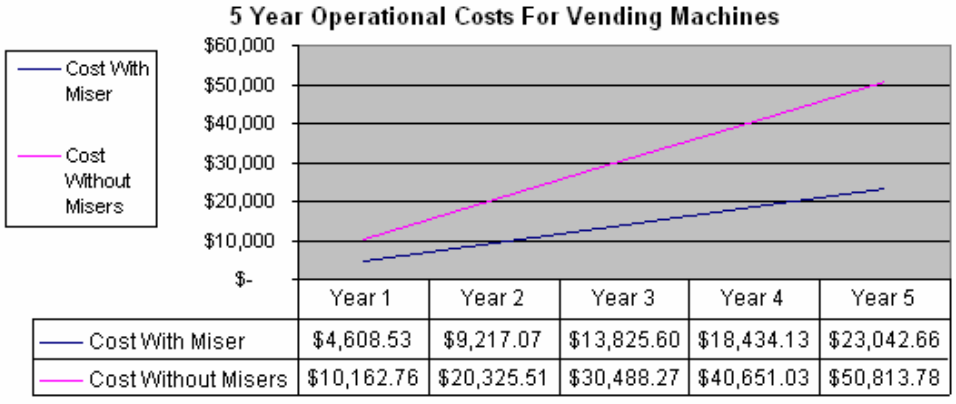
	Before	After	
Cold Drink Machines	$ 8,983.40	$ 4,187.33	**Cost of Operation**
	89833.968	41873.328	**kWh**
		53%	**% Energy Savings**
Snack Machines	$ 1,179.36	$ 421.20	**Cost of Operation**
	11793.6	4212	**kWh**
		64%	**% Energy Savings**

Project Summary

Present kWh	Projected kWh	kWh Savings per Year
101628	46085	55542

Present Cost	Projected Costs	Annual Savings	Per Cent Savings	Total Project Cost
$ 10,162.76	$ 4,608.53	$ 5,554.22	55%	$ 2,631.00

Break Even (Months)		Five Year Savings on 39 Machines =	$ 27,771.12
5.7		Five Year Return on Investment =	956%



	Year 1	Year 2	Year 3	Year 4	Year 5
Cost With Miser	$4,608.53	$9,217.07	$13,825.60	$18,434.13	$23,042.66
Cost Without Misers	$10,162.76	$20,325.51	$30,488.27	$40,651.03	$50,813.78