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Department of Energy and Environment

Verification of the District of Columbia Sustainable Energy Utility

FY14 Annual Evaluation Report for the Performance Benchmarks

Final Draft

September 30, 2015

DEPARTMENT OF ENERGY & ENVIRONMENT

DC SUSTAINABLE ENERGY UTILITY

Your Guide to Green

leidos

BAUMANN CONSULTING

Formerly Ebert & Baumann Consulting Engineers

GDS Associates, Inc.

Engineers and Consultants

Department of Energy and Environment

Verification of the District of Columbia Sustainable Energy Utility

FY14 Annual Evaluation Report for the Performance Benchmarks—Final Draft

September 30, 2015

Tetra Tech
6410 Enterprise Lane, Suite 300 | Madison, WI 53719
Tel 608.316.3700 | Fax 608.661.5181
www.tetratech.com

TABLE OF CONTENTS

List of Tables

List of Figures

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The table below displays the role of each evaluation team member and report content contributor.

Tetra Tech	Teri Lutz	Project Manager, Performance Benchmark Assessments
	Lisa Stefanik	Performance Benchmark 'Improve Efficiency of Low-Income Housing" Evaluation Lead
	Kimberly Bakalars	C&I Process Evaluation Lead
	Kim Baslock	Low-Income Impact Evaluation Lead
	Dan Belknap	Retail Products Impact Evaluation Lead, Sampling Lead, NTG Advisor, Technical Reference Manual Review Lead
	Theresa Holmes	Retail Products–Food Banks and Multifamily Process Evaluation Lead
	Scott Wagner	Retail Products-Appliance & Lighting, HPwES, FHLB and Solar Initiatives Process lead; and, NTG lead for all initiatives
Leidos	Kendra Scott	C&I Impact Evaluation Lead
GDS Associates	Tim Clark	Residential and Solar Impact Evaluation Lead
Baumann Consulting	Jonathan Lemmond	Impact Evaluation–Onsite Verification Lead

ACRONYMS

ACEEE	American Council for an Energy-Efficient Economy
AESC	Avoided Energy Supply Component
AMI	Advanced Metering Infrastructure
Btu	British thermal unit
C&I	Commercial and institutional
CA SPM	California Standard Practice Manual
CAEA	Clean and Affordable Energy Act of 2008
CAT	Custom Application Tool
ccf	100 cubic feet
CPUC	California Public Utility Commission
DCSEU	District of Columbia Sustainable Energy Utility
DDOE	District Department of the Environment
DOEE	Department of Energy and Environment
DI	Direct install
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, measurement, and verification
ESCO	Energy Service Company
FERC	Federal Energy Regulatory Commission
FHLB	Federal Home Loan Bank
FTE	Full time equivalent
FY	Fiscal year
GHG	Greenhouse Gas
GSF	Gross Square Feet
ICDI	Implementation contractor direct install
KITT	Knowledge Information Transfer Tool
kW	Kilowatt
kWh	Kilowatt hour
LI	Low-income
LIMF	Low-income Multifamily
LPG	Liquefied petroleum gas
MW	Megawatt
M&V	Measurement and verification
mcf	1,000 cubic feet
MF	Multifamily
MMBtu	1 million Btu
NAPEE	National Action Plan for Energy Efficiency

NTG	Net-to-gross
O&M	Operation and maintenance
PAC	Program administrator cost
PCT	Participant Cost Test
PJM	Pennsylvania New Jersey Maryland
PV	Photovoltaic
RIM	Rate Impact Measure
RPM	Reliability Pricing Model
SCT	Societal cost test
SqFt	Square Foot
SETF	Sustainable Energy Trust Fund
SEU	Sustainable Energy Utility
SEUAB	Sustainable Energy Utility Advisory Board
SREC	Solar renewable energy certificate
T&D	Transmission and distribution
TRM	Technical reference manual
TRC	Total Resource Cost
Tt	Tetra Tech
VEIC	Vermont Energy Investment Corporation

1. EXECUTIVE SUMMARY

The Department of Energy and Environment (DOEE) has contracted with Tetra Tech (as the prime contractor), GDS Associates, Inc., Leidos, and Baumann Consulting to provide evaluation, measurement, and verification (EM&V) of the portfolio of energy efficiency and renewable energy programs, or initiatives, offered in the District of Columbia (DC), along with six performance benchmarks[1] associated with these initiatives. The initiatives are implemented through the DC Sustainable Energy Utility (SEU, or DCSEU) partnership.

The Clean and Affordable Energy Act of 2008 (CAEA) requires the Mayor, through DOEE, to contract with a private entity to conduct sustainable energy programs on behalf of the District of Columbia. The CAEA authorizes the creation of a Sustainable Energy Utility (SEU) and designates the SEU to be the one-stop resource for energy efficiency and renewable energy services for District residents and businesses.

The DCSEU is led by the Sustainable Energy Partnership and under contract to the Department of Energy and Environment. The Sustainable Energy Partnership includes the following organizations:

- Vermont Energy Investment Corporation (VEIC) - Partnership Lead
- George L. Nichols & Associates
- Groundswell
- Institute for Market Transformation
- L. S. Caldwell and Associates, Inc.
- Nextility
- PEER Consultants
- PES Group / Stateline Energy Associates
- Taurus Development Group.

The SEU Advisory Board provides monitoring of the DCSEU and advice to DOEE and the Council of the District of Columbia according to the *Bylaws of the Sustainable Energy Utility Advisory Board ("Board") adopted pursuant to Section 204(b) of the Clean and Affordable Energy Act ("Act")*[2], Article 1, Section 1.2.

> *"In accordance with the Clean and Affordable Energy Act of 2008, D.C. Official Code § 8-1774.03, the Board shall: (a) Provide advice, comments, and recommendations to the Department of Energy and Environment ("DOEE") and Council of the District of Columbia ("Council") regarding the procurement and administration of the Sustainable*

[1] DOEE verified the "Increase the number of green-collar jobs in the District of Columbia" performance benchmark reported results.
[2] SEU Advisory Board Bylaws, http://green.dc.gov/page/seu-advisory-board-bylaws.

Energy Utility (hereinafter referred to as the "SEU") contract described in sections 201 and 202 of the Act; (b) Advise the DOEE on the performance of the SEU under the SEU contract; and, (c) Monitor the performance of the SEU under the SEU contract. Section 203(a) of the Act."

The DCSEU began implementing energy efficiency and renewable energy programs in FY11.

This report summarizes the evaluation and verification of the six performance benchmarks included within DOEE contract with the DCSEU for fiscal year 2014 (FY14). The fiscal year is defined as October 1st through September 30th.

The six performance benchmarks, in summary, include:

1. Reduce per-capita energy consumption in the District of Columbia
   1a. Reduce per-capita energy consumption - electricity (MWh)
   1b. Reduce per-capita energy consumption - natural gas (mcf)
2. Increase renewable energy generating capacity in the District of Columbia
3. Reduce the growth of peak demand in the District of Columbia
4. Improve the energy efficiency of low-income housing in the District of Columbia
5. Reduce the growth of the energy demand of the District of Columbia's largest energy users
6. Increase the number of green-collar jobs in the District of Columbia.

1.1 PERFORMANCE BENCHMARK ASSESSMENT RESULTS

In FY14, the DCSEU continued to make progress on performance benchmark achievement, with five of the six benchmarks achieved at either the highest level or minimum threshold. The DCSEU exceeded the minimum performance benchmark targets for electric and natural gas savings for the first time. In summary, the DCSEU fully achieved and exceeded two performance benchmarks and achieved the minimum targets for three other performance benchmarks. Performance Benchmark 2, "Reducing the acquisition cost of renewable energy initiatives" was the only benchmark to miss all targets for compensation.

In addition to these achievements, the DCSEU continued to deliver a cost effective portfolio, with a benefit to cost ratio of 4.51 for the fully-loaded cost scenario under the Societal Benefit Test.[3]

The results of the evaluation team's verification of the six performance benchmarks are summarized below and in Table 1-1.

[3] Includes the cost of the third-party independent evaluation as well as the effect of the realization rates determined through the evaluation effort and estimated free-ridership and spillover (net-to-gross estimates).

Maximum Performance Benchmark targets achieved or exceeded

4. **Improve energy efficiency in low-income housing: 30 percent spend ($).** The DCSEU reached 117 percent of high performance benchmark target.

5. **Reduce growth in energy demand of largest users: number of projects completed with a square footage > 200,000.** The DCSEU reached 134 percent of this high performance benchmark target.

Minimum Performance Benchmark targets achieved or exceeded

1a. Reduce per-capita energy consumption - electricity (MWh). The DCSEU achieved 115% percent of the minimum performance benchmark threshold and achieved 58 percent of the h9igh performance benchmark target.

1b. Reduce per-capita energy consumption – natural gas (mcf). The DCSEU achieved 222% percent of the minimum performance benchmark threshold and achieved 50 percent of the high performance benchmark target.

3. **Reduce growth in peak demand (kW).** The DCSEU exceeded this minimum benchmark by more than 396 percent.

6. **Increase number of green-collar jobs: green-job hours directly worked by District residents (FTE).** DOEE verified that the DCSEU achieved 121 percent of the minimum benchmark threshold and exceeded the 85 percent threshold by achieving 96 percent of the high performance benchmark.

Performance Benchmark targets not achieved

2. **Increase renewable energy generating capacity: Cost per MMBtu reduction from prior year (%).** The DCSEU costs per MMBtu increased by 20 percent compared to the prior year, FY13.

Table 1-1. FY14 DCSEU Performance Benchmarks Verification Summary

Item	Benchmark	Maximum Performance Target	Minimum Performance Target[4]	FY14 Reported[5]	FY14 Verified	Maximum Performance Target Achievement %	Minimum Performance Target Achievement %
1a	Reduce per-capita energy consumption – electricity, MWh	103,690	51,845	60,778	59,659	58%	115%
1b	Reduce per-capita energy consumption - natural gas, mcf	273,428	61,521	134,586	136,291	50%	222%
2	Increase renewable energy generating capacity: Cost per MMBtu reduction from prior year, %	20%	10%	8% cost reduction	20% cost increase	0%	0%
3	Reduce growth in peak demand, kW	20,000	2,000	8,620	7,912	40%	396%
4	Improve energy efficiency in low-income housing: 30% spend, $	$5,280,000	$3,520,000	$6,168,206	$6,168,206	117%	175%
5	Reduce growth in energy demand of largest users: number of projects completed with a square footage > 200,000	50	30	77	67	134%	223%
6	Increase number of green-collar jobs: green-job hours directly worked by District residents, FTEs	88	53	82	85 (DOEE verified)	96%	121%

[4] Source: DCSEU FY14 Annual Report, Table 1, page 37; verified with Contract Number DDOE-2010-SEU-0001, Contract Modification M07.
[5] ibid. The MWh and mcf values differ from the final DCSEU FY14 results tracking and reporting database (KITT) extract as the DCSEU FY14 Annual Report was completed prior to finalizing the savings values in the DCSEU FY14 results tracking and reporting database.

2. Reduce Per-Capita Energy Consumption in the District of Columbia (CAEA §201(D)(1))

2.1 DESCRIPTION

The DCSEU is charged with reducing energy consumption in the District of Columbia for both electric and natural gas. For FY14, the maximum performance target was set as 0.85% of the total 2009 electricity and natural gas use. The minimum performance target was set as 50% of the maximum performance target for electricity savings, and 22.5% of the maximum performance target for natural gas savings. Per DCSEU contract, modification 7:[6]

"Beginning in option year 3 of the SEU contract, the Contractor shall develop and implement renewable energy and energy efficiency programs for electricity and natural gas users that directly lead to an annual reduction equivalent to 0.85% of the weather-normalized total electricity consumption in the District for 2009 and an annual reduction equivalent to 0.85% of the weather-normalized natural gas consumption in the District for 2009.[7]

If the SEU implements energy efficiency programs that cause customers to switch how equipment or and application is powered (i.e., from electricity to natural gas or from natural gas to electricity), any increase in the kWh or therms as a result of the switch would be counted as 'negative savings' towards the relevant benchmark. For example, if an energy efficiency program causes a consumer to replace an electric heat pump with a natural gas furnace, then the increase in the consumption of therms as a result of the switch to using natural gas for space heating would be counted as negative savings toward the therm savings benchmark while the reduction in kWh from the no longer using electricity for space heating would be counted as 'positive savings' toward the kWh savings benchmark. Similarly, if an energy efficiency program causes a consumer to replace natural gas furnace with a heat pump, then the increase in the consumption of kWh as a result of the switch to electricity for space heating would be counted as negative savings toward the kWh savings benchmark while the reduction in therms from the no longer using natural gas for space heating would be counted as positive savings toward the therms savings benchmark.

For any SEU energy efficiency program that causes customers to switch how equipment or an application is powered (i.e., from electricity to natural gas or from natural gas to electricity), kWh and therms savings shall be converted to BTUs, in accordance with the total fuel cycle methodology used by the U.S. Department Environmental Information Agency data for the District of Columbia, for the purpose of calculating the Societal Benefit Test.

The SEU shall use gross verified natural gas savings as the claimed savings towards the annual reduction in weather-normalized total natural gas consumption in the District for 2009. Energy and demand savings measure the amount of energy and demand saved as a result of

[6] Contract Number DDOE-2010-SEU-0001, Amendment /Modification No. M07

[7] For FY14, the electricity and natural gas savings targets were adjusted from 1.0 percent to 0.85 percent of the weather-normalized total electricity consumption in the District for 2009 and an annual reduction equivalent to 0.85 percent of the weather-normalized natural gas consumption in the District for 2009

the SEU programs without the inclusion of the facility heating and cooling interactive effects whether they are gas or electric."

2.2 EVALUATION AND VERIFICATION APPROACH

The independent evaluation team verified the impacts on electric and gas usage from the installation of measures by track and for the portfolio as a whole as described in the *Department of Energy and Environment Energy Efficiency Evaluation Plans for Portfolio of Programs Offered in the District of Columbia.* Verified results for each program and in total are reported in the *Department of Energy and Environment Evaluation, Measurement, and Verification of Energy Efficiency and Renewable Energy Programs in the District of Columbia FY14 Annual Evaluation Report, Volume I*.

2.3 VERIFICATION RESULT

The evaluation team's verified, or ex-post, results of the KITT reported electric savings, demand reduction, and natural gas savings for each track, or initiative, and for the overall portfolio are presented in Table 2-1. These verified results reflect portfolio level realization rate estimates of 0.98, 0.92, and 1.00 for kWh, kW, and MMBtu, respectively. This means that the evaluation team estimates that the actual portfolio electric savings result is 98 percent of the DCSEU reported electric savings, the demand reduction result is 92 percent of the DCSEU reported demand reduction, and the actual portfolio gas savings result is 100 percent of the DCSEU reported gas savings. This compares to realization rate estimates at the portfolio level of 1.04, 1.07, and 1.00 for kWh, kW, and MMBtu, respectively for the FY13 results and 0.92, 0.95, and 0.99 for kWh, kW, and MMBtu, respectively for the FY12 results.

Realization rates are the ratio of verified savings to the tracking system savings for a representative sample of projects reported with each track. Realization rates are typically calculated for each end-use category and then applied to the total end-use tracking system savings for a particular program, or track. The results are rolled up to develop program, or track, verified savings. The verified savings for all tracks are summed to obtain portfolio level verified savings.

These realization rate estimates are quite good—especially for programs in their third year of implementation. As a comparison, the Pennsylvania Act 129 Statewide Evaluator Annual Report for Plan Year 4,[8] summarized realization rates for electric savings for the Pennsylvania utilities in the range of 85 to 97 percent, at the portfolio level; in PY5, Pennsylvania utilities' realization rates ranged from 96 to 117 percent.[9] The EmPOWER Maryland 2012 statewide verified results are reported in the *Verification of Reported Impacts from 2012 EmPOWER Maryland Energy Efficiency Programs*[10] as 100.1 and 115.1 percent of reported values for electric savings and demand reduction, respectively. In 2013, evaluated results as reported in the *Verification of Reported Impacts from 2013 EmPOWER Maryland Energy Efficiency Programs* were 92.7 percent and 100.2 percent of reported savings for kWh

[8] http://www.puc.pa.gov/pcdocs/1274547.pdf
[9] http://www.puc.pa.gov/Electric/pdf/Act129/SWE_PY5-Final_Annual_Report.pdf
[10] http://neep.org/Assets/uploads/files/emv/emv-library/MDPSC_2012_Verification_Report_Compiled.pdf

and kW, respectively.[11] Utilities ranged from 88.2 percent to 98.7 percent for kWh and 92.1 percent and 115.5 percent for kW. Pennsylvania and Maryland make for good comparisons because they have similar geographical location, availability of information, and similar implementation periods since inception. Please see Table 2-1 for a summary of these realization rate comparisons.

Table 2-1. Realization Rate Comparison Summary

Metric	DCSEU			PA Range		Maryland Statewide	
	FY12	FY13	FY14	2012	2013	2012	2013
kWh	0.92	1.04	0.98	0.85 to 0.97	0.96 to 1.17	1.001	0.927
kW	0.95	1.07	0.92	na	na	1.151	1.002
MMBtu	0.99	1.00	1.00	na	na	na	na

As for the FY12 and FY13 results evaluation, these realization rates indicate that, overall, the tracking of the measures installed through the initiatives and the calculation of electric savings, demand reduction, and gas savings is accurate. Although there are issues within individual initiatives as discussed in each track section, the adjustments to correct for over-reporting and under-reporting balance out across the portfolio. Tracking and calculation differences between claimed and verified results are common.

The reported and verified electric savings (kWh) and demand reduction (kW) results are adjusted for line losses (8 percent and 6 percent increases, respectively) to express savings at the electric generator rather than at the customer meter.

$$\textit{Non-solar electric savings at generator} = 1.08 * kWh_{KITT/verified}$$

$$\textit{Non-solar demand savings at generator} = 1.06 * kW_{KITT/verified}$$

In addition, the savings and demand for the renewable energy tracks are increased by an additional 15 percent to account for assumed spillover[12]. For the Solar PV tracks (7710SHOT and 7707PV), therefore, the total savings are multiplied by 1.242 (1.08*1.15) and demand is multiplied by 1.219 (1.06*1.15).

$$\textit{Solar electric savings at generator} = 1.08 * 1.15 * kWh_{KITT/verified}$$

$$\textit{Solar demand savings at generator} = 1.06 * 1.15 * kW_{KITT/verified}$$

The gas savings results are converted from MMBtu as reported in KITT to mcf according to the following equation:

$$\textit{one mcf} = 1.028^{13} * MMBtu$$

[11] http://www.neep.org/sites/default/files/resources/9153-57-Itron2013VerificationReport-081314%20%282%29.pdf

[12] Reference DCSEU memorandum to DDOE and Tetra Tech, *Screening assumptions for the DCSEU solar renewable energy program portfolio*, dated August 30, 2012.

[13] The 1.02 conversion factor is slightly conservative compared to the conversion factor of 1.028 established by the U.S. Energy Information Administration last updated March 30, 2015; see http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8.

The DCSEU achieved both the electric savings minimum performance benchmark and the natural gas savings minimum performance benchmark for FY14. This is the first year in which the DCSEU portfolio has made both the electric and natural gas Minimum Targets. The maximum performance target has not yet been achieved for either energy metric.

Table 2-2. FY14 Per Capita Energy Consumption Results Summary

Metric	Maximum Performance Target	Minimum Performance Target	FY14 Reported	FY14 Verified	Maximum Performance Target Achievement	Minimum Performance Target Achievement
Electric (MWh)	103,690	51,845	60,778	59,659	No (58%)	Yes (115%)
Natural gas (mcf)	273,428	61,521	134,586	136,291	No (50%)	Yes (222%)

2.4 PERFORMANCE BENCHMARK ASSESSMENT

2.4.1 Background

In its third full year of portfolio implementation,[14] the DCSEU was able to achieve the minimum performance benchmark for electric and natural gas savings. For FY14, the electricity and natural gas savings targets were adjusted from 1.0 percent to 0.85 percent of the weather-normalized total electricity consumption in the District for 2009 and an annual reduction equivalent to 0.85 percent of the weather-normalized natural gas consumption in the District for 2009. This change holds the electric savings minimum target at the FY13 level and reduces the natural gas minimum target by 55 percent, while the DCSEU budget increased by 18 percent.

Table 2-3. Per Capita Energy Consumption Minimum Performance Target Comparison: FY12, FY13, FY14, and FY15

Metric	FY12 Minimum Target	FY13 Minimum Target	FY14 Minimum Target	FY15 Minimum Target	FY12 to FY13 % Change Target	FY13 to FY14 % Change Target	FY14 to FY15 % Change Target
Electric, MWh	45,746	51,845	51,845	51,845	13%	0%	0%
Natural Gas, mcf	120,630	136,714	61,521	61,521	13%	-55%	0%
Budget, $000	$13,836	$15,400	$18,130	$17,600[15]	11%	18%	-3%

The FY14 verified electric savings increased by 14 percent over FY13 results and natural gas savings increased by 169 percent over FY13 results. The increase in the gas savings was driven primarily by gas measures installed through custom projects including the low-income comprehensive initiatives.

[14] The DCSEU offered quick start programs in FY11.
[15] DCSEU FY2015 Annual Plan, Table 2, page 16.

Table 2-4. Per Capita Energy Consumption Verified Comparison: FY12, FY13, and FY14

Metric	FY12 Verified	FY13 Verified	FY14 Verified	FY12 to FY13 % Change Verified	FY13 to FY14 % Change Verified
Electric, MWh	21,448	52,303	59,659	144%	14%
Natural gas, mcf	-11,284	50,608	136,291	-	169%

2.4.2 Assessment

A. Acquisition Cost Comparisons

The acquisition cost discussion is intended to provide DOEE with analysis to inform future budget and target setting. Acquisition cost comparisons between jurisdictions and similar, or differing, implementation models are meaningful as there is no need to distinguish how various costs are categorized since the cost is the sum of direct, indirect, and incentive expenditures associated with acquiring these energy efficiency resources. This includes all costs associated with designing, administering and implementing, tracking, reporting, and evaluating energy efficiency portfolios. As with many metric comparisons, though, this is not perfect. The high-level acquisition cost does not provide insight into differences in cost drivers such as portfolio maturity or jurisdictional specific requirements, markets served, and constraints in acquiring energy efficiency resources.

These caveats are noteworthy given the DCSEU contractual obligations likely increase the cost of acquiring energy efficiency resources for the District. A cost study was conducted in FY13 to compare DCSEU acquisition costs to other jurisdictions across the United States and to attempt quantification of the contractual obligations. Although data was not sufficient to provide quantification, the acquisition cost benchmarks indicate that the DCSEU is performing in line with other program administrators, municipal and cooperative utilities.

i. Acquisition cost: $ per MWh, excluding renewable energy

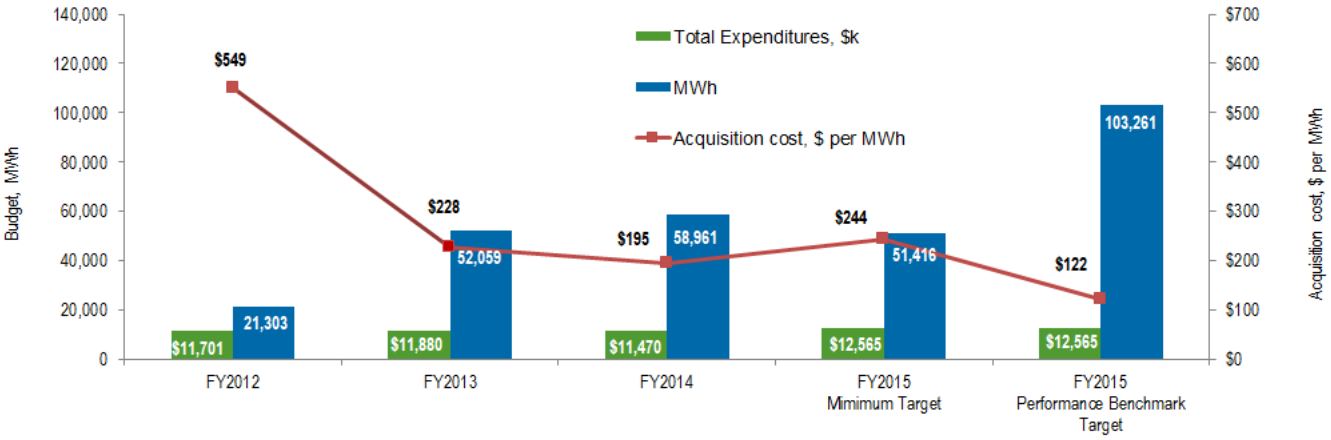
The DCSEU Portfolio of Energy Efficiency electric track offerings reported MWh savings gained 14 percent of over the FY13 implementation period, while electric spending decreased by 3 percent[16] in absolute terms.

The first-year acquisition cost, or MWh achieved (based on verified savings adjusted for line losses) per dollar spent excluding renewable energy tracks, was $195 in FY14 compared to $228 in FY13—a 15 percent decrease.[17] To achieve the performance benchmark for FY15 within the FY15 budget allocated, the acquisition cost must be $122 per MWh and to achieve the minimum target, it must be $244. This suggests that the DCSEU is on track to achieve the minimum target and make significant strides toward the high Performance Benchmark for FY15.This assessment, however, is caveated with the following discussion that suggests acquisition costs begin to rise as portfolios mature.

[16] Although the FY14 budget increased by 15 percent over FY13, the DCSEU allocated more funding to natural gas and renewable energy measures in FY14.
[17] Excludes renewable energy expenditures and associated energy savings.

Figure 2-1 illustrates the DCSEU annual expenditures for FY12 through FY14 and the budget for FY15 compared to the savings achieved in FY12 through FY14, and the targets for FY15.[18] Acquisition costs per MWh have steadily declined (based on reported non-renewable electric savings adjusted for line losses), year over year.

Figure 2-1. Total Electric Savings: FY12 and FY13 Actual (A), FY14 Budget (B) at Generator Level

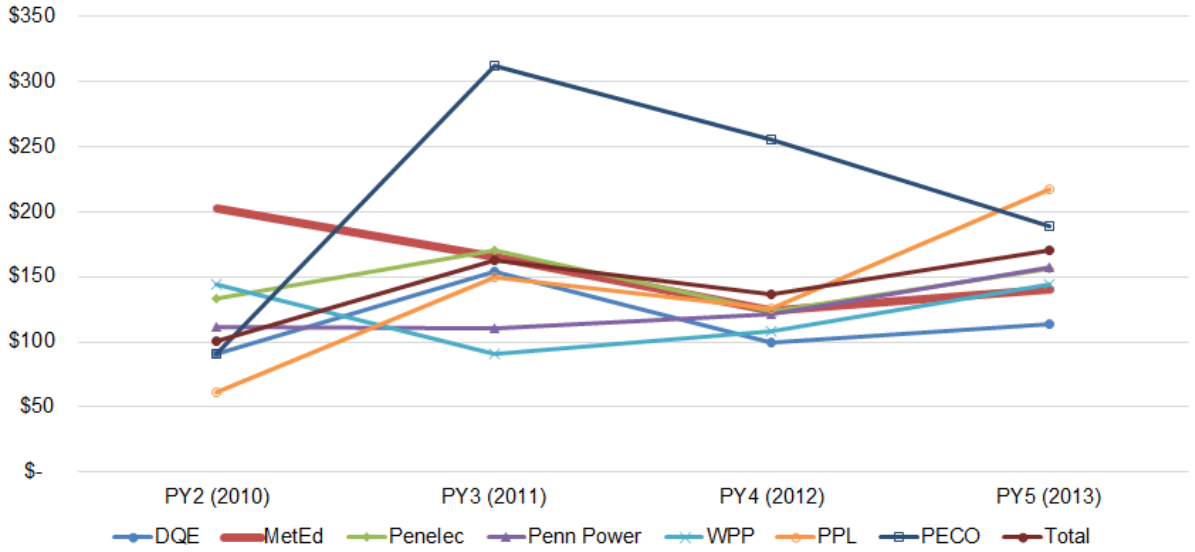


As a comparison, the Pennsylvania utilities under PA Act 129 have demonstrated variable acquisition costs over time as illustrated in the figure below. Phase I of PA Act 129 required each of the seven major Electric Distribution Companies (EDCs) to reduce energy and consumption and peak demand by 1 percent by May 31, 2011. It required a 3 percent and 4.5 percent reduction in energy and peak demand by May 31, 2013. Reduction targets are cumulative.[19] In Phase II, individual EDC cumulative reduction targets for energy consumption were based on the statewide potential study and ranged from 1.6 to 2.9 percent for the three-year implementation period (demand reduction not applicable in Phase II, but proposed again for Phase III). In addition, Act 129 sets a spending cap of 2 percent of 2006 annual revenues for annual program spending and sets “carve-out” savings targets for government, non-profit, schools, and institutions and low-income sectors. Failure to meet compliance targets can result in up to $20 million in penalties.

In initial years, the acquisition costs generally declined for each PA utility, but in plan year (PY) 5 costs are rising as shown in Figure 2-2. This might be due to a couple of factors: less expensive resource acquisition opportunities are diminishing and there are increasing efficiency codes and standards, such as EISA impacts for lighting efficiency standards. The average PY5 acquisition cost per MWh was $170 and ranged from $113 per MWh to $217 per MWh. In Maryland, acquisition costs averaged $206 per MWh and ranged from $144 to $286 per MWh for 2013. The DCSEU FY14 acquisition cost of $195 per MWh compares favorably to these Pennsylvania and Maryland benchmarks.

[18] Actual costs and budget exclude third-party evaluation costs.
[19] All PA Act 129 filings and proceedings are found here: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/energy_efficiency_and_conservation_ee_c_program.aspx

Figure 2-2. Pennsylvania Electric Utilities Energy Resource Acquisition Cost, $ per MWh (PY2 through PY5)[20]



A report completed by ACEEE titled, *An Empirical Model for Predicting Electric Energy Efficiency Resource Acquisition Costs in North America: Analysis and Application*[21] in 2012 provides analysis regarding savings over time and suggests that acquisition costs should decline over the first five to six years of implementation as savings targets increase and then begin to rise as acquisition costs increase with portfolio maturity. A more recent ACEEE report, The *Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs*[22] provides a summary of four-year averages (2009-2012) for dollars per MWh ranging from $130 to $420 with an average of $230 per MWh.

Pennsylvania may be an indication that the acquisition cost increase as portfolios mature is accelerating; that is, costs to acquire energy efficiency savings begins to increase sooner that what prior research and experience indicates.

ii. Acquisition cost: $ per MMBtu, excluding renewable energy

The FY14 non-renewable savings for energy efficient natural gas measures increased by 195 percent while the expenditures increased by 49 percent.[23] The first-year acquisition cost, or dollars spent per MMBtu saved, decreased by 50 percent. Based on the FY14 budget allocations to electric and gas savings initiatives, the acquisition cost must decrease to $14 per MMBtu to achieve the performance benchmark for FY14 within the FY14 budget; to

[20] Source: PA Public Utility Commission Statewide Evaluator Annul PY reports, http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/act_129_statewide_evaluator_swe_.aspx

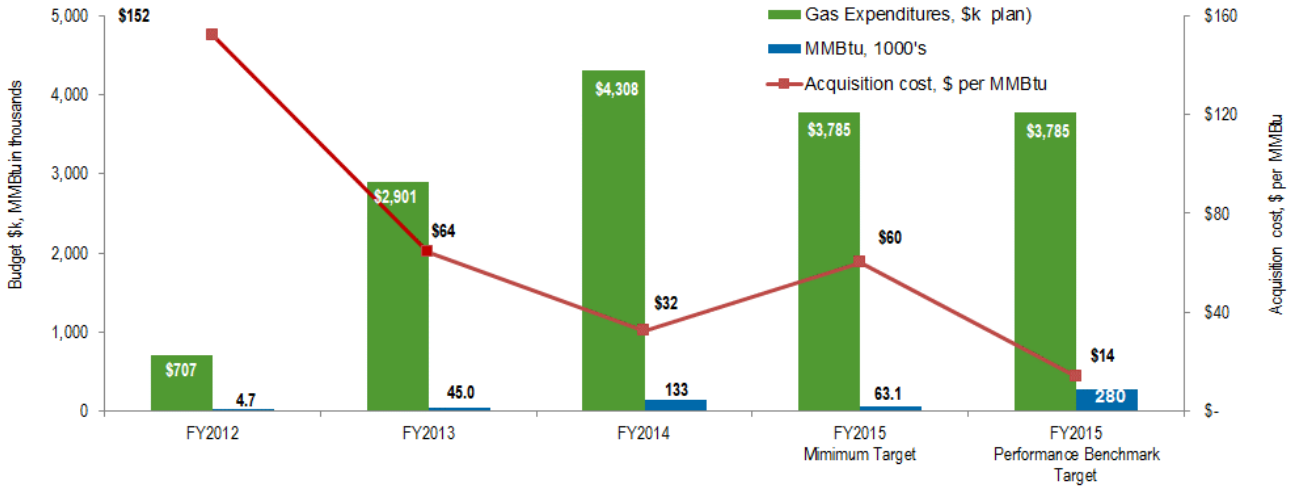
[21] *An Empirical Model for Predicting Electric Energy Efficiency Resource Acquisition Costs in North America: Analysis and Application,* John Plunkett, Theodore Love, and Francis Wyatt, Green Energy Economics Group, Inc., Summer 2012. http://www.aceee.org/files/proceedings/2012/data/papers/0193-000170.pdf.

[22] Maggie Molina, Report Number U1402, March 2014, http://aceee.org/research-report/u1402.

[23] Excludes renewable energy expenditures and associated MMBtu energy savings.

achieve the minimum target, it must be about $60 per MMBtu. An ACEEE report, The *Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs*[24] provides a summary of four-year averages (2009-2012) for dollars per MMBtu ranging from $19 to $59 with an average of $37 per MMBtu. The DCSEU FY14 acquisition cost of $32 per MMBtu compares favorably to these benchmarks.

Figure 2-3. Total Gas Savings: FY12 and FY13 Actual (A), FY14 Budget (B) [25]



2.4.3 Conclusion

The DCSEU has driven down acquisition costs for both MMBtu and MWh over the past 3 years of implementation. The FY14 acquisition cost per MWh is less than half the FY12 cost and the acquisition cost per MMBtu is less than a quarter of the FY12 cost. Data from other states suggests that a continued decrease in acquisition costs may become more difficult. Therefore, the DCSEU might warrant additional funding in order to achieve performance benchmark targets, or conversely, the targets may require further review. Based on the DCSEU FY14 acquisition costs for $195 per MWh and $32 per MMBtu, a budget of about $29 million would have been required to achieve the FY14 high Performance Benchmarks- approximately $20 million for electricity and $9 million for natural gas.

The District potential study completed in 2013 should provide key data and information for informing meaningful targets and should the District conduct a baseline study, this data in conjunction with the DCSEU portfolio savings data to date can be used to update and calibrate the potential study.

[24] Maggie Molina, Report Number U1402, March 2014, http://aceee.org/research-report/u1402.
[25] Gross MMBtu savings excludes penalties, source DCSEU FY12 and FY13 Annual reports.

3. INCREASE RENEWABLE ENERGY GENERATING CAPACITY IN THE DISTRICT OF COLUMBIA (CAEA §201(D)(2))

3.1 DESCRIPTION

The Contractor shall design and implement a cost-effective renewable energy program(s) for installations of renewable energy within the borders of the District. Beginning in Year 3 of the SEU contract, the Contractor shall receive 50% of the compensation at risk allocated for this benchmark for a 10% decrease in $/kWh of the first year of energy production of renewable energy installations incentivized by the renewable energy program(s), compared to the $/kWh for the previous year (energy production from non-electricity producing renewable energy calculations shall be converted to kWh).”[26]

3.2 EVALUATION AND VERIFICATION APPROACH

In FY14, the DCSEU offered two renewable energy measures: photovoltaic (PV) rooftop panels and solar thermal hot water systems. The rooftop photovoltaic track (7107PV) primarily targets low-income single-family housing, but is not exclusively applied to this type of facility. The solar thermal track (7110SHOT) targets solar domestic hot water systems in low-income multifamily buildings and commercial and institutional facilities with high hot water demand and is designed to replace existing inefficient hot water heating systems. The solar thermal track comprised 63 percent of the renewable energy savings in FY14. The solar thermal initiative contributes primarily to natural gas savings, while the solar PV initiative contributes to electric savings. As mandated by the contract, the MMBtu savings were converted to kWh to calculate a total acquisition cost for both initiatives.

The evaluation team compared the financial summary files received from the DCSEU for FY14 titled “Electric Gas Split FY14” and for FY13 “Support and Direct Cost Breakdown FY 13 DCSEU” and “Annual Electric Gas Split Calc_SV_20Aug2014”. These files provided the administrative costs overall and the direct spend costs per track as defined by the DCSEU. The administrative costs were allocated to the track based on the percent direct spend of each track and the total track costs were derived by adding the direct spend to the allocated administrative cost. For the evaluation of the benchmark, the evaluation team assumed that the total costs (administrative cost allocation plus the direct spend) was to be used for the acquisition cost assessment, as acquisition cost assessments typically include all costs.

Next, the verified MMBtu savings values for the solar photovoltaic track (7107PV) at the generator level were converted to kWh per the following conversion:

one MMBtu = 293.3 kWh[27]

After adding the two renewable kWh savings and total costs, the renewable acquisition cost per kWh was calculated as:

[26] Contract Number DDOE-2010-SEU-0001, Attachment J.1, page 55.

[27] 1 kilowatthour = 3,412 Btu, or 1 Btu = 0.0002933, and 1 MMBtu = 0.0002933 kWh * 1,000,000 = 293.3 kWh; source: http://www.eia.gov/energyexplained/index.cfm?page=about_btu, September 30, 2015.

Renewable acquisition costs per kWh = Total renewable cost divided by renewable kWh

The change from FY13 to FY14 was calculated, both with and without administrative costs.

Table 3-1. Renewable Energy Initiatives Acquisition Cost per kWh (with administrative cost allocation)

Track	7120PV	7110SHOT	Total
FY13 Expenditure[28]	$1,011,473	$1,060,768	$2,072,241
FY13 Verified Savings (kWh)	244,344	1,355,033	1,599,377
FY13 Acquisition Cost	$4.14	$0.78	$1.30
FY14 Expenditure[29]	$2,033,366	$319,125	$2,352,492
FY14 Verified Savings (kWh)	561,838	946,813	1,508,651
FY14 Acquisition Cost	$3.62	$0.34	$1.56
Acquisition cost change FY13 to FY14	**-13%**	**-57%**	**20%**

Table 3-2. Renewable Energy Initiatives Acquisition Cost per kWh (without administrative cost allocation)

Track	7120PV	7110SHOT	Total
FY13 Expenditure[30]	$687,583	$721,093	$1,408,676
FY13 Verified Savings (kWh)	244,344	1,355,033	1,599,377
FY13 Acquisition Cost	$2.81	$0.53	$0.88
FY14 Expenditure[31]	$1,459,999	$229,139	$1,689,138
FY14 Verified Savings (kWh)	561,838	946,813	1,508,651
FY14 Acquisition Cost	$2.60	$0.24	$1.12
Acquisition cost change FY13 to FY14	**-8%**	**-55%**	**27%**

3.3 VERIFICATION RESULT

This performance benchmark was not achieved, as there was a 20% cost increase overall. However, if each initiative is assessed individually, the solar thermal initiative meets achieves a reduction of 57 percent with all costs included and the solar PV achieves a reduction of 13 percent with all costs included.

[28] Source: file provided by DCSEU titled “Annual Electric Gas Split Calc_SV_20Aug2014”, ‘Table’ worksheet", cells J15 and J16

[29] Source: file provided by DCSEU titled “Electric Gas Split FY'2014”, ‘DCSEU Cost Breakdown FY14’ worksheet", cells L13 and L14

[30] Source: file provided by DCSEU titled “Annual Electric Gas Split Calc_SV_20Aug2014”, ‘Table’ worksheet", cells J15 and J16

[31] Source: file provided by DCSEU titled “Electric Gas Split FY'2014”, ‘DCSEU Cost Breakdown FY14’ worksheet", cells E13 and E14

Table 3-3. FY13 Renewable Energy Generation Capacity Cost Results Summary

Benchmark	Maximum Performance Target	Minimum Performance Target	FY14 Reported	FY14 Verified	Maximum Performance Target Achieved	Minimum Target Achieved
Cost per kWh reduction from FY13	20%	10%	8%cost reduction	20% cost increase	No	No

3.4 PERFORMANCE BENCHMARK ASSESSMENT

3.4.1 Background

In FY12, the DCSEU was tasked with delivering a cost effective renewable program within the District. The DCSEU offered the Solar PV initiative, a solar photovoltaic rooftop offering that targeted low-income housing. The FY12 cost effectiveness results for this effort was 0.82. In FY13 and FY14, the DCSEU offered an additional measure, solar thermal hot water systems. The cost effectiveness of the solar photovoltaic and solar thermal hot water for FY14 was 1.35 for each initiative compared to FY13 results of 2.36 and 1.96, respectively (including third-party evaluation cost, FY14 evaluation realization rates, and NTG estimates).

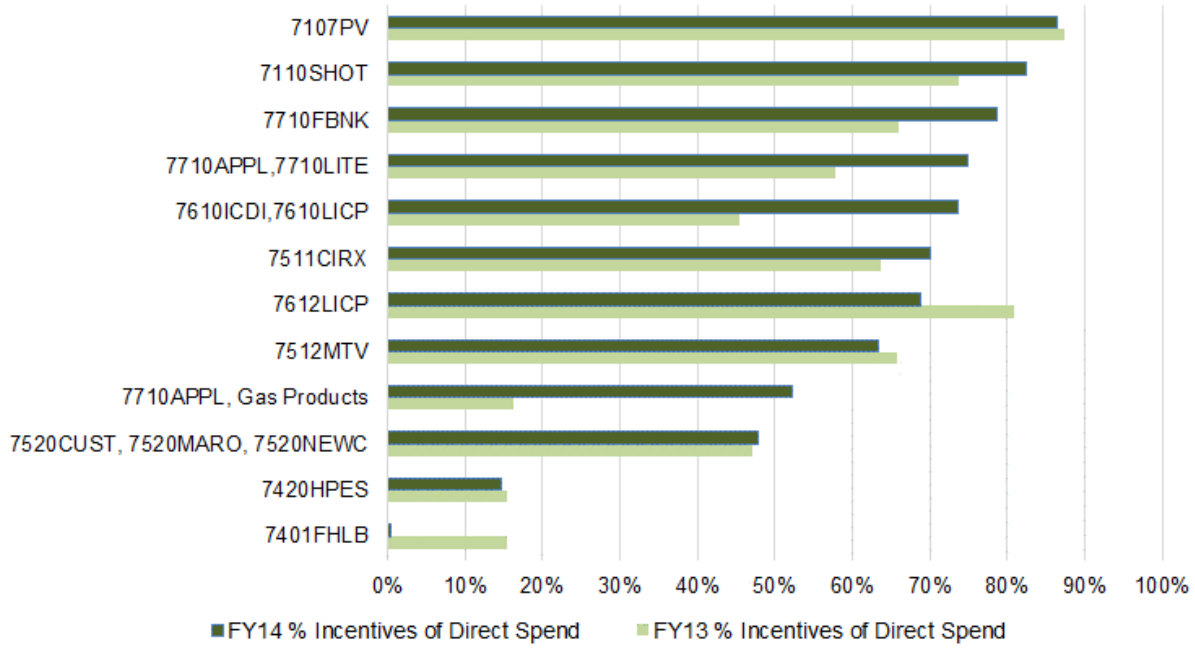
3.4.2 Assessment

For FY14, the energy efficiency resource acquisition cost per kWh saved for this track increased by 20 percent from the FY13 cost. This was driven by both a decrease in kWh savings and an increase in total expenditures. However, the equipment incentives for each of these initiatives is high and the incentive expenditures as a percent of the direct spend is this highest of all initiatives. Figure 3-1 provides this comparison for FY13 and FY14. If only the direct administrative expenditures are considered, the cost per kWh comparison for FY13 to FY14 matches the DCSEU reported result at an 8 percent cost reduction in total.

Table 3-4. Renewable Energy Initiatives Direct Spend Administrative Cost per kWh (excludes incentives and support services expenditures)

Track	7120PV	7110SHOT	Total
FY13 Expenditure[32]	$86,693	$189,182	$275,875
FY13 Verified Savings (kWh)	244,344	1,355,033	1,599,377
FY13 Acquisition Cost	$0.35	$0.14	$0.17
FY14 Expenditure[33]	$198,640	$40,294	$238,933
FY14 Verified Savings (kWh)	561,838	946,813	1,508,651
FY14 Acquisition Cost	$0.35	$0.04	$0.16
Acquisition cost change FY13 to FY14	**0%**	**-70%**	**-8%**

Figure 3-1. FY13 and FY14 Comparison of Incentives as a Percent of Direct Spend



When the direct administrative expenditures are the basis for the support services cost allocation, the renewable energy acquisition cost comparison of FY13 to FY14 only by 1 percent compared to the 20 percent increase for all costs included.

Table 3-5. Renewable Energy Initiatives Acquisition Cost per kWh Support Services Administrative Cost Allocation Based on Direct Administrative Cost

Track	7120PV	7110SHOT	Total

[32] Source: file provided by DCSEU titled "Annual Electric Gas Split Calc_SV_20Aug2014"
[33] Source: file provided by DCSEU titled "Electric Gas Split FY'2014"

FY13 Expenditure[34]	$793,119	$951,393	$1,744,512
FY13 Verified Savings (kWh)	244,344	1,355,033	1,599,377
FY13 Acquisition Cost	$3.25	$0.70	$1.09
FY14 Expenditure[35]	$1,679,272	$273,617	$1,952,889
FY14 Verified Savings (kWh)	561,838	946,813	1,508,651
FY14 Acquisition Cost	$2.99	$0.29	$1.29
Acquisition cost change FY13 to FY14	**-8%**	**-59%**	**19%**

3.4.3 Conclusion

The renewable energy initiatives expenditures are driven primarily by the measure incentive expenditures. These costs are largely outside of the DCSEU control, so a different approach to assessing this benchmark might be warranted.

[34] Source: file provided by DCSEU titled “Annual Electric Gas Split Calc_SV_20Aug2014”
[35] Source: file provided by DCSEU titled “Electric Gas Split FY'2014”

4. REDUCE GROWTH OF PEAK DEMAND IN THE DISTRICT OF COLUMBIA (CAEA §201(D)(3))

4.1 DESCRIPTION

"The SEU is not required to undertake any programs aimed exclusively at reducing the growth of peak demand. However, the SEU is required to estimate, using protocols developed by PJM for evaluating the capacity effects of energy efficiency projects for base residual auction, the impact on peak demand of its energy efficiency programs. The forecast increase in electric demand in the District between July 2010 and July 2011 is 40.8 MW."[36] The minimum performance benchmark is 2 MW, or 2,000 kW.

4.2 EVALUATION AND VERIFICATION APPROACH

To assess this benchmark, the independent evaluator verified the demand reductions associated with the energy efficiency and renewable programs within the SEU portfolio and for the portfolio as a whole as described in the *Department of Energy and Environment Energy Efficiency Evaluation Plans for Portfolio of Programs Offered in the District of Columbia.* Verified results for each program and in total are reported in the *Department of Energy and Environment Evaluation, Measurement, and Verification of Energy Efficiency and Renewable Energy Programs in the District of Columbia FY14 Annual Evaluation Report, Volume I*.

4.3 VERIFICATION RESULT

The evaluation team's verified, or ex-post, results for the overall portfolio are presented in the table below. These results reflect a realization rate estimate of 0.92 for kW. This means that the evaluation team estimates that the verified portfolio electric demand reduction result is 92 percent of the DCSEU final dataset (KITT) demand reduction of 8,553 kW. This final KITT value differs from the reported DCSEU value in the FY2014 Annual report and the value presented in Table 4-1 because the DCSEU annual report was completed prior to the finalization of the DCSEU tracking database for FY14 results. The DCSEU exceeded the minimum target.

Table 4-1. Peak Demand Reduction Results Summary

Benchmark	Maximum Performance Target	Minimum Performance Target	FY14 Reported	FY14 Verified	Maximum Performance Target Achieved	Minimum Performance Target Achieved
Reduce growth in peak demand (kW)	20,000	2,000	8,620	7,912	No (40%)	Yes (396%)

[36] Contract Number DDOE-2010-SEU-0001, Amendment /Modification No. M07.

4.4 PERFORMANCE BENCHMARK ASSESSMENT

4.4.1 Background

The DCSEU is required to implement demand reduction specific programs and relies on the associated demand reduction component of the electric energy reduction initiatives to contribute to this target.

Advanced metering systems is one effective tool to offer demand response programming. Pepco, the electric distribution company serving the District of Columbia, has implemented Advanced Metering Infrastructure (AMI), commonly known as "smart meters," throughout the District. Currently, Pepco does not offer smart meter specific demand or energy reduction programs; rather, they encourage District residents and businesses to sign up for account online access to allow for more informed energy usage management with this messaging, *"Smart meters enable you to view your home electricity use in easy-to-read graphs. Armed with a better understanding of your energy use, you can make more informed decisions on how to manage and control your energy consumption."*[37] Other demand response programs can also rely on infrastructure related technologies such as direct load control devices. The DCSEU does not have access to the electrical infrastructure (Pepco does not share electric usage data with the DCSEU nor does it provide DCSEU access to its AMI and electric infrastructure), limiting their ability to offer these types of programs.

The DCSEU is currently assessing participation in the PJM Capacity Market that may lead to opportunities to bid energy efficiency and demand resources into the market.

4.4.2 Assessment

The DCSEU is not developing initiatives with the specific intent of reducing demand savings; reported savings result from the installation of electric savings measures and the associated reduction in demand. This approach makes sense given that the local utility has installed an advanced metering infrastructure but has not provided DCSEU access for program implementation for all customers.

4.4.3 Conclusion

Continuing to calculate and verify the demand resources available for potential PJM Capacity Market participation is useful. However, the current performance benchmark may not be useful in fully assessing the value the DCSEU brings to the District for this metric since the DCSEU does not develop and implement demand reduction specific initiatives. Future demand performance benchmarks could be based on PJM Capacity Market metrics should the DCSEU begin bidding into this market.

[37] See PepCo website for quote (captured March 31, 2015) and more information, https://energywiserewards.pepco.com/dc/index.php

5. IMPROVE THE ENERGY EFFICIENCY OF LOW-INCOME HOUSING IN THE DISTRICT OF COLUMBIA (CAEA §201(D)(4))

5.1 DESCRIPTION[38]

"On an annual basis, a minimum of 30 percent of the SETF funds expended by the SEU shall be dedicated to improving the energy efficiency of low-income housing in all eight wards of the District. Programmatic, administrative, evaluation, and other expenses of the SEU for all of its programs shall be included in the denominator (the SEU's total expenditures) but not the numerator (the amount spent on low-income programs). DOEE defines "low-income" as households earning 60 percent of state median income, or 200 percent of federal poverty level, whichever is higher. Households will qualify at or below that level. Qualifying structures will have at least two-thirds of its units at this income level or lower. A building that contains many lower-income families, but less than two-thirds of the units in the building, may be included in a low-income housing program if approved by DOEE."

5.2 EVALUATION AND VERIFICATION APPROACH

In addition to the project files requested to support the impact evaluation effort, the DCSEU provided a summary file titled, "Electric Gas Split FY 2014", which summarized project spending – including direct program costs, administrative costs, and incentive dollars allocated to each program. The evaluation team additionally reviewed all provided project files for each FY14 low-income track and one renewable energy track – solar hot water – that were uploaded by the VEIC / DCSEU team to assess project low-income eligibility, review project costs, and evaluate check release dates.[39,40,41] Properties are eligible within the low-income tracks when at least 66 percent of the residential units per building are designated for, or inhabited by, households with incomes at or below 60 percent Area Median Income. A list of affordable housing units located within the District was also reviewed to check for property eligibility.

The DCSEU developed consistent income verification protocols and required documentation for each of the low-income initiatives with the exception of the Food Bank initiative. The Food Bank initiative relies upon the verification of income eligibility by Food Bank staff during food and DCSEU lighting distribution events. The project file documentation reviewed included:

- Application and/or third party agreement
- Income eligibility form(s) and/or income qualification data
- Contractor invoice
- Check Request

[38] Contract Number DDOE-2010-SEU-0001, Attachment J.1, page 56.
[39] See Table 5-1 for a list if initiatives eligible for this performance benchmark.
[40] The solar photovoltaic initiative (Track 7107PV) exclusively targets low-income households but was excluded from the Low-Income spend assessment for FY14 evaluation, per instructions from DOEE.
[41] This assessment is based on the premise that the reported financials provided by the DCSEU are correct and accurate.

- Check copy, date, and amount
- Quality assurance or post project completion forms.

5.3 VERIFICATION RESULT

Based on the project files available to the Tetra Tech team, we concluded there were no issues related to Low-Income eligibility. Therefore, adjustments to the project financials – and in particular, spend by program -- were not warranted. Table 5-1 tracks provides a summary of this assessment by low-income track. In FY14, per DOEE instructions, the Solar PV initiative (7107PV) was not eligible for contribution to this performance benchmark.

Table 5-1. Low-Income Spend: Actual vs. Adjusted

Track	Track Description	Actual (Direct) Spend	Adjustment Needed?	Adjusted Spend
7612LICP	LIMF Comprehensive	$1,358,762.74	N	$1,358,762.74
7610ICDI,7610LICP	LIMF Direct Install	$3,665,524.05	N	$3,665,524.05
7710FBNK	Efficient Products: Food Bank Lighting	$417,839.53	N	$417,839.53
7401FHLB	Income Qualified Home Performance	$406,995.03	N	$406,995.03
7110SHOT	LIMF Solar Hot Water	$319,125.25	N	$319,125.25
Total		**$6,168,246.59**		**$6,168,246.59**

Upon concluding that the program spending did not need an adjustment based on our review of available program files and documentation, we compared our verified program spending against the FY14 Performance Benchmarks for Low-Income spending.

DCSEU's Verified Low-Income Spend for FY14 comfortably exceeded both the Minimum Benchmark threshold target and the maximum Performance Benchmark target.

Table 5-2. Low-Income Housing Results Summary

Metric	Maximum Performance Target	Minimum Performance Target	FY14 Reported	FY14 Verified	Maximum Performance Target Achieved	Minimum Performance Target Achieved
Improve energy efficiency in low-income housing: 30% spend ($)	$ 5,280,000	$3,520,000	$6,168,206	$6,168,247	Yes (117%)	Yes (175%)

The Non-renewable energy tracks files had various levels of project file completeness, and file organization varied by program track. Therefore, a complete and thorough project file review and assessment was not possible for each reviewed track. However, for those projects with all pertinent documents available, there were no issues found related to eligibility-that is, all projects passed the income eligibility review. Two of the six tracks examined had complete income eligibility information and other robust documentation; one of the six tracks – 7610ICDI (also one of the largest) – had a nearly perfect documentation availability. Table 5-3 provides a summary of this desk review effort across all the tracks examined.

Table 5-3. Low-Income Track Desk Review Summary for Performance Benchmark Assessment

Track	Project Files Reviewed (n)	Application Available	Income Eligibility Documentation	Inspection/ QAQC Form Available	Check and/or Check Request	Contractor Invoice
7610ICDI	35	34	34	34	35	33
7610LICP	5	5	3	5	5	3
7612LICP	5	5	1	5	4	0
7410FHLB	6	6	6	6	2	6
7110SHOT	5	5	5	5	5	1
7710FBNK	0	Not applicable	Assumed verified through partnering food banks; documentation not available	Not applicable	Not applicable	Not applicable

While the 7110SHOT track has not been a high contributor to the overall portfolio savings, its modest program size presents a good opportunity for a deeper dive into the project files and subsequent impact assessment. DCSEU completed six projects within the 7110SHOT track in FY14. Five 7110SHOT projects were reviewed for the impact evaluation effort – including an income eligibility review. The 7110SHOT track serves income-qualified multifamily and/or cooperative housing buildings through the installation of solar thermal arrays. All five examined project passed the eligibility review. The valid income qualification documentation available for all five projects results in our ability to verify the expenditures attributed to the projects we reviewed.

5.4 PERFORMANCE BENCHMARK ASSESSMENT

5.4.1 Background

This benchmark has not changed over the contracting periods since inception; however, the eligibility of initiatives that count toward this benchmark has changed. For FY14, all low-income specific non-renewable energy initiatives count but only the Solar Hot Water (7710SHOT) renewable energy initiative is allowed, per DOEE.

VEIC, the lead partner in the Sustainable Energy Partnership has a company-wide commitment to serve the low-income population, setting a goal to "ensure that at least 10% of the GHG and fiscal savings we create in 2027 will be from work that benefits low-income people."[42] This commitment to serving the low-income population is shared by the DCSEU.

[42] https://www.veic.org/company/our-story

5.4.2 Assessment

A. Acquisition Cost Review and Cost Effectiveness Assessment

The FY14 low-income acquisition costs per MWh were $1,385 compared to non-low-income, non-renewable energy acquisition costs per MWh of $101. The FY14 low-income spend exceeded the performance benchmark by 17 percent (a 69 percent increase over FY13), or almost $900,000-funding that could have been spent toward the non-low income energy savings benchmark. If these funds were redirected into non-low-income energy efficiency initiatives, and additional 8,700 MWh (or about 15 percent) could be acquired. Table 5-4 illustrates this point.

Table 5-4. Low-Income Additional Spend Assessment and Additional MWh Savings Opportunity

Low-Income $ Spend over Performance Benchmark	$888,247
FY14 non-LI non-Renewable Acquisition Cost per MWh	$101
Additional MWh possible	8,763
Verified MWh	59,659
Verified plus Additional Possible MWh	68,422

The low-income initiatives are cost effective at the track level except for the Federal Home Loan track (7420FHLB). The volume of projects within this track was limited; therefore, reported savings were limited.

5.4.3 Conclusion

The evaluation suggests that the DCSEU could acquire additional MWh savings by redirecting about 15 percent of the FY14 expenditures from low-income initiatives to non-low-income non-renewable energy initiatives. The evaluation team recognizes, though, that the DCSEU is tasked with achieving several (and sometimes conflicting) performance benchmarks and contractual obligations requiring close management of the portfolio throughout the year. Additionally, the DCSEU is committed to serving the low-income population within the District. Thus, it is a challenging undertaking to precisely achieve each and every benchmark and obligation.

6. REDUCE THE GROWTH OF ENERGY DEMAND OF THE DISTRICT OF COLUMBIA'S LARGEST ENERGY USERS (CAEA § 201(D)(5))

6.1 DESCRIPTION

This is the first year for which achievement of this performance benchmark was defined. For FY14, it was defined as:

> *"Beginning in option year 3 of the SEU contract, the contractor shall design and implement energy efficiency program(s) that provide technical and financial assistance that result in at least 50 completed energy efficiency projects. Large energy users are defined as organizations or individuals that own a business, government, or residential building with more than 200,000 square feet of gross floor area or own a campus of buildings in a contiguous geographical area that share building systems or at least one common energy meter without separate metering, or sub-metering, such that their energy use cannot be individually tracked. Gross floor area include infrastructure that contain heated and unheated space that is connected to a qualified building. Energy efficiency or renewable energy measures must be installed in a qualified building or an infrastructure connected to a qualified building in order to qualify as a large energy user project. A completed large energy user project is one in which there is a signed customer agreement and completed and verified energy savings."*[43]

6.2 EVALUATION AND VERIFICATION APPROACH

The evaluation team was alerted late in the evaluation effort that this performance benchmark had been defined for FY14. Therefore, the evaluation effort is not as robust as what will be for FY15 should the definition stay the same. Examples of additional evaluation activities include phone survey and/or onsite assessment for square footage compliance, metering configuration (especially when projects include multiple buildings) and history of energy management, and property cross-reference to public records to verify square footage. '

The performance benchmark is assessed by the number of projects meeting the performance benchmark definition as well as the following tracking requirements in order to count toward the benchmark achievement:

1.3.5.1.3. The scope of each project and the dollar amount provided by the SEU is documented in a properly executed incentive agreement of memorandum of understanding prior to the completion date of the project.

1.3.5.1.4. The estimated annual amount of natural gas and electricity savings for each project.

1.3.5.1.5. Total project cost.

[43] Contract Number DDOE-2010-SEU-0001, Amendment /Modification No. M07.

1.3.5.1.6. Project notes including a summary of energy management history including energy service companies ("ESCO") or performance contracting used by the owner.

For the FY14 effort, the evaluator conducted the following activities:

Table 6-1. District Large Energy Users Verification Actions and Result Summary

File Name | Source	Evaluation Activity	Number Reviewed	Result
9 30 Largest Energy Users | DCSEU	Verify count of unique properties reported	77 unique sites	100% pass
9 30 Largest Energy Users | DCSEU	Assess the fill list of reported Large Energy User projects for SqFt Eligibility	112 projects and 77 unique sites	100% pass
KITT Extract | VEIC	Verify all projects in list are included within KITT FY14 Population	112 projects	100% pass
Impact Evaluation Project Sample | VEIC	Cross-reference Largest Energy User reported file to Impact sample to select sample for detailed desk review	46 projects, 15 projects were randomly selected detailed desk review for this assessment	Various results
	Clear indication of square footage	Looked for SqFt indicted in CAT file "Overview" tab	27% pass
	1.3.5.1.3.	Reviewed signed application form (CIRX) or incentive agreement (all other tracks) noting date fully executed, DCSEU incentive clearly identified, and SOW included	100% pass
	1.3.5.1.3.	Compared signed application (CIRX) or incentive agreement (all other tracks) date to the project inspection date (13 projects) or check request date (2 projects)	87% pass
	1.3.5.1.4.	Reviewed KITT tracking database to verify estimated savings was included	100% pass
	1.3.5.1.5.	Reviewed KITT tracking database to verify total project cost was included	100% pass
	1.3.5.1.6.	Reviewed CAT file Overview form, Project Notes section for mention of energy management history; exclusion of history in notes may mean that there isn't anything to include, so not necessarily a good measure of pass or fail	7% pass

Table 6-2. Detailed Project File Sample Review Summary

Track ID	ProjectId	Clear Indication of Project SF	1.3.5.1.3. Scope of work and $ incentive in IA	1.3.5.1.3. IA/MOU executed before last measure install date?	1.3.5.1.3. IA/MOU executed before inspection date?	1.3.5.1.4. KITT Estimated annual mcf/MWh saved	1.3.5.1.5. KITT Total Project Cost	1.3.5.1.6. Project notes with summary of EM history, ESCO, Performance Contracting	Pass all requirements (without inclusion EM history)	Pass all requirements (without inclusion EM history)and SqFt)
t7511CIRX	6151	Y	Y	Y	Y	Y	Y	N	Y	Y
7511CIRX	7796	N	Y	Y	Y	Y	Y	N	N	Y
7511CIRX	8632	N	Y	Y	Y	Y	Y	N	N	Y
7512MTV	8280	N	Y	Y	Y	Y	Y	N	N	Y
7520CUST	6010	N	Y	Y	Y	Y	Y	Y	N	Y
7520CUST	6204	N	Y	Y	Y	Y	Y	N	N	Y
7520CUST	6442	N	Y	Y	Y	Y	Y	N	N	Y
7520CUST	6965	N	Y	N	Y	Y	Y	N	N	Y
7520CUST	7035	Y	Y	Y	Y	Y	Y	N	Y	Y
7520CUST	7186	N	Y	N	N	Y	Y	N	N	N
7520CUST	7842	Y	Y	N	Y	Y	Y	N	N	Y
7520CUST	8473	N	Y	N	Y	Y	Y	N	N	Y
7520CUST	8625	Y	Y	N	N	Y	Y	N	N	N
7520MARO	6616	N	Y	N	Y	Y	Y	N	N	Y
7520MARO	7548	N	Y	N	Y	Y	Y	N	N	Y
Pass Rate		**27%**	**100%**	**53%**	**87%**	**100%**	**100%**	**7%**	**13%**	**87%**

The project documentation was varied and no files passed all requirements. The evaluation team believes that interpretation of energy management system history criteria can vary and recommends a 100 percent pass rate. Also, lacking information on the square footage of properties in the desk review sample and the late evaluation of this performance benchmark, the evaluation team recommends that this be assigned a 100% pass rate. Therefore, the overall recommended pass rate is 87 percent.

6.3 VERIFICATION RESULT

Table 6-3. District Large Energy Users Verification Summary

Metric	Maximum Performance Target	Minimum Performance Target	FY14 Reported	FY14 Verified	Maximum Performance Target Achieved	Minimum Performance Target Achieved
Reduce growth in energy demand of largest users (number of projects completed with a SqFt > 200,000)	50	30	77	67	Yes (134%)	Yes (223%)

6.4 PERFORMANCE BENCHMARK ASSESSMENT

6.4.1 Background

The DCSEU does not have access to District-wide utility billing data to identify the largest energy users, so a proxy metric is required. The current metric was established September 2014, under Contract Amendment /Modification No. M07. This benchmark was based on the first set of buildings that had to report energy benchmarking data to DOEE under the Energy Benchmarking Program (as laid out in D.C. Code § 6-1451.03(c)(2)(D) and 20 DCMR 3513). The set of buildings covered by the benchmarking program has since been expanded to include all buildings over 50,000 gross square feet. Data collected through this program is shared with DOEE for program design and lead generation.

6.4.2 Assessment

A robust evaluation of this performance benchmark was not conducted, as the evaluation team did not receive notification of this metric until late in the evaluation period (March 3, 2015). If useful to DOEE, this effort can be conducted in the remainder of FY15, or can be scheduled for robust assessment as a part of the FY15 DCSEU results evaluation effort to be conducted in FY16.

6.4.3 Conclusion

For the current definition of the benchmark, recommended evaluation activities include phone verification surveys and site visits to verify square footage of projects reported under this benchmark, along with cross-referencing with the tax database, and the energy management history of the properties. Additionally, the evaluation team recommends that information to support eligibility for this benchmark be included within the incentive agreement, along with DCSEU staff signature on the accuracy of the information. It is also recommended that the project square footage and energy management history be indicated in new dedicated fields on the CAT Overview tab, or clearly noted in the 'Project Narrative', first item.

7. INCREASE THE NUMBER OF GREEN-COLLAR JOBS IN THE DISTRICT OF COLUMBIA (CAEA § 201(D)(6))

7.1 DESCRIPTION

"The SEU shall ensure that…at least 77 green jobs [are created] in Year 3. The following criteria will be used in the calculations of what constitutes a green job for the purposes of this benchmark:

- *A green job or green-collar job is 1 FTE job held by a District resident who is paid at least a living wage[44] or a factor of $200,000 of SEU direct cash incentives to end-use customers and/or manufacturers. No distinction is required for new versus retained jobs.*
- *1 FTE = 1,950 work-hours and is applied to hours reported by the SEU and its subcontractors.*
- *SEU direct cash incentives to end-use customers and for upstream/midstream cash incentives to manufacturers to buy down the cost of energy efficiency measures will be used to estimate the number of green jobs created through DCSEU incentive programs.*
- *Only direct jobs are to be used in the green jobs calculation. Indirect (primarily suppliers to SEU contractors or subcontractors) and induced jobs (derived from a multiplier effect) are not counted."*[45, 46]

7.2 EVALUATION AND VERIFICATION APPROACH

DOEE conducted a detailed audit and review of the DCSEU reporting for this benchmark.

7.3 VERIFICATION RESULT

Table 7-1. Green-collar Jobs Summary

Metric	Maximum Performance Target	Minimum Performance Target	FY14 Reported[47]	FY14 Verified	Maximum Performance Benchmark Target	Minimum Performance Target Achieved
Increase the number of green-collar jobs (FTE)	88	70	82	85	No (96%)	Yes (121%)

[44] The Living Wage Act of 2006 is Title I of the "Way to Work Amendment Act of 2006", D.C. Law 16-118 (D.C. Official Code §2-220.01 to .11), which became effective June 8, 2006. See the following cite for details: http://www.does.dc.gov/does/cwp/view,a,1233,q,636800,doesNav,%7C32064%7C.asp.

[45] For a more complete definition of indirect and induced jobs, see Executive Office of the President, Council of Economic Advisors, Estimates of job Creation from the American Recovery and Reinvestment Act of 2009, May 2009, p. 6.

[46] Contract Number DDOE-2010-SEU-0001, Amendment /Modification No. M07.

[47] Source: DCSEU Annual Report FY2014.

7.4 PERFORMANCE BENCHMARK ASSESSMENT

7.4.1 Background

This benchmark is measured as the jobs *directly* created for District residents resulting from the DCSEU's implementation of the DCSEU energy efficiency and renewable energy portfolio. This includes jobs held with the DCSEU and those resulting from others in the District performing work directly associated with the DCSEU portfolio. It excludes indirect jobs—those jobs created in support of direct jobs such as suppliers of energy efficiency equipment—and induced jobs, which are those created due to the economic impact of hired workers spending incomes within the District.

For FY14, the Performance Benchmark was modified to allow for the inclusion of estimated green job creation based on the "Total dollar amount of SEU cash incentives to end-use customers and for upstream/midstream cash incentives to manufacturers to buy down the cost of energy efficient measures."[48]

7.4.2 Assessment

The DCSEU is working toward a consumer-driven energy efficiency market and most programmatic designs allow for District residents and businesses to select the vendors and contractors of their choice to implement energy efficiency projects. This limits the directly measurable green jobs created. As the DCSEU continues to move toward a market-based programmatic approach, less of the green job creation will be within the control of the DCSEU—that is, District businesses and households will be driving job creation through their selection of who to hire to implement energy efficient projects and where to purchase energy efficient equipment. It would seem that this would lead to more efficient implementation and, thus, lower energy resource acquisition costs.

7.4.3 Conclusion

The inclusion of 'estimated green job creation for cash incentives' does not necessarily produce a more reliable estimate of District green jobs created, but it does account for dollars spent outside of the DCSEU control. Therefore, it is a method to provide recognition of those expenditures that deliver energy and demand savings, but cannot necessarily be traced directly to District job creation.

[48] Contract Number DDOE-2010-SEU-0001, Amendment /Modification No. M07, Article 1.3.6.1.11.

8. COST EFFECTIVENESS ASSESSMENT

GDS, under the direction of Tetra Tech, conducted a cost benefit analysis for 12 energy efficiency initiatives sponsored by the DC Sustainable Energy Utility (DCSEU). GDS performed a Societal Cost Test (SCT) for each program and compared the results to the SCT results provided by Vermont Energy Investment Corporation (VEIC).

Presented below are the benefit cost results.

Scenario 1:

> The FY14 DCSEU benefit cost model classifies one category of cost and benefits differently than the GDS model. The DCSEU model separates the total MMBtu savings from fossil fuels into two categories: cost penalties and benefits savings. The GDS model groups the MMBtu savings into the one category and nets the penalties and savings as a benefit. To reconcile the classification of MMBtu savings, GDS adjusted the DCSEU benefit cost results to show all MMBtu savings and penalties as a net benefit. The DCSEU 14 Screening model was changed from previous year's models to classify O&M expense as a benefit, which matches GDS classification for this expense. The original DCSEU model produced a benefit cost ratio of 4.89 and the adjusted DCSEU model produces a benefit cost ratio of 5.35. This adjusted ratio is comparable to the GDS' Model benefit cost ratio of 5.03.

Scenario 2:

> The third-party evaluation (Tt evaluation team) costs for the DCSEU FY13 results totaled $751,190 that was not included in either the GDS or VEIC benefit cost models results discussed above. Adding this third-party evaluation expense decreases the overall portfolio benefit cost ratio to 4.92. The evaluation expense was allocated to specific programs based upon direct expense program allocations in the DCSEU benefit cost model.

Scenario 3:

> The evaluation team developed realization rates for each track through the impact evaluation effort. These realization rates were applied to the kWh, kW and MMBtu savings in the benefit cost model for Scenario 2. The overall impact of incorporating realization rates decreases the benefit cost ratio of the total portfolio to 4.86.

Scenario 4:

> The evaluation team estimated net-to-gross ratios (NTGR) for each track. These NTGR were applied to the kWh, kW and MMBtu savings in the benefit cost model for Scenario 3. The overall impact of incorporating NTGR decreases the benefit cost ratio of the total portfolio to 4.51.

The results of these comparisons and scenarios are presented in Table 8-1.

Table 8-1. Societal Cost Test Comparison

Initiative	DCSEU (original)	DCSEU (adjusted)	Scenario 1	Scenario 2[1]	Scenario 3[2]	Scenario 4[2]
7110SHOT Solar Hot Water	1.47	1.47	1.31	1.29	1.35	1.35
7107PV Solar Photo Voltaic	1.42	1.42	1.41	1.35	1.35	1.35
7401FHLB Federal Home Loan Bank	0.49	0.49	0.49	0.47	0.46	0.46
7420HPES HP with Energy Star	0.38	0.38	0.37	0.35	0.33	0.32
7511CIRX Business Energy Rebates	6.44	7.37	8.48	8.19	8.28	7.88
7510MTV T12 Lighting Replacement	4.52	5.27	5.52	5.25	4.49	4.21
7520CUST, 7520MARO, 7520NEWC Commercial Custom	5.92	6.04	5.63	5.57	5.69	5.35
7610ICDI, LI CP	3.27	3.47	2.42	2.29	2.10	2.10
7612LICP	3.54	3.60	3.79	3.68	3.68	3.68
7710APPL Appliances	2.71	2.71	2.58	2.52	2.53	2.18
7710FBNK Retail Lighting Food Bank	1.87	2.30	3.51	3.38	3.26	3.26
7710LITE Retail Efficient Products	5.78	8.65	8.37	8.17	7.54	7.54
Portfolio	**4.89**	**5.35**	**5.03**	**4.92**	**4.86**	**4.51**

[1] Includes the cost of the third-party independent evaluation conducted by the Tetra Tech evaluation team.

[2] Includes the cost of the third-party independent evaluation and the effect of the realization rates determined through the evaluation effort.

[3] Includes the cost of the third-party independent evaluation, the effect of the realization rates determined through the evaluation effort, and estimated free-ridership and spillover (net-to-gross estimates).

Variability between benefit/cost models is expected, as not all the calculation methods and assumptions between both models can be specifically quantified. However, the resultant variances are minimal, especially at the portfolio level with all program administrative costs and third party evaluator costs included.

GDS notes no significant differences between the benefit/cost ratios calculated in the GDS models versus the VEIC model.

8.1 SOCIETAL COST TEST

The Societal Cost Test (SCT) measures the net direct economic impact to the utility service territory, state, or region, plus indirect benefits such as environmental benefits and direct non-energy related customer benefits. Below is a brief description of the benefits and costs included by DCSEU (and hence GDS) to determine the societal cost test results for this analysis.

Table 8-2. Benefits and Costs Included in the DCSEU Societal Cost Test

Benefits	Costs
Avoided Energy Costs Avoided Capacity Costs Avoided Transmission & Distribution Costs Avoided Fossil Fuel Costs Avoided Water Costs Risk Adder (Percent of Electric and Fossil Fuel Avoided cost) Non-Energy Benefits Adder (Percent of Electric and Fossil Fuel Avoided Costs) Avoided Environmental Externality Costs for Electric and Fossil Fuels ($/kWh and $/MMBtu)	Program Administrator Costs Energy Efficiency Measure Cost—Financial Incentives Energy Efficiency Measure Cost—Participant Contribution

8.1.1 Societal Cost Test Assumptions

The following table presents the SCT benefit/cost assumptions and sources used by DCSEU for FY13.

Table 8-3. Societal Cost Test Benefits Assumptions and Sources

Screening Assumption	Value (monetary values in 2014$)*	Source
Future Inflation Rate	2.39%	Based on past 10 years of consumer price index data, calculated December 2013. (DDOE -2010-SEU-0001 Section B.10.4.2.4)
Water Avoided Cost	$10.65/CCF	State of Vermont screening tool, established by the Department of Public Service as $.01 per gallon in 2000.
Real Discount Rate	2.647%	10-year treasury rate posted in the Wall Street Journal on the first business day of October 2013 (DDOE-2010-SEU-0001 Section B.10.4 Societal Benefit Test).
Line Losses	8% (energy) 6% (demand)	Based on a Pepco screening tool developed by ICF International, Inc.
Natural Gas Capacity Adder	5%	As per the DCSEU contract, to capture the costs of capacity and delivery of gas.
Transmission Cost	$23.821/kW-yr	Pepco's August 7, 2013 filing of the FERC

Screening Assumption	Value (monetary values in 2014$)*	Source
		formula transmission rate update.
Distribution Cost	$207.892/kW-yr	Calculated, based on Pepco's indication that distribution costs are 8.73 times that of transmission costs.
Electric & Fuel Externalities	See Table 1	DCSEU 2013 Screening Model Assumption[49]
Electric Energy Cost	See Table 8-4	Years 2012-2015 and 2020, drawn from Pepco's filed 2012 through 2014 EmPOWER Maryland Energy Efficiency Plan. The missing years were estimated by linear extrapolation up to 2025, at which point the costs were held constant to be conservative.
Electric Power Cost	See Table 8-5	Years 2012-2015 and 2020, drawn from Pepco's filed 2012 through 2014 EmPOWER Maryland Energy Efficiency Plan. The missing years were estimated by linear extrapolation up to 2025, at which point the costs were held constant to be conservative.
Natural Gas Cost	See Table 8-6	Provided by Washington Gas.
Other Fuels Cost	See Table 8-7	Synapse Energy Economics, Inc.'s "Avoided Energy Supply Costs in New England: 2013 Report" was used as a basis. The average 10-year historical price ratio between the DC and New England retail markets, sourced from the U.S. EIA, was used to adjust values to the DC market.
Risk Adder	10%	DDOE-2010-SEU-0001 B.10.4.1.5 – 10% Reduced risk/uncertainty benefits
NEB Adder	10%	DDOE-2010-SEU-0001 B.10.4.1.6 – 10% Non-Energy Benefits

The tables below presents the avoided supply costs for 2014 (in 2014 dollars) included in the DCSEU screening tool. GDS needs to review the 2014 Screening Assumption Document from VEIC to verify the sources of the current avoided cost.

[49] "Proposed DC Externality values for FY 13" memorandum from DCSEU to DDOE dated September 28, 2012.

Table 8-4: Electric Energy Cost In 2014$, ($/kWh)

Year	Winter Peak	Winter Off-Peak	Summer Peak	Summer Off-Peak
2014	0.0827	0.0633	0.0966	0.0623
2015	0.0848	0.0655	0.0988	0.0633
2016	0.0872	0.0669	0.1017	0.0655
2017	0.0892	0.0684	0.1041	0.0670
2018	0.0913	0.0699	0.1065	0.0686
2019	0.0933	0.0714	0.1090	0.0702
2020	0.0953	0.0729	0.1114	0.0718
2021	0.0973	0.0744	0.1138	0.0734
2022	0.0993	0.0759	0.1163	0.0749
2023	0.1014	0.0774	0.1187	0.0765
2024	0.1034	0.0790	0.1212	0.0781
2025 - 2041[50]	0.1054	0.0805	0.1236	0.0797

Table 8-5. Electric Power Cost 2014$

Year	$/kW-yr
2014	53.48
2015	65.27
2016	71.03
2017	76.83
2018	82.63
Ibid.	88.43
2020	95.70
2021	96.24
2022	100.04
2023	103.83
2024	107.63
2025 - 2041[51]	111.43

Table 8-6. Natural Gas Cost 2014$

Year	$/MMBtu	Year	$/MMBtu

[50] Data remains the same for years 2025 through 2041.
[51] ibid.

Year	$/MMBtu	Year	$/MMBtu
2014	9.36	2028	14.76
2015	9.59	2029	15.53
2016	9.75	2030	16.33
2017	9.94	2031	17.18
2018	10.19	2032	18.07
2019	10.46	2033	19.01
2020	10.73	2034	20.01
2021	11.08	2035	21.06
2022	11.31	2036	22.16
2023	11.50	2037	23.33
2024	12.08	2038	24.57
2025	12.70	2039	25.87
2026	13.35	2040	27.24
2027	14.04	2041	28.69

Table 8-7. Other Fuels Costs 2014$ ($/MMBtu)

Year	Commercial Distillate	Residential Distillate	Propane	Kerosene
2014	21.49	29.18	26.13	27.33
2015	21.40	28.90	25.13	27.07
2016	22.38	30.19	25.99	28.27
2017	23.00	31.00	27.08	29.02
2018	23.40	31.42	27.63	29.42
2019	23.79	31.92	28.14	29.88
2020	24.14	32.37	28.63	30.31
2021	24.59	32.87	28.97	30.77
2022	25.06	33.37	29.36	31.23
2023	25.45	33.88	29.69	31.72
2024	25.85	34.42	29.98	32.22
2025	26.27	34.99	30.27	32.76
2026	26.67	35.51	30.55	33.25
2027	27.08	36.04	30.78	33.74
2028	27.50	36.59	31.02	34.25
2029	27.94	37.14	31.35	34.78

Year	Commercial Distillate	Residential Distillate	Propane	Kerosene
2030	28.40	37.71	31.69	35.31
2031	28.85	38.29	32.04	35.85
2032	29.33	38.87	32.38	36.40
2033	29.80	39.46	32.74	36.94
2034	30.29	40.07	33.09	37.51
2035	30.78	28.96	33.46	38.08
2036	31.27	41.30	33.82	38.66
2037	31.78	41.93	34.18	39.26
2038	32.29	42.56	34.56	39.86
2039	32.82	43.22	34.93	40.47
2040	33.35	43.88	35.31	41.08
2041	33.89	44.55	35.69	41.71

8.1.2 Evaluation of the DCSEU Societal Costs Test Model and Recommendations

In its FY12 evaluation report, the evaluation team noted that the general calculation framework of the SCT cost-effectiveness screening as implemented by DCSEU closely follows the prescribed methodology detailed in the California Standard Practice Manual (CA SPM). The California Standard Practice Manual establishes standard procedures for cost-effectiveness evaluations for utility-sponsored programs and is generally considered the authoritative source for defining cost-effectiveness criteria, and is often referenced by many other states and utilities. In addition, the screening tool is capable of evaluating cost-effectiveness based on various market replacement approaches, including replace-on-burnout, retrofit, and early retirement.

The evaluation team made the following recommendations for future model refinements in the FY12 and FY13 reports. Also shown is the recommendation and status of action taken on each. .

i. **Consider expanding functionality of model beyond measure level screening.** For instance, include the ability to quickly and easily screen for cost-effectiveness at both the measure and program level. Current model functionality requires societal cost-effectiveness at the program and portfolio level to calculate manually for quarterly and annual reporting purposes. Also, provide the ability to include program administrative costs at either the measure level and/or program-specific level.

   Status: The Screening Tool is not typically for use to process batch data, as DCSEU screens at the measure level. Using the tool to screen at the track level would be difficult without additional analysis and assumptions given the unique screening inputs for each measure (measure life, loadshape, etc.). Developing screening outputs on a measure-by-measure basis and input into our KITT database.

Additionally developing cost effectiveness analyses by querying KITT to provide the screening output (SumOfPVBenefit and SumOfPVCost), incentives, and direct costs associated with each track. For the renewables tracks allocated support costs are included, based on those track's portion of total direct costs.

Evaluation Response: As noted in the VEIC response, the DCSEU screens cost effectiveness at a measures level. As such, the additionally functionality to screen at a program level is not required at this time.

ii. **Provide for the capability to include net-to-gross (NTG) factors into the model once they are developed.** A NTG factor of 1.0 is currently in use. In the SCT, benefits should be calculated using net program savings. Although this model is utilized for measure screening prior to program implementation, as programs are evaluated and NTG values are determined, it will be beneficial to have the ability to factor the prescribed NTG ratios into the cost-effectiveness screen.

Status: Within the DCSEU database, an external and more streamlined process is in use to calculate NTG numbers. Because all results are verified on gross numbers, it makes sense to have this be a back-end calculation to maintain traceability and consistency among all other DCSEU data systems.

Evaluation Response: GDS understands that NTG ratios are calculated outside of the VEIC cost effectiveness model. We are simply recommending that the model include the capability to input NTG ratios explicitly to make it easier to conduct sensitivity analysis around NTG values and enhance transparency.

iii. **For O&M costs, GDS recommend that VEIC classify O&M Expense Savings as a benefit in their future cost benefit model runs.** The National Action Plan for Energy Efficiency (NAPEE) supports this recommendation on understanding cost-effectiveness, which classifies O&M expense savings a benefit when determining cost-effectiveness.

Status: This change was implemented for FY14 screening tools.

Evaluation Response: GDS verified the change made in the FY14 Screening Model.

iv. **Fossil Fuel Savings:** GDS recommends that VEIC classify fossil fuel savings into the benefit category. The NAPEE regards co-benefits in water, natural gas, fuel oil, etc. as energy savings benefits.

Status: Fuel savings are treated as benefits when savings occurs. They are treated as costs when increased usage occurs.

Evaluation Response: The stated approach for treating fuel savings and increased fuel use is appropriate.

v. **Avoided costs:** Accurate avoided costs are a critical component in any evaluation of cost-effectiveness and the DCSEU should ensure that their screening tool employs the latest and most accurate estimates of avoided supply costs, as they are revised and updated. In addition, the societal benefit/cost test is impacted by the use of a societal discount rate and the quantification of environmental externalities and non-energy benefits. The DCSEU should also ensure that the societal screening tool utilizes the most recent approved societal discount rate (DCSEU screening tool currently utilizes a real discount rate of 2.647 percent equal to the 10-year treasury rate posted on Oct. 1, 2013) and potentially undertake a review of externality adder best practices in an effort to refine their current estimates.

Status: VEIC provided DC 2014 PIP Screening Assumption memo[52] with the latest avoided cost used in the 2014 Screening Tool.

Evaluation Response: GDS reviewed the Screening assumption memo. This item has been adequately addressed.

vi. Evaluate the current Solar Renewable Energy Certificate (SREC) market price to determine if the value of $241 is a reasonable assumption to calculate avoided compliance payments.

Status: VEIC provided GDS with a memo related to Screening Assumptions for the DCSEU solar renewable energy program portfolio[53]. This memo specified the following:

"The previous year's average SREC trading price for the DC market will be used to establish the SREC value for the subsequent program year. For 2015, the average 2014 SREC price ($479.84) will be used to calculate the value of avoided compliance payments, up to 2017, at which point the SACP begins an annual decline. At this point, the SREC price is taken to be 95.9% of the SACP (ratio of $479.84 to $500) until the RPS expires in 2024. Beginning 2024, standard avoided costs of electric generation are used."

Evaluation Response: The SREC value has been updated to current figures based upon DC market prices. This item has been adequately addressed.

8.1.3 Environmental Adders Used in the DCSEU Societal Cost Test

For FY14, the District of Columbia estimated the value of environmental adders by calculating the externality avoided costs based on reduced CO_2 emissions.

[52] 2014 Program Implementation Procedure (PIP) Market: District of Columbia Sustainable Energy Utility Initiator: Pierre van der MerweProcedure: Documentation for FY2014 Screening Assumptions, Effective 10/1/2013

[53] Screening assumptions for the DCSEU solar renewable energy program portfolio. Memo dated 1/7/2015.

Fossil Fuel Externalities

The basis of all fossil fuel externality values is the $100/ton CO2. We took the values from an AESC 2013 Report[54] that provided the values for natural gas and residential, commercial and industrial distillate (fuel oil). The commercial and industrial distillate externality values were combined into one value based on 2010 Energy Information Administration (EIA) data, which indicated 99.8% commercial versus 0.2% industrial distillate consumption. These values were inflated to 2014 dollars using a 2.39% inflation assumption.

The externality values for propane and kerosene were not provided in the AESC 2013 Report. These were calculated using the $100/ton CO_2 and EIA emission factors of 63.07 kg CO_2/MMBtu and 72.31 kg CO_2/MMBtu for propane and kerosene, respectively.

The following table shows the externality values for fossil fuels used in FY14.

Table 8-8. Fossil Fuel Externality Values FY14 (in 2014 dollars)

	Natural Gas	Residential Distillate	Residential Propane	Commercial Distillate	Commercial Propane	Kerosene
$/MMBtu	$6.021	$8.857	$7.118	$8.396	$7.118	$8.161

Electric Externalities

The basis of electric externalities is on $100 per short ton of CO2. Calculating the marginal electric externality value also required the marginal type of generation mix, the heat rate for each generation type, and the CO2 emissions rates by fuel type.

Combining all of the above factors produces a weighted average electric externality for CO2 emissions of $ 0.062/kWh in 2013 dollars. Inflating by 2.39% annual gives an electric externality value of $0.064/kWh in 2014 dollars.

The above electric externality value assumes that none of the costs for CO2 abatement are internalized in the Pepco electric avoided costs used for efficiency cost-effectiveness analysis in DC. If any of the costs are internalized, then that amount internalized for each particular year should be subtracted from the $0.064/kWh externality value calculated above.

8.1.4 Other Adders Used in the DCSEU Societal Cost Test

In addition to environmental externality adders, DCSEU also includes Risk and Non-Energy Benefits adders in its program cost effectiveness analysis. Each adder assumes a value of 10 percent. The adders are applied to total energy and capacity avoided costs.

[54] Avoided-Energy-Supply-Component (AESC) Study Group, titled Avoided Energy Supply Costs in New England: 2013 Report, July 12, 2013, by Synapse Energy Economics, Inc.

Per the DCSEU contract, the definitions of these adders are as follows:

Risk Adder: Recognizes the benefits of energy efficiency and conservation in addressing risk and uncertainty.

Non-Energy Benefits (NEBs) Adder: Recognizes the non-energy benefits of energy efficiency including comfort, noise reduction, aesthetics, health and safety, ease of selling/leasing home or building, improved occupant productivity, reduced work absences due to reduced illnesses, ability to stay in home/avoided moves, and macroeconomic benefits.