Guidehouse
Outwit Complexity

Final Annual Report to the Pennsylvania Public Utility Commission Phase IV of Act 129

Program Year 13
(June 1, 2021-May 31, 2022)

For Pennsylvania Act 129 of 2008
Energy Efficiency and Conservation Plan

Prepared for:

DUQUESNE LIGHT CO.

Duquesne Light Company

Submitted by:

Guidehouse Inc.
1676 International Drive, Suite 800
McLean, VA 22102

September 30, 2022

guidehouse.com

Table of Contents

Figures

Tables

Acronyms

C&I	Commercial and Industrial
CDD	Cooling Degree Days
CHP	Combined Heat and Power
CSP	Conservation Service Provider or Curtailment Service Provider
CV	Coefficient of Variation
DLC	Direct Load Control
DDR	Dispatchable Demand Response
EAP	Energy Association of Pennsylvania
EDC	Electric Distribution Company
EDT	Eastern Daylight Time
EE&C	Energy Efficiency and Conservation
EFLH	Equivalent Full Load Hours
EM&V	Evaluation, Measurement, and Verification
ER	Early Replacement
EUL	Effective Useful Life
FCM	Forward Capacity Market
FE	FirstEnergy
GNI	Government, Nonprofit, Institutional
HDD	Heating Degree Days
HER	Home Energy Report
HIM	High-Impact Measure
HOU	Hours of Use
HPWH	Heat Pump Water Heater
HVAC	Heating, Ventilating, and Air Conditioning
ICSP	Implementation Conservation Service Provider
IDI	In-Depth Interview
IMP	Interim Measure Protocol
kW	Kilowatt
kWh	Kilowatt-hour
LBVC	Large Business Virtual Commissioning
LED	Light-Emitting Diode
LI	Low-Income
LI-BEEP	LI Behavioral Energy Efficiency Program
LIEEP	LI Energy Efficiency Program
LLF	Line Loss Factor
MW	Megawatt
MWh	Megawatt-hour
NPV	Net Present Value
NTG	Net-to-Gross
O&M	Operation and Maintenance
P4TD	Phase IV to Date
PA PUC	Pennsylvania Public Utility Commission
PJM	Pennsylvania-Jersey-Maryland Interconnection LLC
PMRS	Program Management and Reporting System (Duquesne's Tracking Database)
PSA	Phase IV to Date Preliminary Savings Achieved; equal to VTD + PYRTD
PSA+CO	PSA savings plus Carryover from Phase III
PY	Program Year: e.g., PY13, from June 1, 2021, to May 31, 2022
PYRTD	Program Year Reported to Date

PYVTD	Program Year Verified to Date
R-BEEP	Residential Behavioral Energy Efficiency Program
RCT	Randomized Control Trial
RDIP	Residential Downstream Incentives Program
ROB	Replace on Burnout
RPM	Reliability Pricing Model
RTD	Phase IV to Date Reported Gross Savings
RTO	Regional Transmission Organization
SBDI	Small Business Direct Install
SO	Spillover
SWE	Statewide Evaluator
TA	Trade Ally
TRC	Total Resource Cost
TRM	Technical Reference Manual
VTD	Phase IV to Date Verified Gross Savings
WACC	Weighted Average Cost of Capital

Types of Savings

Gross Savings: The change in energy consumption or peak demand that results directly from program-related actions taken by participants in an energy efficiency and conservation (EE&C) program, regardless of why they participated.

Net Savings: The total change in energy consumption or peak demand that is attributable to an EE&C program. Depending on the program delivery model and evaluation methodology, the net savings estimates may differ from the gross savings estimate due to adjustments for the effects of free riders, changes in codes and standards, market effects, participant and nonparticipant spillover, and other causes of changes in energy consumption or demand not directly attributable to the EE&C program.

Reported Gross: Also referred to as ex ante (Latin for beforehand) savings. The energy and peak demand savings values calculated by the electric distribution company (EDC) or its program implementation conservation service providers (ICSPs) and stored in the program tracking system.

Unverified Reported Gross: The Phase IV Evaluation Framework allows EDCs and the evaluation contractors the flexibility to not evaluate each program every year. If an EE&C program is being evaluated over a multi-year cycle, the reported savings for a program year where evaluated results are not available are characterized as unverified reported gross until the impact evaluation is completed and verified savings can be calculated and reported.

Verified Gross: Also referred to as ex post (Latin for from something done afterward) gross savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after the gross impact evaluation and associated measurement and verification efforts have been completed.

Verified Net: Also referred to as ex post net savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after application of the results of the net impact evaluation. Typically calculated by multiplying the verified gross savings by a net-to-gross (NTG) ratio.

Annual Savings: Energy and demand savings expressed on an annual basis, or the amount of energy or peak demand an EE&C measure or program can be expected to save over the course of a typical year. Annualized savings are noted as MWh/year or MW/year. The Pennsylvania technical reference manual (TRM) provides algorithms and assumptions to calculate annual savings, and Act 129 compliance targets for consumption reduction are based on the sum of the annual savings estimates of installed measures or behavior change.

Lifetime Savings: Energy and demand savings expressed in terms of the total expected savings over the useful life of the measure. Typically calculated by multiplying the annual savings of a measure by its effective useful life (EUL). The Total Resource Cost (TRC) Test uses savings from the full lifetime of a measure to calculate the cost-effectiveness of EE&C programs.

Program Year Reported to Date (PYRTD): The reported gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year. Program Year to Date (PYTD) values for energy efficiency will always be reported gross savings in a semiannual or preliminary annual report.

Program Year Verified to Date (PYVTD): The verified gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year as determined by the impact evaluation findings of the independent evaluation contractor.

Phase IV to Date (P4TD): The energy and peak demand savings achieved by an EE&C program or portfolio within Phase IV of Act 129. Reported in several permutations described below.

Phase IV to Date Reported (RTD): The sum of the reported gross savings recorded to date in Phase IV of Act 129 for an EE&C program or portfolio.

Phase IV to Date Verified (VTD): The sum of the verified gross savings recorded to date in Phase IV of Act 129 for an EE&C program or portfolio, as determined by the impact evaluation finding of the independent evaluation contractor.

Phase IV to Date Preliminary Savings Achieved (PSA): The sum of the verified gross savings (VTD) from previous program years in Phase IV where the impact evaluation is complete plus the reported gross savings from the current program year.

Phase IV to Date Preliminary Savings Achieved + Carryover (PSA+CO): The sum of the verified gross savings from previous program years in Phase IV plus the reported gross savings from the current program year plus any verified gross carryover savings from Phase III of Act 129. This is the best estimate of an EDC's progress toward the Phase IV compliance targets.

Phase IV to Date Verified + Carryover (VTD + CO): The sum of the verified gross savings recorded to date in Phase IV plus any verified gross carryover savings from Phase III of Act 129.

DUQUESNE LIGHT CO.

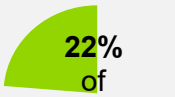
Guidehouse

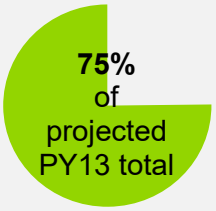
PORTFOLIO

Duquesne Light offers 17 energy efficiency programs to nonresidential, residential, and low-income customers

Reported Energy Savings

Phase IV has so far been reported to save **77,238 MWh** (VTD+CO)

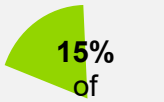


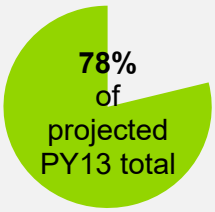


PY13 saved **49,101 MWh/yr**

Reported Demand Savings

Phase IV has so far been reported to save **9.21 MW** (VTD)





PY13 saved **9.21 MW/yr**

PY13 Participation

A total of **216,759** participants:

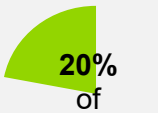
24,809 Low Income

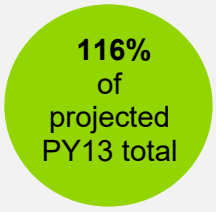
191,040 Residential

910 Nonresidential

Actual Expenditures ($1,000)

Phase IV expenditures: **$19,946**





PY13 expenditures: **$19,946**

1. Introduction

Pennsylvania Act 129 of 2008, signed on October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania for Phases I (2008 through 2013), II (2013 through 2016), and III (2016 through 2021). In late 2020, each EDC filed a new energy efficiency and conservation (EE&C) plan with the Pennsylvania Public Utility Commission (PA PUC) detailing the proposed design of its portfolio for Phase IV. These plans were updated based on stakeholder input and subsequently approved by the PUC in 2021.

Implementation of Phase IV of the Act 129 programs began on June 1, 2021. This report documents the progress and effectiveness of the Phase IV EE&C accomplishments for Duquesne Light Company (Duquesne Light) in program year 13 (PY13), as well as the cumulative accomplishments of the Phase IV programs since inception. This report additionally documents the energy savings carried over from Phase III. The Phase III carryover savings count toward EDC savings compliance targets for Phase IV.

This report details the participation, spending, reported gross, verified gross energy (MWh) and peak demand (MW), and verified net impacts of the energy efficiency programs in PY13. Compliance with Act 129 savings goals are ultimately based on verified gross savings. This report also includes estimates of cost-effectiveness accorded to the Total Resource Cost (TRC) Test.[1] Duquesne Light has retained Guidehouse Inc. (Guidehouse) as an independent evaluation contractor for Phase IV of Act 129. Guidehouse is responsible for the measurement and verification of the savings and calculation of gross verified and net verified savings.

Guidehouse also performed a process evaluation to examine the design, administration, implementation, and market response to the EE&C program. This report presents the key findings and recommendations identified by the process evaluation and documents any changes to EE&C program delivery considered based on the recommendations.

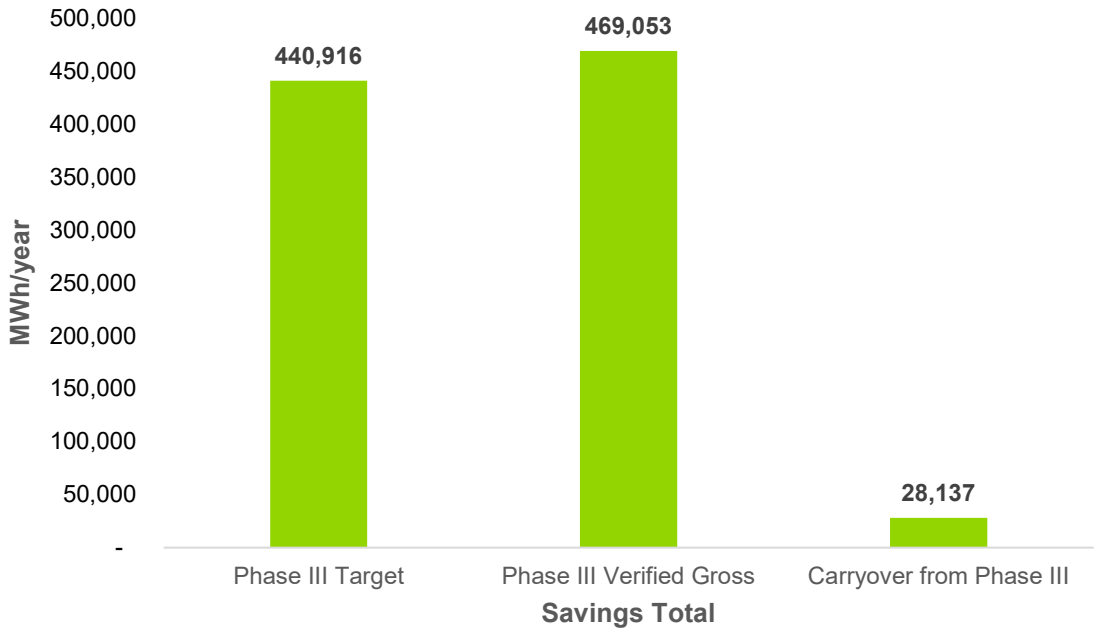
[1] The Pennsylvania TRC Test for Phase I was adopted by PUC Order at Docket No. M-2009-2108601 on June 23, 2009 (*2009 PA TRC Test Order*). The TRC Test Order for Phase I later was refined in the same docket on August 2, 2011 (*2011 PA TRC Test Order*). The 2013 TRC Order for Phase II of Act 129 was issued on August 30, 2012. The 2016 TRC Test Order for Phase III of Act 129 was adopted by PUC Order at Docket No. M-2015-2468992 on June 11, 2015. The 2021 TRC Test Order for Phase IV of Act 129 was adopted by PUC Order at Docket No. M-2019-3006868 on December 19, 2019.

2. Summary of Achievements

2.1 Carryover Savings from Phase III of Act 129

Duquesne Light has a total of 28,137 MWh/year of portfolio-level carryover savings from Phase III. Figure 2-1 compares Duquesne Light's Phase III verified gross savings total to the Phase III compliance target to illustrate the carryover calculation.

Figure 2-1: Carryover Savings from Phase III of Act 129



Source: SWE Phase III Report[2]

The Commission's Phase IV Implementation Order[3] also allowed EDCs to carry over savings in excess of the Phase III low-income (LI) savings goal.[4] With the carrying over of 3,266 MWh/yr of Phase II LI savings, Duquesne Light achieved the Phase III compliance target. However, with 23,128 MWh/yr of VTD LI energy savings achieved during Phase III, Duquesne Light does not have LI carryover energy savings from Phase III to Phase IV. Figure 2-2 shows the calculation of carryover savings for the LI customer segment.

[2] PA SWE, *SWE Annual Report Act 129 Phase III and Program Year 12*, March 31, 2022, https://www.puc.pa.gov/pcdocs/1746475.pdf

[3] Pennsylvania Public Utility Commission, *Energy Efficiency and Conservation Program Implementation Order* at Docket No. M-2020-3015228 (*Phase IV Implementation Order*), entered June 18, 2020.

[4] Proportionate to those savings achieved by dedicated LI programs in Phase III.

Figure 2-2: LI Carryover from Phase III

Source: SWE Phase III Report[5]

2.2 Phase IV Energy Efficiency Achievements to Date

Phase IV energy savings targets (MWh) were established at the meter level and peak demand reduction targets (MW) were set at the system level. Accordingly, the MWh totals in this report are presented at the meter level, while peak demand savings are adjusted for transmission and distribution losses to reflect system-level savings. Since the beginning of PY13 on June 1, 2021, Duquesne Light has claimed:

- 47,492 MWh/yr of reported gross electric energy savings (PYRTD)
- 8.14 MW/yr of reported gross peak demand savings (PYRTD)
- 49,101 MWh/yr of verified gross electric energy savings (PYVTD)
- 9.21 MW/yr of verified gross peak demand savings (PYVTD)

Since the beginning of Phase IV of Act 129 on June 1, 2021, Duquesne Light has achieved:

- 47,492 MWh/yr of reported gross electric energy savings (RTD)
- 8.14 MW/yr of reported gross peak demand savings (RTD)
- 49,101 MWh/yr of verified gross electric energy savings (VTD)
- 9.21 MW/yr of verified gross peak demand savings (VTD)

[5] PA SWE, *SWE Annual Report Act 129 Phase III and Program Year 12*, March 31, 2022, https://www.puc.pa.gov/pcdocs/1746475.pdf

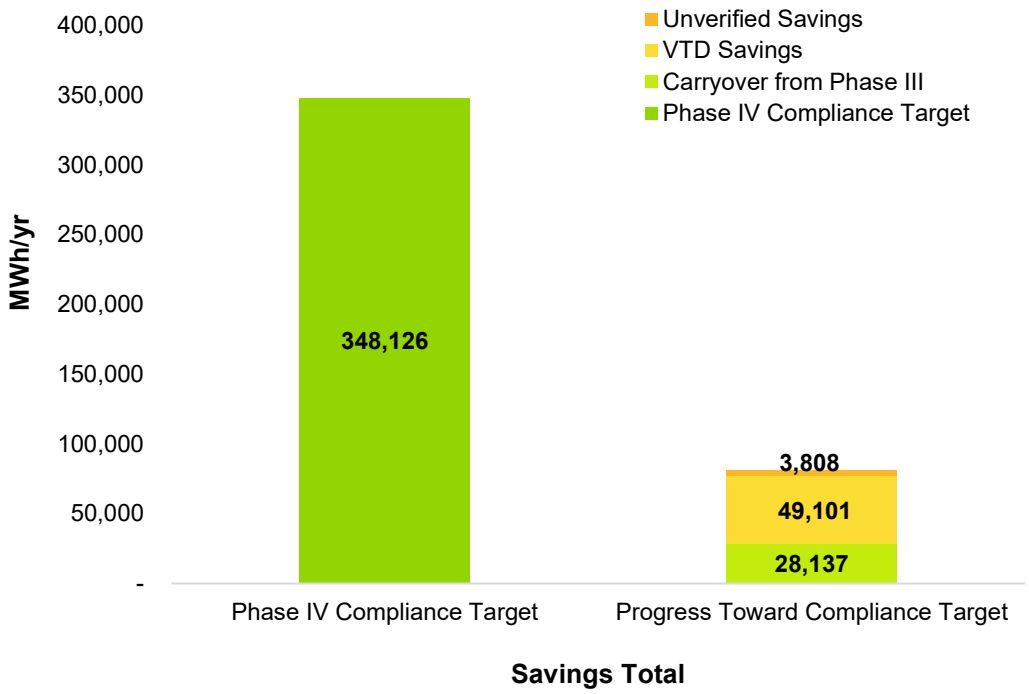
- This represents 15% of the May 31, 2026, peak demand savings compliance target of 62 MW/yr

Including carryover savings from Phase III, Duquesne Light has achieved:

- 77,238 MWh/yr of VTD + portfolio-level carryover energy savings
  - This represents 22% of the May 31, 2026, energy savings compliance target of 348,126 MWh/yr.

Figure 2-3 summarizes Duquesne Light's progress toward the Phase IV MWh portfolio compliance target and Figure 2-4 summarizes progress toward the Phase IV MW portfolio compliance target. In PY13 the evaluation of the Residential Low Income Energy Efficiency Program was deferred as part of the SWE approved evaluation plan. Savings for this program are currently considered unverified until the impact evaluation is conducted in PY14. Additionally, there were a number of Nonresidential Midstream projects that were considered unverified in PY13 due to extraordinary circumstances in the ability for customers to find contractors to install measures. Therefore, the evaluation for these projects was also deferred and will be completed in PY14.

Figure 2-3: EE&C Plan Performance Toward Phase IV Portfolio Compliance Target



Source: Guidehouse analysis

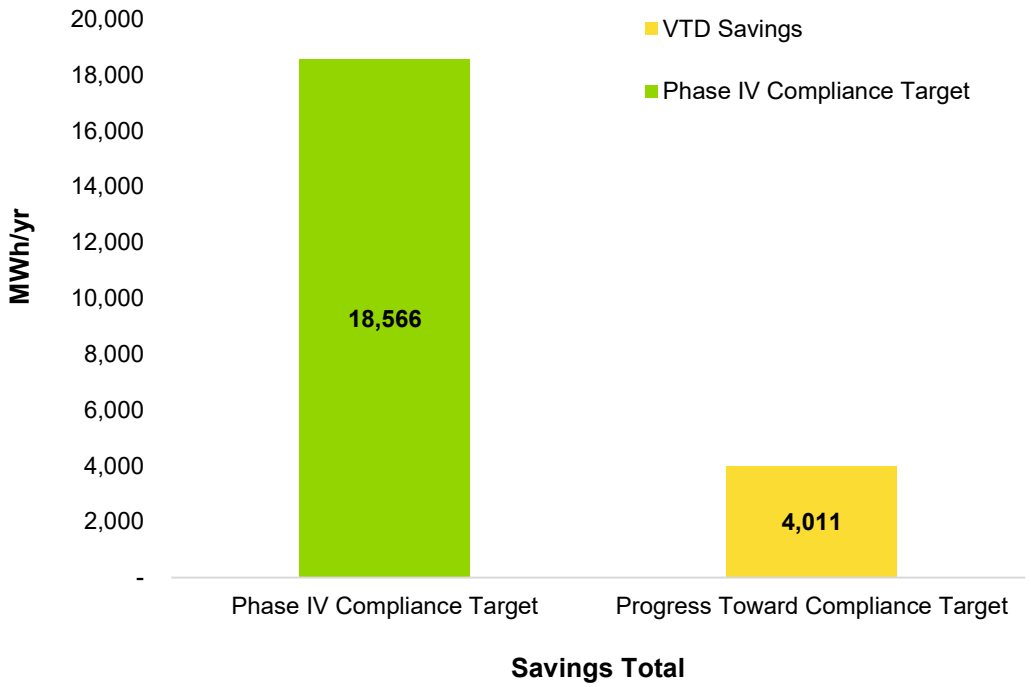
Figure 2-4: EE&C Plan Performance Toward Phase IV Portfolio Compliance Target

Source: Guidehouse analysis

The Phase IV Implementation Order directed EDCs to offer conservation measures to the LI customer segment based on the proportion of electric sales attributable to LI households. The proportionate number of measures target for Duquesne Light is 8.4%. Duquesne Light offers a total of 194 EE&C measures to its residential and nonresidential customer classes. There are 28 measures available to the LI customer segment at no cost to the customer. This represents 14.4% of the total measures offered in the EE&C plan and exceeds the proportionate number of measures target.

The PA PUC also established a LI energy savings target of 5.8% of the portfolio savings goal. The LI savings target for Duquesne Light is 18,566 MWh/yr and is based on verified gross savings. Figure 2-5 compares the VTD performance for the LI customer segment to the Phase IV savings target. Based on the latest available information, Duquesne Light has achieved 22% of the Phase IV LI energy savings target.

Figure 2-5: EE&C Plan Performance Toward Phase IV LI Compliance Target



Source: Guidehouse analysis

2.2.1 Phase IV Performance, Multifamily Housing

Duquesne Light has achieved 636 MWh/yr of verified gross electric energy savings (PYVTD) from multifamily housing, including 636 MWh/yr of verified gross electric energy savings (PYVTD) from LI households. These savings are reported under the Small Business Direct Install program.

2.3 Phase IV Performance by Customer Segment

Table 2-1 presents the participation, savings, and spending by customer sector for PY13.The residential, small commercial and industrial (C&I), and large C&I sectors are defined by EDC tariff and the residential LI and governmental/educational/nonprofit sector were defined by statute (66 Pa. C.S. § 2806.1). The residential LI segment is a subset of the residential customer class and the government, nonprofit, institutional (GNI) segment will include customers who are part of the small C&I or large C&I rate classes. The savings, spending, and participation values for the LI segments have been removed from the parent sectors in Table 2-1. Pursuant to the Commission's Implementation Order for Phase IV, Duquesne Light will not offer a specialized program, but will report the savings associated with the GNI customers participating in the Non-Residential programs. The savings, spending, and participation values for the GNI segment are shown in Table 2-1, but have not been removed from the parent sectors.

Table 2-1: PY13 Summary Statistics by Customer Segment

Parameter	Residential (Non-LI)	LI	Small C&I	Large C&I	GNI*	Total
Number of participants	191,040	24,809	720	190	204	216,759
PYVTD MWh/yr	8,375	3,375	16,150	21,201	5,767	49,101
PYVTD MW/yr	1.05	0.34	4.26	3.56	0.99	9.21
Incentives ($1,000)	$219	$975	$2,314	$1,537	$742	$5,045

**Small C&I and large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

Table 2-2 summarizes plan performance by sector since the beginning of Phase IV.

Table 2-2: Phase IV Summary Statistics by Customer Segment

Parameter	Residential (Non-LI)	LI	Small C&I	Large C&I	GNI*	Total
Number of Participants	191,040	24,809	720	190	204	216,759
VTD MWh/yr	8,375	3,375	16,150	21,201	5,767	49,101
VTD MW/yr	1.05	0.34	4.26	3.56	0.99	9.21
Incentives ($1,000)	$219	$975	$2,314	$1,537	$742	$5,045

**Small C&I and large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

2.4 Summary of Participation by Program

Participation is defined differently for certain programs and program components depending on the program delivery channel and data tracking practices. The nuances of the participant definition vary by program and are summarized by program in the following bullets. Table 2-3 provides the current participation totals for PY13 and Phase IV:

- For customers participating in the Rebate component of the Residential Downstream Incentives Program (RDIP), it is the number of distinct account numbers in the program tracking data within a given program year. For the Educational Kits component of RDIP, it is the number of kits distributed within a given program year.
- For Residential Midstream Incentives Program (RMIP), it is the number of distinct account numbers in the program tracking data within a given program year.

- For Residential Upstream Incentives Program (RUIP), participation cannot be accurately collected due to the nature of the program and therefore are not counted. Guidehouse used guidance listed in the applicable Pennsylvania TRM sections for a census of projects implemented during PY13.
- For Residential Appliance Recycling Program (RARP), it is the number of distinct measures in the program tracking data within a given program year.
- For Low Income Energy Efficiency Program (LIEEP), it is the number of distinct account numbers in the tracking data within a given program year.
- For Residential and LI Behavior, it is the number of distinct account numbers in the tracking data within a given program year.
- For Small Business Direct Install (SBDI), it is the number of unique participants (defined as unique account numbers).
- For Small and Large Business Solutions, including industrial, it is the number of unique participants (defined as unique account numbers).
- For Small and Large Business Midstream Solutions, including industrial, it is the number of unique participants (defined as unique account numbers).

Table 2-3: EE&C Portfolio Participation by Program

Program	PY13 Participation	P4TD Participation
Downstream Incentives	4,648	4,648
Midstream Incentives	-	-
Upstream Incentives	N/A	N/A
Appliance Recycling	545	545
Residential Total	**5,193**	**5,193**
LI Total	**4,211**	**4,211**
Residential Behavior Total	**185,846**	**185,846**
LI Behavior Total	**20,598**	**20,598**
Small Business Direct-Install	41	41
Small Business Solutions	191	191
Small Business Midstream Solutions	488	488
Small Business Virtual Commissioning	-	-
Commercial - Large Business Solutions	49	49
Industrial - Large Business Solutions	13	13
Commercial - Large Business Midstream Solutions	89	89
Industrial - Large Business Midstream Solutions	39	39
Large Business Virtual Commissioning	-	-
Nonresidential Total	**910**	**910**
Portfolio Total	**216,759**	**216,759**

Source: Guidehouse analysis

2.5 Summary of Impact Evaluation Results

During PY13, Guidehouse completed impact evaluations for several program components in the portfolio. Table 2-4 summarizes the realization rates and net-to-gross (NTG) ratios by evaluation component.

Table 2-4: Impact Evaluation Results Summary

Program and Initiative	Energy Realization Rate	Demand Realization Rate	NTG Ratio
Downstream Incentives	72%	97%	68%
Midstream Incentives	N/A	N/A	N/A
Upstream Incentives	120%	131%	65%
Appliance Recycling	113%	112%	47%
Residential Total	**97%**	**112%**	**64%**
LI Total	**86%**	**88%**	**100%**
Residential HER Total	**102%**	**94%**	**100%**
LI HER Total	**128%**	**280%**	**100%**
Small Business Direct-Install	103%	109%	99%
Small Business Solutions	136%	199%	79%
Small Business Midstream Solutions	60%	72%	88%
Small Business Virtual Commissioning	N/A	N/A	N/A
Commercial - Large Business Solutions	114%	119%	79%
Industrial - Large Business Solutions	90%	95%	61%
Commercial - Large Business Midstream Solutions	141%	103%	88%
Industrial - Large Business Midstream Solutions	146%	100%	88%
Large Business Virtual Commissioning	N/A	N/A	N/A
Nonresidential Total	105%	115%	82%
Portfolio Total	103%	113%	84%

Source: Guidehouse analysis

2.6 Summary of Energy Impacts by Program

Act 129 compliance targets are based on annualized savings estimates (MWh/year). Each program year, the annual savings achieved by EE&C program activity are recorded as incremental annual, or first-year, savings and added to an EDC's progress toward compliance. Incremental annual savings estimates are presented in Section 2.6.1. Lifetime energy savings incorporate the effective useful life (EUL) of installed measures and estimate the total energy savings associated with EE&C program activity. Lifetime savings are used in the TRC Test by program participants when assessing the economics of upgrades and by the statewide evaluator (SWE) when calculating the emissions benefits of Act 129 programs. Section 2.6.2 presents the lifetime energy savings by program.

2.6.1 Incremental Annual Energy Savings by Program

Table 2-5 presents a summary of the PY13 and Phase IV to date energy savings by program. The energy impacts in this report are presented at the meter level and do not reflect adjustments for transmission and distribution losses. The verified gross savings are adjusted by the energy recent realization rate and the verified net savings are adjusted by both the realization rate and the NTG ratio.

Table 2-5: Incremental Annual Energy Savings by Program (MWh/Year)

Program	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Residential Downstream Incentives	1,533	1,099	749	1,533	1,099	749
Residential Midstream Incentives	N/A	N/A	N/A	N/A	N/A	N/A
Residential Upstream Incentives	1,381	1,659	1,083	1,381	1,659	1,083
Residential Appliance Recycling	347	391	183	347	391	183
Low Income Energy Efficiency	2,534	2,179	2,179	2,534	2,179	2,179
Residential Behavioral Savings	5,137	5,227	5,227	5,137	5,227	5,227
LI Residential Behavioral	931	1,196	1,196	931	1,196	1,196
Small Business Direct Install	1,298	1,343	1,333	1,298	1,343	1,333
Small Business Solutions	6,134	8,369	8,369	6,134	8,369	8,369
Small Business Midstream Solutions*	10,665	6,438	5,659	10,665	6,438	5,659
Small Business Virtual Commissioning	N/A	N/A	N/A	N/A	N/A	N/A
Commercial Large Business Solutions	9,189	10,442	10,442	9,189	10,442	10,442
Industrial Large Business Solutions	2,142	1,933	1,933	2,142	1,933	1,933
Large Business Midstream Solutions – Commercial*	3,359	4,727	4,727	3,359	4,727	4,727
Large Business Midstream Solutions – Industrial*	2,841	4,098	4,098	2,841	4,098	4,098
Large Business Virtual Commissioning	N/A	N/A	N/A	N/A	N/A	N/A
Portfolio Total	47,492	49,101	41,355	47,492	49,101	41,355

** These programs had unverified savings and therefore the verified to date savings will increase after the rest of the program savings are verified. Savings considered unverified will be adjusted once the impact evaluation is complete.*
Source: Guidehouse analysis

2.6.2 Lifetime Energy Savings by Program

Table 2-6 presents the PYTD and P4TD lifetime energy savings by program. Lifetime energy savings are calculated by multiplying the annual energy savings by the EUL. Per the PA 2016 TRC Order, the measure EUL does not exceed 15 years for any measure in the portfolio. Early replacement measures are subject to a dual baseline calculation, leading to modified lifetime savings. For these measures, savings relative to the in-place baseline equipment are used for

the remaining useful lifetime (RUL) of the base equipment. After the RUL, savings relative to code equipment are used for the remainder of the efficient measure's EUL.

Table 2-6: Lifetime Energy Savings by Program (MWh)

Program Name	PYVTD Gross Lifetime (MWh)	PYVTD Net (MWh)	VTD Gross Lifetime (MWh)	VTD Net Lifetime (MWh)
Residential Downstream Incentives	11,081	7,554	11,081	7,554
Residential Midstream Incentives	-	-	-	-
Residential Upstream Incentives	23,503	15,345	23,503	15,345
Residential Appliance Recycling	1,873	875	1,873	875
Low Income Energy Efficiency	13,233	13,233	13,233	13,233
Residential Behavioral Savings	7,936	7,936	7,936	7,936
LI Residential Behavioral	1,899	1,899	1,899	1,899
Small Business Direct Install	20,140	19,999	20,140	19,999
Small Business Solutions	124,786	98,274	124,786	98,274
Small Business Midstream Solutions	96,569	84,884	96,569	84,884
Small Business Virtual Commissioning	-	-	-	-
Commercial Large Business Solutions	156,453	123,213	156,453	123,213
Industrial Large Business Solutions	28,801	17,506	28,801	17,506
Large Business Midstream Solutions - Commercial	70,906	62,326	70,906	62,326
Large Business Midstream Solutions - Industrial	61,465	54,028	61,465	54,028
Large Business Virtual Commissioning	-	-	-	-
Portfolio Total	**618,645**	**507,071**	**618,645**	**507,071**

Source: Guidehouse analysis

2.7 Summary of Peak Demand Reduction Impacts by Program

Act 129 defines peak demand savings from energy efficiency as the average expected reduction in electric demand from 2:00 p.m. to 6:00 p.m. EDT on non-holiday weekdays from June through August. Peak demand impacts from energy efficiency in this report are presented at the system level, meaning they have been adjusted to account for transmission and distribution losses. Duquesne Light uses the following line loss percentages/multipliers by sector.

- Residential = 1.0741
- Small C&I = 1.0741
- Large C&I = 1.0081

Table 2-7 presents a summary of the peak demand impacts by energy efficiency program through the current reporting period.

Table 2-7: Peak Demand Savings by Energy Efficiency Program (MW/Year)

Program Name	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Residential Downstream Incentives	0.30	0.29	0.19	0.30	0.29	0.19
Residential Midstream Incentives	N/A	0.00	0.00	0.00	0.00	0.00
Residential Upstream Incentives	0.24	0.32	0.24	0.24	0.32	0.24
Residential Appliance Recycling	0.07	0.07	0.03	0.07	0.07	0.03
Low Income Energy Efficiency	0.27	0.24	0.24	0.27	0.24	0.24
Residential Behavioral Savings	0.40	0.38	0.38	0.40	0.38	0.38
LI Residential Behavioral	0.03	0.10	0.10	0.03	0.10	0.10
Small Business Direct Install	0.21	0.23	0.22	0.21	0.23	0.22
Small Business Solutions	1.25	2.50	1.97	1.25	2.50	1.97
Small Business Midstream Solutions	2.13	1.54	1.35	2.13	1.54	1.35
Small Business Virtual Commissioning	N/A	0.00	0.00	0.00	0.00	0.00
Commercial Large Business Solutions	1.71	2.04	1.60	1.71	2.04	1.60
Industrial Large Business Solutions	0.33	0.60	0.53	0.58	0.60	0.53
Large Business Midstream Solutions - Commercial	0.58	0.00	0.00	0.00	0.00	0.00
Large Business Midstream Solutions - Industrial	0.61	0.31	0.19	0.33	0.31	0.19
Large Business Virtual Commissioning	N/A	0.61	0.54	0.61	0.61	0.54
Portfolio Total	**8.14**	**9.21**	**7.58**	**8.14**	**9.21**	**7.58**

Source: Guidehouse analysis

2.7.1 Peak Demand Savings Nominated to PJM Forward Capacity Market

For Phase IV of Act 129, EDCs are expected to retain the capacity rights to Act 129 projects and nominate a portion of the resources acquired to PJM Forward Capacity Market (FCM). If the resources clear, proceeds flow back to the rate class that generated the Act 129 savings to offset cost recovery via riders. Interior lighting measures savings from certain Non-Residential programs may contribute to Duquesne Light's collective EE Resource for nomination into PJM FCM RPM Base Residual Auction. Duquesne Light did not nominate any projects to PJM in PY13.

2.8 Summary of Fuel Switching Impacts

Act 129 allows EDCs to achieve electric savings by converting electric equipment to non-electric equipment. Table 2-8 summarizes key fuel switching metrics in PY13 and to date in Phase IV.

Table 2-8. Fuel Switching Summary

Metric	PY13
Fuel Switching Measures Offered	None
Fuel Switching Measures Implemented	0
VTD Energy Savings Achieved via Fuel Switching (MWh/yr)	N/A
P4TD Increased Fossil Fuel Consumption Due to Fuel Switching Measures (MMBTU/yr)	N/A
P4TD Incentive Payments for Fuel Switching Measures ($1,000)	N/A

Source: Guidehouse analysis

2.9 Summary of Cost-Effectiveness Results

A detailed breakdown of portfolio finances and cost-effectiveness is presented in Table 2-9. TRC benefits in Table 2-9 were calculated using gross verified impacts. Net present value (NPV) PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in 2021 dollars.

Table 2-9: Summary of Portfolio Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 6,191		$ 6,191	
2	Rebates to Participants and Trade Allies	$ 5,045		$ 5,045	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 1,146		$ 1,146	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 176	$ 135	$ 176	$ 135
8	Administration and Management	$ 443	$ -	$ 443	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 7,378	$ -	$ 7,378
11	EDC Evaluation Costs	$ 182		$ 182	
12	SWE Audit Costs	$ 396		$ 396	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 8,710		$ 8,710	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 14,901		$ 14,901	
15	Total NPV Lifetime Electric Energy Benefits	$ 18,380		$ 18,380	
16	Total NPV Lifetime Electric Capacity Benefits	$ 9,499		$ 9,499	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 1,620		$ 1,620	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (2,128)		$ (2,128)	
19	Total NPV Lifetime Water Impacts	$ 113		$ 113	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 27,484		$ 27,484	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.84		1.84	

Source: Guidehouse analysis
* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

TRC benefit-cost ratios are calculated by comparing the total NPV TRC benefits and the total NPV TRC costs. It is important to note that TRC costs are materially different from the EDC

spending and rate recovery tables presented later in the report. TRC costs include estimates of the full cost incurred by program participants to install efficient equipment, not just the portion covered by the EDC rebate. Appendix D shows the TRC ratios by program and for the portfolio.

2.10 Comparison of Performance to Approved EE&C Plan

Table 2-10 presents PY13 expenditures compared to the budget estimates set forth in the EE&C plan for PY13 and P4TD. PY13 values are presented in 2021 dollars and P4TD values are presented in 2021 dollars. Program-level comparisons of expenditures to plans are presented in Appendix D.

Table 2-10: Comparison of Expenditures to Phase IV EE&C Plan ($1,000)

Expenditures	Budget from EE&C Plan	Actual Expenditures	Ratio (Actual/Plan)
PY13 Portfolio	$17,053	$19,946	1.16
P4TD	$17,053	$19,946	1.16

Source: Guidehouse analysis

Table 2-11 compares PY13 and P4TD verified gross program savings compared with the energy savings projections set forth in the EE&C plan.

Table 2-11: Comparison of Actual Program Savings to EE&C Plan Projections

Savings	EE&C Plan Projections	VTD Gross MWh Savings	Ratio (Actual/Plan)
PY13 Portfolio MWh	65,367	49,101	0.75
P4TD MWh	65,367	49,101	0.75
PY13 Portfolio MW	11.77	9.21	0.78
P4TD MW	11.77	9.21	0.78

Source: Guidehouse analysis

The list below briefly discusses key reasons why programs exceeded or fell short of projected gross energy savings in PY13.

- Both Residential and Non-Residential Programs were slow to ramp up and launch, as well as getting customers familiar with and participation in the program.
- The CSP for the Residential Programs had technical issues getting program activity uploaded into Duquesne Light's tracking database, and therefore program activity that took place in PY13 was unable to be reported as such.
- Non-Residential programs saw supply chain issues, which decreased the availability of specific measures.
- Non-Residential programs, specifically Midstream, experienced labor issues. Many Midstream projects were found to have measures still in storage upon inspection due to the inability to find personnel to install them.

- Some programs, specifically Virtual Commissioning, have inherently long pre and post installation periods in order to verify savings, and therefore, Guidehouse was unable to report savings in PY13.

2.11 Findings and Recommendations

The impact and process evaluation activities completed by Guidehouse led to specific recommendations for program improvement. Table 2-12 provides the section number for the findings and recommendations of each program. Due to the early stage of programs in the phase, Guidehouse makes no overarching program recommendations in PY13.

Table 2-12: Findings and Recommendations Sections by Program

Program	Findings and Recommendations Section
Residential Downstream Incentives	3.1.7
Residential Upstream Incentives	3.3.7
Residential Appliance Recycling	3.4.7
Residential Behavioral	3.6.7
LI Behavioral	3.7.7
Small Business Solutions	3.9.7
Small Business Midstream Solutions	3.10.7
Large Business Solutions	3.12.7
Large Business Midstream Solutions	3.13.7

Source: Guidehouse analysis

3. Evaluation Results by Program

This section documents the gross impact, net impact, and process evaluation activities conducted in PY13 along with the outcomes of those activities. Not every program receives an evaluation every year. Table 3-1 provides an impact evaluation overview for Phase IV. Each row indicates how savings from the individual component will be presented in that year's final annual report, where:

V = verified using the results of the impact evaluation completed that year.

H = verified using realization rate values from the most recent evaluation activities based on previous years.

U = unverified until the results of the impact evaluation are available.

Table 3-1: Proposed Gross Impact Overview

Component	PY13	PY14	PY15	PY16	PY17
Residential					
Downstream Incentives	V	H	V	H	V
Midstream Incentives	U	V	H	H	H
Upstream Incentives	V	V	V	V	V
Appliance Recycling	V	H	V	H	H
LI Energy Efficiency	H	V	H	V	H
Residential Behavioral	V	V	V	V	V
LI Behavioral	V	V	V	V	V
Small/Medium C&I					
Small Business Direct Install	V[6] (2-year rolling sample)		H	V	H
Small Business Solutions	Uses a 2-year rolling sample approach				
Small Business Midstream	V	H	V	H	H
Small Virtual Commissioning	U	V	H	V	H
Large C&I					
Large Business Solutions	Uses a 2-year rolling sample approach				
Large Business Midstream	V	H	V	H	H
Large Virtual Commissioning	U	V	H	V	H

Source: Guidehouse analysis

3.1 Residential Downstream Incentives

The Residential Downstream Incentives Program (RDIP) includes incentives for a wide variety of energy efficiency products, including ENERGY STAR appliances; high efficiency heating, cooling, and water heating equipment; and other products. There are three components of the

[6] SBDI showed low participation in the first three quarters of PY13. Guidehouse verified several projects for PY13 and will complete a rolling 2-year evaluation of this program in PY14.

program: customers who received rebates for purchasing and installing energy efficient equipment (Rebate), customers who received a comprehensive energy efficiency audit (Audit), and students and teachers who participate in a K-12 Energy Efficiency Education program (Education).

The CSP for RDIP is CLEAResult. CLEAResult processes the rebate applications as well as performs marketing, verification, and calculation of energy savings for the three components.

For customers participating in the Rebate component of the program, participation is equal to the number of distinct account numbers in the program tracking data within a given program year. Participating customers fill out and submit applications for rebates for qualifying products online or by mail.

Similar to the Rebate component, customers participating in the Audit component of the program are counted based on the number of distinct account numbers in the program tracking data within a given year. This component provides comprehensive in-home audits and incentives for air sealing; basement, exterior wall, floor, and attic insulation; and direct-install water heating measures. In addition to the in-person audit, the program offers an online home energy audit to allow customers to first obtain instant results by answering questions regarding their home energy use. Customers receive educational materials, and a menu of approved measures and rebate amounts to reduce the cost of replacing inefficient equipment. The online home energy audit simplifies the in-person audit process, should the customer choose to continue in the program. In addition to direct-install measures, which are provided at no cost, the program provides up to a $250 home energy credit for installation of audit recommended measures. The audit component of the program did not see participation in PY13.

Finally, the program provides an Education component to K-12 students and teachers. The Education component offers educational materials, kits, presentations with hands-on activities, poster contests, and a data collection and tracking process. The data collection and tracking process is used to compile, analyze, and report energy savings. The Education component of the program influences and reinforces the energy efficiency behavioral changes geared toward students, their families, and teachers[7]. The kits are distributed to students and teachers with measures intended to be installed in the home.

In PY13, Guidehouse evaluated two components of the RDIP, the Downstream Rebate component and the Education component.

The objective of the evaluation for the Downstream Rebate delivery channel was to verify PY13 reported energy savings and demand savings as well as obtain feedback from participants on program processes, customer satisfaction, free ridership, and spillover. Guidehouse conducted a comprehensive desk review for a sample of project files in addition to an online survey to evaluate this program. Guidehouse developed a sample design for each of the survey components to determine the minimum number of responses needed in total.

The objective of the evaluation for the Downstream Education component was to verify PY13 reported energy and demand savings as well as to obtain feedback on program processes and satisfaction among participating teachers. Guidehouse analyzed data collected by the CSP for a

[7] Guidehouse does not report any behavioral savings for the education component.

census of participant responses to evaluate programs energy and demand savings. Guidehouse also gathered feedback from participating teachers through an online survey launched via email.

3.1.1 Participation and Reported Savings by Customer Segment

Table 3-2 presents the participation counts, reported energy and demand savings, and incentive payments for Residential Downstream Incentives in PY13 by customer segment.

Table 3-2: Residential Downstream Participation and Reported Impacts

Parameter	Residential (Non-LI)	Total
PY13 # Participants	4,648	4,648
PYRTD MWh/yr	1,533	1,533
PYRTD MW/yr	0.30	0.30
PY13 Incentives ($1,000)	$11	$11

Source: Guidehouse analysis

3.1.2 Gross Impact Evaluation

In PY13, Guidehouse conducted an impact evaluation of the Rebate and Education Kits components of the program. For the Rebate component, this included a comprehensive desk review for a sample of project files and an online survey of participating customers. For the Education component, Guidehouse did a tracking database review and recalculation of savings. Guidehouse did not do an impact evaluation of the Audit component of the program because there was no activity in PY13. Table 3-3 presents the RDIP gross impact results for energy, and Table 3-4 presents the RDIP gross impact results for demand.

Table 3-3: Residential Downstream Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Rebates	152	98%	0.03	0.01
Energy Efficiency Education	1,382	69%	-	-
Program Total	**1,533**	**72%**		**0.00**

Source: Guidehouse analysis

Table 3-4: Residential Downstream Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Rebates	0.01	85%	0.49	0.09
Energy Efficiency Education	0.29	97%	-	-
Program Total	**0.30**	**96%**		**0.00**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and led to the observed realization rates.

- Downstream - Rebate

  Gross demand savings for all Connected Thermostats are being multiplied twice by the reported quantity and therefore over claiming savings. This affected projects where more than one thermostat was purchased at the same time. In PY13, roughly 12% of participants purchased more than one thermostat at the same time.

- Downstream – Education Kit

  Gross savings for outlet gaskets, weather stripping, and filter whistles assumed 100% electric heating and cooling for all households, therefore over estimating electric and demand savings for these kit measures.

3.1.3 Net Impact Evaluation

Per Guidehouse's Evaluation Plan, the team conducted a net impact evaluation in PY13 for the RDIP. The team launched participating customer surveys via email to collect data on free ridership and spillover for rebated products. Guidehouse launched this survey to a census of program participants. In total, 59 rebate participants completed a battery of NTG questions providing responses on free ridership for 63 measures rebated through the program. In Section 3.1.5, Table 3-9 describes RDIP rebates population, sample targets, achieved sample sizes, and response rates. Table 3-5 and Table 3-6 show the results of the analysis. Similar to previous years, statistically significant RDIP rebate NTGs were developed at the initiative level. Guidehouse did not stratify by equipment type.

Guidehouse estimated the RDIP's NTG ratio for the rebate component of 82%. The evaluation team estimated spillover of approximately 28 kWh per survey respondent for customers who received a rebate.

Table 3-5: Residential Downstream Incentives Net Impact Evaluation Results

Component	PYVTD	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Rebates	149	37%	19%	82%	15%

Source: Guidehouse analysis

The team quantified free ridership scores for each type of product incentivized by the RDIP rebate component. Table 3-6 provides the free ridership scores calculated for each product. The highest free ridership rates calculated were for refrigerators and dehumidifiers. The high free ridership rate for these products is most likely driven by the low rebate amount compared to the total cost of the equipment, which does not have a significant impact on customers' decision to purchase these ENERGY STAR products.

Table 3-6: Free Ridership Scores for Residential Downstream Rebated Products

Component	PY13 Installed Measure Count for Survey Respondents	Average Free Ridership
ENERGY STAR Refrigerator	28	56%
ENERGY STAR Dehumidifier	27	52%
Smart Thermostat	7	34%
Heat Pump Water Heater	1	0%

Source: Guidehouse analysis

3.1.3.1 High-Impact Measure Research

Guidehouse conducted high-impact measure (HIM) research for measures implemented during PY13. The team reviewed the PY13 residential program activities and identified smart thermostats within RDIP as a HIM. Table 3-7 presents estimated free ridership, spillover, and NTG ratios for PY13 for this residential sector HIM.

Table 3-7. PY13 RDIP HIM

Program	HIM	Free Ridership	Spillover	NTG Ratio
RDIP Rebates	Smart Thermostats	34%	13%	79%

Source: Guidehouse analysis

3.1.4 Verified Savings Estimates

In Table 3-8, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for Residential Downstream Incentives in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-8: RDIP PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	1,533	0.30
PYVTD Gross	1,099	0.29
PYVTD Net	749	0.19
RTD	1,533	0.30
VTD Gross	1,099	0.29
VTD Net	749	0.19

Source: Guidehouse analysis

3.1.5 Process Evaluation

Guidehouse conducted process evaluation research for the residential downstream incentive program's rebates and Energy Efficiency Education components in PY13. This research focused on program awareness, satisfaction, and barriers to participation. The evaluation team deployed an online survey to a census of PY13 program participants to obtain feedback about their experience with the program delivery processes and opportunities for program improvement. Additionally, given that this program also offers an educational component for K-12 schools, the team conducted an online survey via email to a census of participating teachers and other education professionals who were involved in the program. The team also interviewed the Duquesne Light program manager and the CSP, and reviewed program materials that were provided by Duquesne Light. The interviews and the materials review informed the RDIP evaluation and aided in survey instrument creation and updates. The following sections discuss the approach, findings, and recommendations resulting from each evaluation activity.

3.1.5.1 Downstream Rebate Participant Survey

Guidehouse completed process evaluation for the Downstream Rebate component of the RDIP in PY13. Process evaluation included interviews with Duquesne Light and CSP program managers, review of program materials provided by the CSP and Duquesne Light, and an online survey of program participants. Guidehouse launched an online survey to a census of 201 customers who participated in the program and received 59 survey completes. Table 3-9 describes the sample targets, number of completed surveys, and survey response rate.

Table 3-9: PY13 Residential Downstream Incentives Sample Design

Component	Population Count*	Evaluation Method	Targeted Sample Surveys	Completed Surveys	Response Rate
Rebates	201	Online Survey	38	59	29%

*This population count represents unique customers who participated in this program in PY13.
Source: Guidehouse analysis

The process sections of the survey included questions on four main research topics:

- Program awareness
- Program influence
- Program satisfaction
- Program improvement opportunities

Guidehouse aimed to understand participants' experiences in the program and identify areas for future improvement. The remainder of this section outlines the findings for each of these topics.

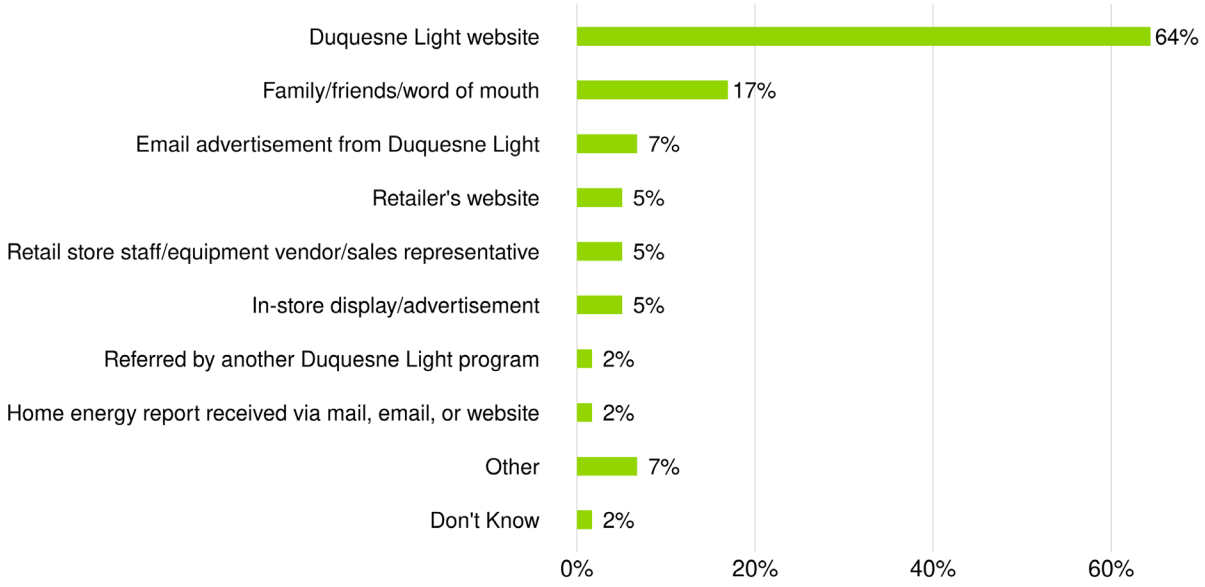
Program Awareness

Guidehouse asked participants to identify how they learned about the program. As Figure 3-1 shows, respondents indicated the most common sources of program awareness for the rebate program were the Duquesne Light website (65%), family, friends, and word of mouth (17%), and

email advertisements from Duquesne Light (7%). Of the seven percent of respondents who learned of the program through other means, three participants came across the program through internet searches, and one participant became aware of the program through their work at a different utility.

Comparing these findings to research conducted for the residential rebates program in PY11, Duquesne Light's website plays a much larger role in increasing program awareness in PY13 than it did in the past, when 36% of respondents learned about the program through the website in PY11 versus 65% in PY13. Also, installation contractors, trade allies, and energy equipment vendors played a much larger role in promoting this program in PY11 (19% reported to learn about the program through installation contractors and 11% through vendors or salespersons in PY11), which is not reflected in PY13's survey results or program participation of products typically purchased through vendors or installed by contractors. In PY13, only 5% of survey respondents learned about the program through retail store staff, vendors and sales representatives, and none reported learning about the program through trade allies, such as installation contractors or auditors. These survey results show that the program currently strongly relies on the website and family/friends/word of mouth and might benefit from greater focus on email advertisements, support from trade ally network such as installation contractors, vendors, home energy auditors, retail sales representatives, and as well as cross promotions through home energy reports (HERs) and other energy efficiency programs.

Figure 3-1: How did you learn about the Duquesne Light Residential Energy Efficiency Program? (n=59, multiple responses allowed)

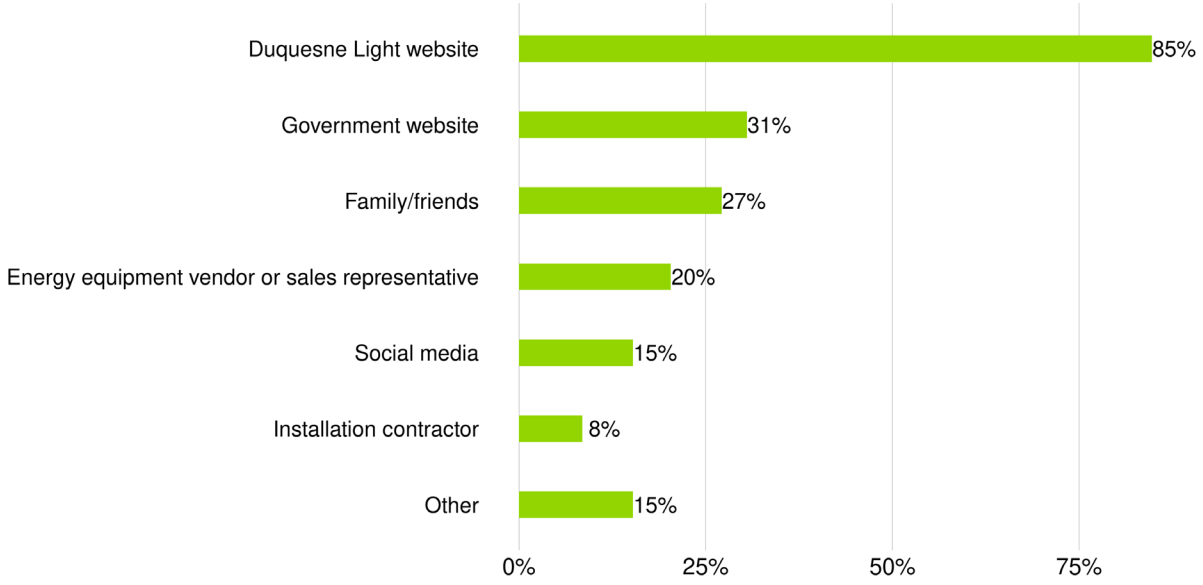


Source: Guidehouse analysis

Guidehouse also asked participants where they would search to find additional information about ways to save energy. As Figure 3-2 illustrates, 85% of the respondents would look for additional energy efficiency information directly on the Duquesne Light website. Other significant responses for sources of information include government website (31%) and family and friends (27%). Of the 15% of respondents who would look at other sources for additional information,

six participants would search the internet, one would read through science articles, and one would refer to the Pennsylvania Public Utility Commission.

Figure 3-2: If you wanted additional information about ways to save energy, where would you typically look for this information? (n=59, multiple responses allowed)



Source: Guidehouse analysis

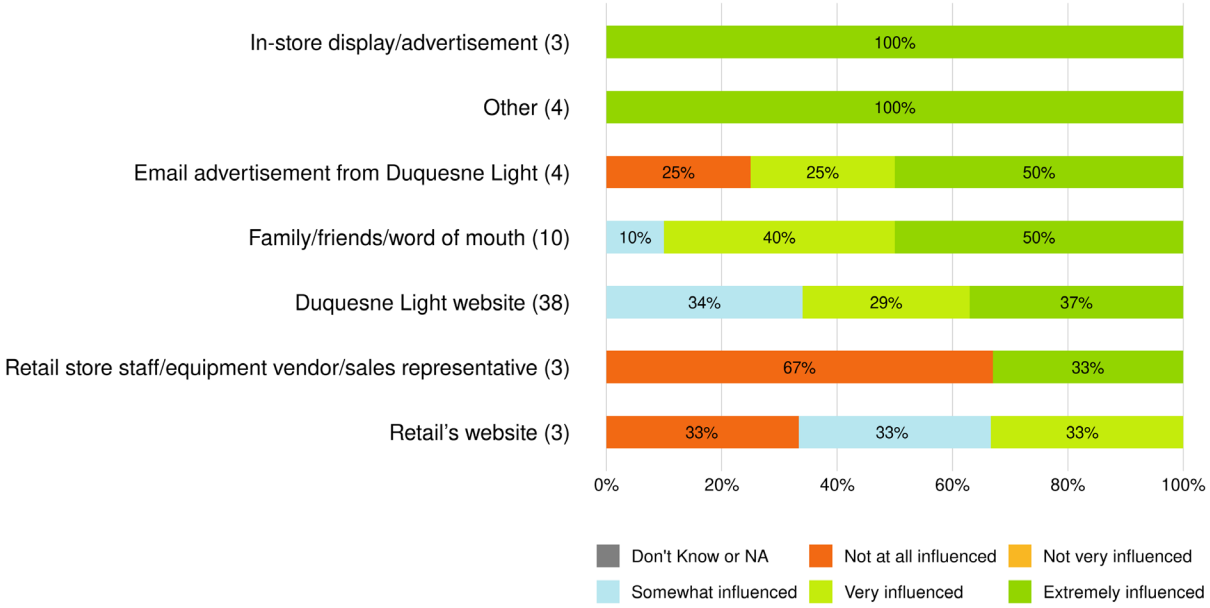
Program Influence

Guidehouse asked program participants how various program marketing materials influenced their decision to participate in the rebate program. The team asked participants to rate strength of influence only for customers who selected that source of awareness option. Participants rated all factors on a scale of 0-10, where 10 means extremely influenced and 0 means not at all influenced. As shown in Figure 3-3, in-store displays/advertising (3) and the other sources of awareness (4), which included internet searches and previous work experience, were extremely influential. Half of the participants who became aware of the program through email advertisements from Duquesne Light and word of mouth reported being extremely influenced in their decision to participate in the rebate program. Additionally, 66% of participants who learned about the program through the website were very or extremely influenced in their decision to participate. The least influential sources of awareness were the retail's website and retail store/staff/equipment vendors/sales representatives, where 33% of respondents reported being extremely or very influenced in their decision to participate.

Comparing these results to survey results for the residential rebates program in PY11, word of mouth plays a much larger role in influencing program participation in PY13 than it did in the past, when 55% of respondents were very or extremely influenced in PY11 as compared to 90% in PY13. The influence of the Duquesne Light website has also increased since PY11, when 58% of respondents reported being very or extremely influenced by the website compared to 66% in PY13. Conversely, sales representatives are not as influential in PY13 as they were to participants in PY11, when 67% of participants were very or extremely influenced by vendors in PY11 and only 33% were very or extremely influenced in PY13. These findings further support

an opportunity for a greater focus on trade ally networks, such as retailers, vendors, and installation contractors.

Figure 3-3: To what extent was your decision to participate in the program influenced by the following? (n=59)

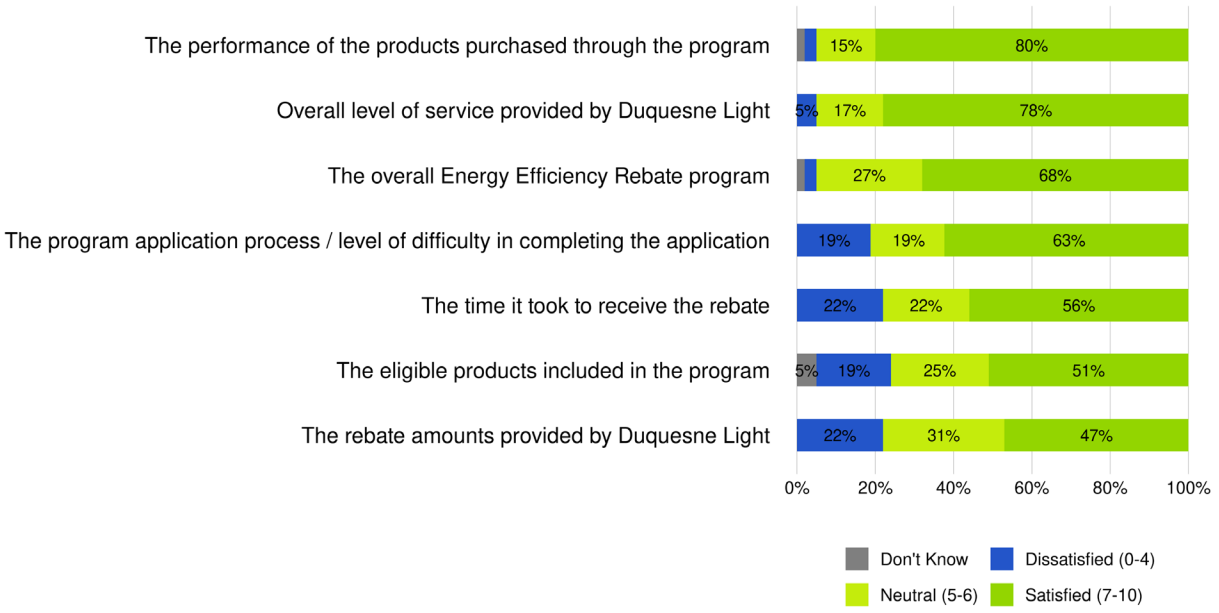


Only influence scores for sources of awareness options that received 3 or more responses are shown in this figure.
Source: Guidehouse analysis

Satisfaction

Guidehouse asked participants about their satisfaction with the program, its various program aspects, and with Duquesne Light in general using a scale of 0-10, where 10 means very satisfied and 0 means not at all satisfied. Figure 3-4 shows participants generally reported satisfaction with most aspects of the program. Guidehouse found that 68% of respondents were satisfied with the program. The highest satisfaction rates were associated with performance of the product purchased (80%) and the overall level of service from Duquesne Light (78%). Respondents were the least satisfied with the rebate amounts provided by Duquesne Light (47%), the eligible products included in the program (51%), and the time it took to receive the rebate (56%). The average overall satisfaction rate for this program was 7.4, which is slightly lower than the average satisfaction rate of 8.2 when this evaluation was lasted conducted in PY11. Overall, 92% of respondents said they were somewhat, very, or extremely likely to recommend this program to other people they know.

Figure 3-4: How satisfied are you with each of the following aspects? (n=59)



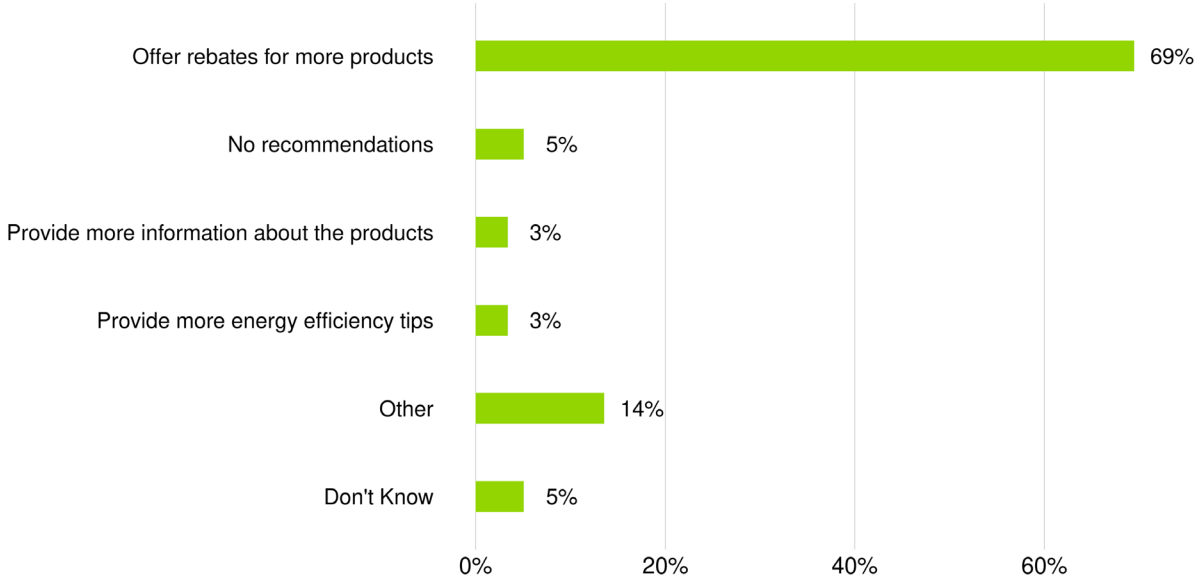
Source: Guidehouse analysis

When participants provided reasons for rating the program below 5 (15 out of 59 respondents), they reported a desire for a significantly shorter turnaround time for receiving a rebate and clear communication on the status of the rebate. Four customers stated that they have not received the rebate yet, and eight reported waiting for many months to receive the rebate. Respondents also communicated a desire for a larger selection of qualifying products (11) and a higher rebate amount (10). Some customers reported trouble with the application process, such as problems with being able to remove and add attachments, and their application being cancelled due to trying to address this issue by submitting a new application (1); issues with creating an account to submit the online application (1); confusion on when/where the check would be sent (1), and no longer being eligible for a rebate for HVAC equipment due to delays in delivery and installation after the rebate program ended in PY12 (1).

Program Improvement Opportunities

Guidehouse also asked participants if they had any recommendations on ways to improve the program. The team offered various potential suggestions for customers to select. Figure 3-5 summarizes program improvement recommendations made by the survey respondents, majority of whom asked for rebates for more energy efficient products (69%). Among the 8 customers who provided other recommendations, they asked for a better and easier application process (2), better tracking for rebates (2), more rebates (2), improvements in the Duquesne website (1), as well as training support staff to help customers who are having problems with application submission and using software that allows to upload and remove attachments (1).

Figure 3-5: How could Duquesne Light improve the program? (n=59)



Source: Guidehouse analysis

Furthermore, Guidehouse asked participants for suggestions for what Duquesne Light could do to get more customers to participate in the rebate program. Of the 39 respondents, the most common suggestions were to increase advertising (12), make the application process easier (9), increase the rebate amount (8), and make more products eligible for rebates (7). Some participants suggested better communication from Duquesne Light such as emails advertisements (4) and sending the rebate out faster (3). Two participants suggested partnering with organizations to increase awareness, and one participant suggested free home energy audits.

3.1.5.2 Energy Efficiency Education Participant Survey

Guidehouse completed process evaluation for the Energy Efficiency Education component of the RDIP in PY13. The process evaluation included interviews with Duquesne Light and CSP program managers, a review of program materials provided by the CSP and Duquesne Light, and an online survey of program participants. Guidehouse launched an online survey to a census of 164 participating teachers, administrators, and other professionals who were involved in the program and received 44 completed surveys. Table 3-10 describes the sample targets, number of completed surveys, and response rates for this survey.

Table 3-10: PY13 Energy Efficiency Education Participant Survey Sample Design

Component/ Initiative	Population Count*	Evaluation Method	Targeted Sample Surveys	Completed Surveys	Response Rate
Energy Efficiency Education	164	Online Survey	44	44	27%

*This population count represents unique teachers, administrators, and other professionals who participated in this program in PY13.

Source: Guidehouse analysis

The process section of the online survey included questions on five main research topics:

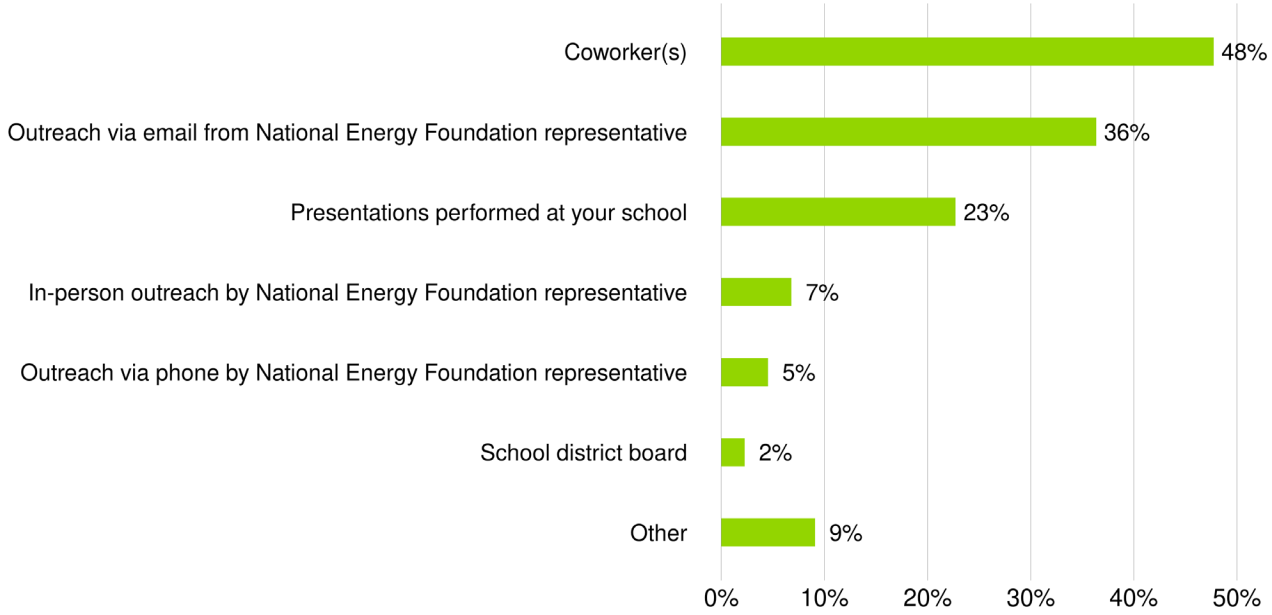
- Program awareness
- Program influence
- Program satisfaction
- Program barriers and challenges
- Opportunities and suggestions

Guidehouse aimed to understand participants' experiences in the program and identify areas for future improvement. The remainder of this section outlines the findings for each of these topics.

Program Awareness

Guidehouse asked participants to identify how they learned about the Energy Efficiency Education component. As shown in Figure 3-6, respondents indicated the most common sources of program awareness were coworkers (48%), outreach via email from a National Energy Foundation (NEF) representative (36%), and presentations performed at the participant's school (23%). NEF played a significant role in raising awareness among teachers and other professionals in schools about this program, where 45% of respondents stated that NEF reached out to them directly via email, phone, or in-person. Other sources of awareness included a zoom call (1), general email (2), and Community School representative (1).

Figure 3-6: How did you learn about the Energy Efficiency Education Program? (n=44, multiple responses allowed)

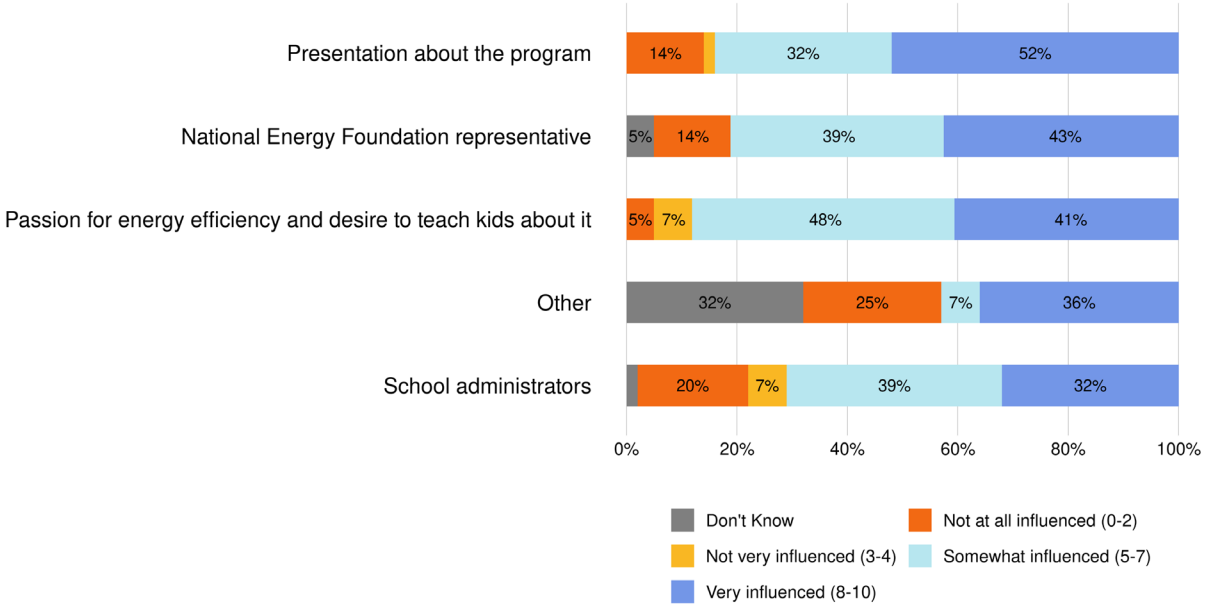


Source: Guidehouse analysis

Program Influence

Guidehouse asked participants how certain factors influenced their decision to participate in the Energy Efficiency Education program. Participants rated all factors on a scale of 0-10, where 10 means extremely influenced and 0 means not at all influenced. As shown in Figure 3-7, the strongest sources of influence were the presentation about the program, the NEF representatives, and passion for energy efficiency and desire to teach kids about it. School administrators were less influential in promoting program participation with 32% of respondents reporting being very influenced in their decision.

Figure 3-7: How influential were the following factors on the decision to participate in the program? (n=44)

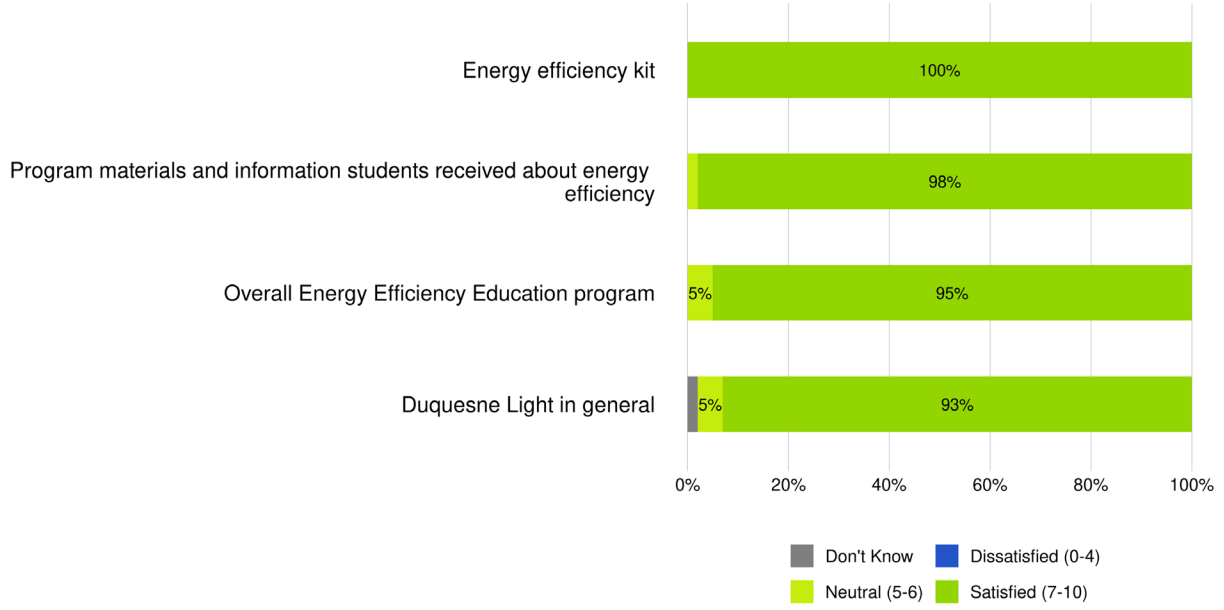


Source: Guidehouse analysis

Satisfaction

Guidehouse asked participants about their satisfaction with various program aspects and with Duquesne Light overall using a scale of 0-10, where 0 means not at all satisfied and 10 means very satisfied. Figure 3-8 shows survey respondents reported high satisfaction with all aspects of the program and with Duquesne Light. Guidehouse found that 95% of participants were satisfied with the program. Participants were very satisfied with energy efficiency kits and program materials and information student received about energy efficiency, reporting satisfaction rate of 100% and 98%, respectively. Additionally, 93% of respondents reported being satisfied with Duquesne Light in general, with the remainder of respondents reporting either neutral (5%) or don't know (2%). The average overall satisfaction rate for this program was 8.9. Guidehouse also asked participants to rate how likely they were to recommend the program on a scale of 0-10, where 10 means very likely and 0 means not at all likely to recommend. On average, the respondents provided a rating of 9.2 on the likeliness scale to recommend this program.

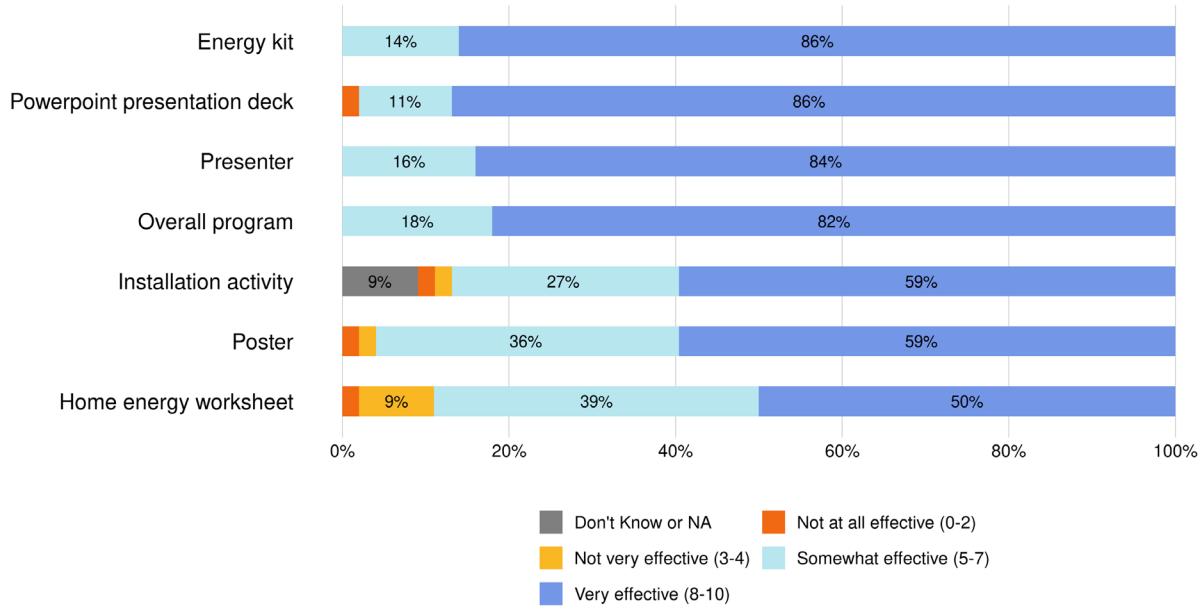
Figure 3-8: How satisfied are you with the following aspects of the program? (n=44)



Source: Guidehouse analysis

Furthermore, Guidehouse asked participants how effective certain aspects of the program were at educating students about energy efficiency on a scale of 0-10, where 10 means very effective and 0 means not at all effective. Figure 3-9 depicts the effectiveness for different program components. All survey respondents reported that the Energy Efficiency Education program was either very effective or somewhat effective (82% of respondents reported the program was very effective). The most effective aspects of the program were the energy kit, the presentation deck, and the presenter. The home energy worksheet and the poster were rated as less effective.

Figure 3-9: How effective were the following aspects at educating students on energy efficiency? (n=44)



Source: Guidehouse analysis

When customers provided reasons for the effectiveness ratings of below 5, they reported some of the activities such as the home energy worksheet and the presentation deck were not engaging enough or age appropriate for the kids. Some teachers stated that the materials seemed a bit above second-grade level (1), and home energy sheet was tough for students to understand (1). Other teachers either did not complete the installation activity (2) or did not use the provided poster (2).

Program Barriers and Challenges

Guidehouse also asked participants about program barriers and challenges associated with program participation that the schools, students, or teachers encountered during the program year. Thirteen respondents mentioned a few challenges for the school and teachers. Among teachers and schools, about 84% of the respondents indicated there were challenges with scheduling and a lack of time for the program. Other barriers included COVID-19 precautions (3), not having the space to accommodate the presentation (2), and lack of parent involvement (2). Participants also provided responses for barriers to program participation for students. The most common responses were lack of parent involvement (6) and students having a hard time understanding, implementing, or sharing what they learned to effectively use the materials at home either due to language barriers or materials not being age appropriate (6). Other common responses included lack of engagement for the students (3), and teachers not passing out materials in a timely manner to provide enough time to complete the at home activity (2).

Opportunities and Suggestions

Guidehouse also asked participants to provide suggestions for the program. Many survey respondents commented on how great, interactive, and fun the program was for students, who loved the color changing pencils and were excited about saving energy and receiving the kit.

Additionally, teachers commented that families were impressed with the home energy efficiency kits. Respondents provided a few suggestions for potential improvements, such as making the program more interactive and engaging by, for example, using students as examples or demonstrators (at least for K-3) (2), providing hands-on experiences (1), and an in-depth explanation of each item received in the kit (1). Additionally, a few other suggestions included making it easier for parents to complete the survey by providing an incentive or a postage paid envelope to encourage them to complete and send back the survey (2), providing more directions for parents (1), including directions in Spanish/other languages, or sending materials in advance so the school district can translate the materials (2). Additionally, one participant suggested faculty should also receive the kit, and one suggested a mini poster handout for the students to take home.

Furthermore, Guidehouse asked participants whether the provided materials were at the appropriate education level for the students' grade level. The large majority (93%) of survey respondents agreed, and 7% stated that they did not think the materials were at the appropriate level for that grade of students. When asked to explain why the materials were not at the appropriate grade level, one teacher stated that the materials were a bit above second-grade level, another teacher stated that the home energy sheet was tough for students to understand, and the third teacher stated the program should be more interactive and engaging. These responses indicate that K-3 students may benefit from updated program materials and presentation to simplify the information to make it easier and more engaging for students to understand the program materials.

3.1.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-11. TRC benefits in Table 3-11 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-11: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 75		$ 75	
2	Rebates to Participants and Trade Allies	$ 11		$ 11	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 64		$ 64	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 10	$ 8	$ 10	$ 8
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 870	$ -	$ 870
11	EDC Evaluation Costs	$ 11		$ 11	
12	SWE Audit Costs	$ 24		$ 24	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 950		$ 950	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,025		$ 1,025	
15	Total NPV Lifetime Electric Energy Benefits	$ 344		$ 344	
16	Total NPV Lifetime Electric Capacity Benefits	$ 226		$ 226	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (6)		$ (6)	
19	Total NPV Lifetime Water Impacts	$ 25		$ 25	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 589		$ 589	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.57		0.57	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-12 presents program financials and cost-effectiveness on a net savings basis.

Table 3-12: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 51		$ 51	
2	Rebates to Participants and Trade Allies	$ 7		$ 7	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 30		$ 30	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 10	$ 8	$ 10	$ 8
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 870	$ -	$ 870
11	EDC Evaluation Costs	$ 11		$ 11	
12	SWE Audit Costs	$ 24		$ 24	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 950		$ 950	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,001		$ 1,001	
15	Total NPV Lifetime Electric Energy Benefits	$ 234		$ 234	
16	Total NPV Lifetime Electric Capacity Benefits	$ 154		$ 154	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (4)		$ (4)	
19	Total NPV Lifetime Water Impacts	$ 17		$ 17	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 401		$ 401	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.40		0.40	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.1.7 Status of Recommendations

The impact and process evaluation activities in PY13 led to the following findings and recommendations. Table 3-13 summarizes the findings and recommendations for rebates and Table 3-14 for Energy Efficiency Education; each table also includes responses on how Duquesne Light plans to address the recommendations in program delivery.

Table 3-13. Residential Downstream Rebates Findings and Recommendations

Findings	Recommendations
Reported Savings	
• The demand savings for all Connected Thermostats are being multiplied twice by the measure quantity. This affected six projects out of 66, where there were multiple thermostats purchased.	• Duquesne Light should locate where this discrepancy is taking place, either in the data collection process or the upload process, and correct it.
Duquesne Light Response: Duquesne Light is identifying the discrepancy in the savings calculation process and correcting it.	
Program Awareness	
• The most common source of program awareness is the Duquesne Light website, where 64% of the respondents learned about the Program. • Majority of survey respondents (84%) reported that they would look for additional energy efficiency information directly on Duquesne Light's website. • Among the respondents who learned about program through the website, 66% were very or extremely influenced in their decision to participate by the website.	• Given the high visibility and influence of the program website among customers, Duquesne Light should continue to focus on improving the website and conduct customer focus groups to ensure the website and the online application portal are easy for customers to find, use, follow and understand. • Duquesne Light should also continue to promote its website through email advertisements to draw customers to the website.
Duquesne Light Response: Duquesne Light will take this under consideration and explore opportunities to improve their website and the online application portal.	
• Only 5% of participants learned about the program through energy equipment vendors, retail store staff or sales representatives and 2% through HERs. Guidehouse received no responses on participants learning about the program through installation contractors. These sources used to play a significant role in increasing customer awareness and driving program participation in the previous Phase.	• Duquesne Light should consider re-engaging with trade allies, such as vendors, retail store staff, sales representatives, and installation contractors to promote the downstream rebate program. • Duquesne Light should consider continuing to cross promote the Program through other program offerings to increase customer awareness, such as advertising the rebates program in the HERs.
Duquesne Light Response: Duquesne Light will take this under consideration and continue to explore opportunities to promote the program.	
• Email advertisements are starting to play a role in increasing customer awareness in PY13, with 7% of participants reporting they learned about the program through email advertisements from Duquesne Light. • Among participants who learned about the program through the email advertisements, 75% were very or extremely influenced in their decision to participate. • When asked how Duquesne Light could get more customers to participate in the rebate program, 31% of respondents suggested to increase advertising.	• Duquesne Light should continue to use email advertisements and newsletters to increase customer awareness of program offerings.

Duquesne Light Response: Duquesne Light will continue their current marketing strategy.	
Satisfaction	
• Among survey respondents, 68% reported high satisfaction with the rebate program and 78% reported high satisfaction with the level of service provided by Duquesne Light (ratings of 7 or higher). • A slight majority of survey respondents (56%) reported high satisfaction with the amount of time it took to receive the rebate.	• Duquesne Light should consider reducing the amount of time it takes to process the rebate checks to participants for the purchased products.
Duquesne Light Response: Duquesne Light is actively working with the CSP to decrease the amount of time it takes for participants to receive their rebate.	
• A slight majority of respondents (51%) reported being satisfied with the eligible products included in the program. • When asked how Duquesne Light could improve the program, survey respondents recommended offering rebates for more products (69%).	• Duquesne Light should consider increasing the variety of energy efficient products that are eligible for rebates through the program.
Duquesne Light Response: Duquesne Light will take this under consideration.	

Source: Guidehouse analysis

Table 3-14. Energy Efficiency Education Findings and Recommendations

Findings	Recommendations
Reported Savings	
• The savings calculations for outlet gaskets, weatherstripping, and filter whistles were assuming that customers had 100% electric heating and cooling in their homes. Therefore, electric and demand savings for these kit measures were being overestimated.	• Duquesne Light should update the savings calculation for these three measures to reflect the proportion of customers that have electric heating and cooling per the SWE's 2018 Baseline Study[8].
Duquesne Light Response: Duquesne Light is reviewing the applicability of this recommendation and will seek further guidance on this parameter.	
Program Awareness	
• The most common sources of program awareness were participants' coworkers (48%), email outreach from a NEF representative (36%), and presentations performed at the participant's school (23%). • NEF played a significant role in raising awareness among teachers and other professionals in schools about this program, where 45% of respondents stated that NEF reached out to them directly via email, phone, or in-person.	• No recommendation.
Duquesne Light Response: Accepted.	

[8] Pennsylvania ACT 129 2018 Residential Baseline Study, https://www.puc.pa.gov/Electric/pdf/Act129/SWE-Phase3_Res_Baseline_Study_Rpt021219.pdf

Findings	Recommendations
Satisfaction	
• Participants reported very high satisfaction with the Energy Efficiency Education Program (95% of respondents rated the program 7 or higher). • All survey respondents reported that the program was either very effective or somewhat effective at educating students on energy efficiency, with 82% reporting the program was very effective.	• Duquesne Light should continue to build upon the successes achieved by the program given the high satisfaction and high effectiveness of the program at educating students about energy efficiency.
Duquesne Light Response: Accepted.	

Source: Guidehouse analysis

3.2 Residential Midstream Incentives

The Residential Midstream Incentives Program includes rebates for select HVAC, hot water, and auxiliary equipment for residential Duquesne Light customers paid directly to program participating distributors. This program eliminates the burden of customers filling out rebate applications, leading to reduced program participation barriers for customers. For Residential Midstream Incentives, participation is equal to the number of distinct account numbers in the program tracking data, within a given program year. There was no activity in the Residential Midstream Incentives Program in PY13.

3.2.1 Participation and Reported Savings by Customer Segment

Table 3-15 presents the participation counts, reported energy and demand savings, and incentive payments for Residential Midstream Incentives in PY13 by customer segment.

Table 3-15: Residential Midstream Participation and Reported Impacts

Parameter	Residential (Non-LI)	Total
PY13 # Participants	-	-
PYRTD MWh/yr	-	-
PYRTD MW/yr	-	-
PY13 Incentives ($1,000)	-	-

Source: Guidehouse analysis

3.2.2 Gross Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct a gross impact evaluation for Residential Midstream Incentives Program in PY13. Guidehouse plans to complete this evaluation PY14.

3.2.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct a net impact evaluation for Residential Midstream Incentives Program in PY13 and plans to complete this evaluation PY14. There was no participation in this program in PY13, therefore, Guidehouse did not need to make any assumptions for NTG estimates for PY13.

3.2.3.1 HIM Research

Guidehouse did not conduct HIM research for the Residential Midstream Incentives Program in PY13.

3.2.4 Verified Savings Estimates

In Table 3-16 the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for Residential Midstream Incentives Program in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-16: Residential Midstream PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	-	-
PYVTD Gross	-	-
PYVTD Net	-	-
RTD	-	-
VTD Gross	-	-
VTD Net	-	-

Source: Guidehouse analysis

3.2.5 Process Evaluation

Guidehouse did not conduct process evaluation research for the Residential Midstream Incentives Program in PY13 and plans to complete it in PY14.

3.2.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-17. TRC benefits in Table 3-17 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-17: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ -	$ 1	$ -	$ 1
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 44	$ -	$ 44
11	EDC Evaluation Costs	$ 1		$ 1	
12	SWE Audit Costs	$ 1		$ 1	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 74		$ 74	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 74		$ 74	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.00		0.00	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-18 presents program financials and cost-effectiveness on a net savings basis.

Table 3-18: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ -	$ 1	$ -	$ 1
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 44	$ -	$ 44
11	EDC Evaluation Costs	$ 1		$ 1	
12	SWE Audit Costs	$ 1		$ 1	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 74		$ 74	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 74		$ 74	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.00		0.00	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.2.7 Status of Recommendations

There were no impact or process related findings for this program in PY13.

3.3 Residential Upstream Incentives

The Residential Upstream Incentives Program (RUIP) offers point of sale incentives for qualified energy efficient lighting and appliances[9] to Duquesne Light's residential customers, which are paid directly to manufacturers or retailers. Customers purchase discounted products at participating retailers without having to complete rebate applications. This program eliminates the burden of customers filling out rebate applications leading to reduced program participation barriers for customers. RUIP fosters a partnership among the CSP, manufacturers, and retailers through the CSP's delivery team that supports retailers and manufacturers throughout the product promotion and rebate processing journey. The CSP for this program is CLEAResult.

For RUIP, participation cannot be accurately collected due to the nature of the program and therefore are not counted. Guidehouse used guidance listed in the applicable Pennsylvania TRM sections for a census of projects implemented during PY13.

3.3.1 Participation and Reported Savings by Customer Segment

Table 3-19 presents the participation counts, reported energy and demand savings, and incentive payments for Residential Upstream Incentives in PY13 by customer segment.

Table 3-19: Residential Upstream Participation and Reported Impacts

Parameter	Residential (Non-LI)	Total
PY13 # Participants	N/A	N/A
PYRTD MWh/yr	1,381	1,381
PYRTD MW/yr	0.24	0.24
PY13 Incentives ($1,000)	$178	$178

Source: Guidehouse analysis

3.3.2 Gross Impact Evaluation

In PY13, Guidehouse conducted a gross impact evaluation of RUIP. The evaluation included a tracking database review and recalculation of savings for a census of participants to verify that data was transferred correctly between the CSP's database and Duquesne Light's. This was completed for both the Upstream Lighting and Upstream Appliance components.

Table 3-20 presents the gross impact results for energy, and Table 3-21 presents the gross impact results for demand.

[9] Non-lighting upstream measures may include heat pump water heaters, ENERGY STAR dehumidifiers, ENERGY STAR refrigerators, ENERGY STAR freezers, and ENERGY STAR room air conditioners.

Table 3-20: Residential Upstream Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Appliances	371	175%	-	-
LEDs	1,010	100%	-	-
Program Total	**1,381**	**120%**	**-**	**-**

Source: Guidehouse analysis

Table 3-21: Residential Upstream Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Appliances	0.10	173%	-	-
LEDs	0.14	100%	-	-
Program Total	**0.24**	**131%**	**-**	**-**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and led to the observed realization rates.

- The reported dehumidifier savings from the CSP were calculated using incorrect inputs; therefore, savings were underestimated.

3.3.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for RUIP in PY13. Guidehouse plans to complete this evaluation for this program in PY14. The team relied on research completed in PY9 for upstream lighting program in Phase III and used PY9 estimates for participant free ridership and spillover. Table 2-4 shows the NTG ratio applied to the Residential Upstream Incentive Program projects.

3.3.3.1 HIM Research

Guidehouse did not conduct HIM research for the Residential Upstream Incentives Program in PY13.

3.3.4 Verified Savings Estimates

In Table 3-22, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for Residential Upstream Incentives in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-22: Residential Upstream PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	1,381	0.24
PYVTD Gross	1,659	0.32
PYVTD Net	1,083	0.24
RTD	1,381	0.24
VTD Gross	1,659	0.32
VTD Net	1,083	0.24

Source: Guidehouse analysis

3.3.5 Process Evaluation

Guidehouse did not conduct process evaluation research for RUIP during PY13 and plans to complete it in PY14.

3.3.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in. TRC benefits in Table 3-23 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-23: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 627		$ 627	
2	Rebates to Participants and Trade Allies	$ 178		$ 178	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 449		$ 449	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 7	$ 5	$ 7	$ 5
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 344	$ -	$ 344
11	EDC Evaluation Costs	$ 7		$ 7	
12	SWE Audit Costs	$ 16		$ 16	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 406		$ 406	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,033		$ 1,033	
15	Total NPV Lifetime Electric Energy Benefits	$ 693		$ 693	
16	Total NPV Lifetime Electric Capacity Benefits	$ 319		$ 319	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (95)		$ (95)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 916		$ 916	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.89		0.89	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-24 presents program financials and cost-effectiveness on a net savings basis. NTGR applied to the PY13 Upstream Lighting component are from the PY9 process evaluation conducted in Phase III.

Table 3-24: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 410		$ 410	
2	Rebates to Participants and Trade Allies	$ 116		$ 116	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 192		$ 192	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 7	$ 5	$ 7	$ 5
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 344	$ -	$ 344
11	EDC Evaluation Costs	$ 7		$ 7	
12	SWE Audit Costs	$ 16		$ 16	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 406		$ 406	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 816		$ 816	
15	Total NPV Lifetime Electric Energy Benefits	$ 453		$ 453	
16	Total NPV Lifetime Electric Capacity Benefits	$ 208		$ 208	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (62)		$ (62)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 598		$ 598	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.73		0.73	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.3.7 Status of Recommendations

The impact evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-25 presents a summary of the findings with a response from Duquesne Light and their plans to address the recommendation in program delivery.

Table 3-25. Residential Upstream Incentives Findings and Recommendations

Findings	Recommendations
Reported Savings	
• Savings calculations for dehumidifiers were underestimated because the savings were being calculated from an incorrect CSP input.	• Duquesne Light should update the calculations for dehumidifiers to reflect deemed savings in the TRM.
Duquesne Light Response: Duquesne Light is identifying the discrepancy in the savings calculation process and correcting it.	

Source: Guidehouse analysis

3.4 Residential Appliance Recycling

The Residential Appliance Recycling Program (RARP) helps customers become more energy efficient by educating them about the amount of energy consumed by and the costs associated with operating inefficient refrigerators, freezers, dehumidifiers, and room air conditioners. It then provides access to a no-cost service that removes and recycles the operational but inefficient appliance. Customer motivation is enhanced by providing a cash incentive for program participation. For RARP, participation is equal to the number of distinct measures in the program tracking data within a given program year.

The objective of the RARP evaluation is to verify PY13 reported energy and demand savings for the program. Per the SWE's request, Guidehouse continued to estimate savings using all the appliance data collected by the CSP in Phase III to update the unit energy consumption estimates for PY13 and throughout Phase IV. In addition to that activity, a sample of the population was surveyed, and documentation associated with each surveyed project was reviewed to evaluate the accuracy of the CSP's data. The CSP for this program is CLEAResult.

3.4.1 Participation and Reported Savings by Customer Segment

Table 3-26 presents the participation counts, reported energy and demand savings, and incentive payments for RARP in PY13 by customer segment.

Table 3-26: Appliance Recycling Participation and Reported Impacts

Parameter	Residential (Non-LI)	Total
PY13 # Participants	545	545
PYRTD MWh/yr	347	347
PYRTD MW/yr	0.07	0.07
PY13 Incentives ($1,000)	$30	$30

Source: Guidehouse analysis

3.4.2 Gross Impact Evaluation

In PY13, Guidehouse conducted an impact evaluation of RARP. This included a tracking database review and an online survey of participating customers. The census review of program tracking data also included the recalculation of recycled refrigerator, freezer, dehumidifier, and room air conditioner unit energy consumptions (UECs) as specified by the TRM and using all the appliance data collected by the CSP. The program tracking data review consisted of the following steps:

- Comparison of CSP tracking data to Duquesne Light participant data for consistency
- Check of equipment specifications within CSP tracking data to confirm measure eligibility per the TRM
- Recalculation of savings for each appliance using the TRM's regression equation and the equipment specifications gathered by the CSP

Next, the evaluation team completed participant surveys. In Duquesne Light's PY13 sampling plan, the team targeted 45 participants for RARP to meet precision targets of 15% at 85% confidence. Guidehouse completed surveys with 59 participants who recycled 76 appliances. Within that group, 48 participants recycled 50 refrigerators, 14 participants recycled 15 freezers, 6 participants recycled 8 room air conditioners, and 3 participants recycled 3 dehumidifiers. Some of those participants are counted within both groups given that participants can recycle up to two appliance types per address per calendar year. The survey verified the recycling event and gathered information to estimate part use factors (PUF) separately for the different appliances.

In summary, the gross impact realization rates are informed by the following:

- Recalculation of the UEC (i.e., savings) for each appliance using the TRM's regression equation and the equipment specifications gathered by the CSP.
- Accounting for savings only for equipment that meet the program's eligibility criteria. Guidehouse incorporated these adjustments into the updated UECs.
- An updated PUF based on survey responses. Guidehouse also incorporated the PUF into the updated UECs.
- Survey responses that confirmed the recycling event and the appliance type.

Table 3-27 presents the gross impact results for energy, and Table 3-28 provides the gross impact results for demand.

Table 3-27: Appliance Recycling Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Freezers	55	95%	0.68	27%
Other	15	100%	-	0%
Refrigerators	277	117%	0.39	8%
Program Total	**347**	**113%**	**-**	**8%**

Source: Guidehouse analysis

Table 3-28: Appliance Recycling Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Freezers	0.01	95%	0.68	27%
Other	0.01	100%	-	0%
Refrigerators	0.05	117%	0.39	8%
Program Total	**0.07**	**112%**	**0.31**	**7%**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and led to the observed realization rates.

- The survey effort discovered that one single door refrigerator was misidentified as a standing freezer.
- Guidehouse found that 80% of the refrigerators had a PUF greater than the default value provided by the TRM. However, 8 refrigerators and 3 freezers had a PUF lower than the TRM values. Verified savings were adjusted using the PUF reported by the participants.

- Participants also reported whether the appliance was in an area with heating or cooling. The CDD and HDD factors were adjusted based on the fraction of survey appliances located in unconditioned spaces.

3.4.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for RARP in PY13. Guidehouse will complete NTG evaluation in PY15 for this program. Table 2-4 shows the NTG ratio applied to Appliance Recycling projects, which was caried over from the PY11 NTG evaluation in Phase III.

3.4.3.1 HIM Research

Guidehouse did not conduct HIM research for RARP in PY13.

3.4.4 Verified Savings Estimates

In Table 3-29, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings for RARP in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-29: Appliance Recycling PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	347	0.07
PYVTD Gross	391	0.07
PYVTD Net	183	0.03
RTD	347	0.07
VTD Gross	391	0.07
VTD Net	183	0.03

Source: *Guidehouse analysis*

3.4.5 Process Evaluation

Guidehouse did not conduct process evaluation research for RARP in PY13 and plans to complete it in PY15.

3.4.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-30. TRC benefits in Table 3-30 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-30: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 3		$ 3	
2	Rebates to Participants and Trade Allies	$ 30		$ 30	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (27)		$ (27)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 5	$ 3	$ 5	$ 3
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 749	$ -	$ 749
11	EDC Evaluation Costs	$ 5		$ 5	
12	SWE Audit Costs	$ 11		$ 11	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 800		$ 800	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 803		$ 803	
15	Total NPV Lifetime Electric Energy Benefits	$ 55		$ 55	
16	Total NPV Lifetime Electric Capacity Benefits	$ 29		$ 29	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 84		$ 84	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.11		0.11	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-31 presents program financials and cost-effectiveness on a net savings basis. The NTGR applied in PY13 comes from the PY11 NTG evaluation conducted in Phase III.

Table 3-31: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 1		$ 1	
2	Rebates to Participants and Trade Allies	$ 14		$ 14	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (13)		$ (13)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 5	$ 3	$ 5	$ 3
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 749	$ -	$ 749
11	EDC Evaluation Costs	$ 5		$ 5	
12	SWE Audit Costs	$ 11		$ 11	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 800		$ 800	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 801		$ 801	
15	Total NPV Lifetime Electric Energy Benefits	$ 26		$ 26	
16	Total NPV Lifetime Electric Capacity Benefits	$ 14		$ 14	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 40		$ 40	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.05		0.05	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.4.7 Status of Recommendations

The impact evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-32 provides a summary of findings, along with Duquesne Light's plan to address the recommendation in program delivery.

Table 3-32. Residential Appliance Recycling Findings and Recommendations

Findings	Recommendations
Reported Savings	
• The survey effort for RARP discovered that one single door refrigerator was misidentified as a standing freezer.	• Guidehouse recommends that the CSP ensure accuracy when recording data on appliances.
Duquesne Light Response: Duquesne Light will work with the CSP to ensure that data is collected and recorded accurately.	

Source: Guidehouse analysis

3.5 Residential LI Energy Efficiency

The Residential LI Energy Efficiency Program (LIEEP) is a direct-install program that includes walk-through and comprehensive audits, provides Energy Efficiency Education, and installs energy efficient products and equipment at no cost to the participant. The program provides these services to residential households at or below 150% of the federal poverty income guidelines who reside in single-family or multifamily housing.

Under LIEEP, income-qualified residential customers will be scheduled for a virtual assessment or in-home energy audit that will include direct-install measures and energy education. For the virtual assessment, the direct-install measures will be drop shipped to the customer in the form of an energy efficiency kit and customers may be referred for direct installation of eligible HVAC, water heat, health and safety, and insulation or air sealing measures. Participation for this program is equal to the number of distinct account numbers in the tracking data within a given program year.

Multifamily facilities are eligible for cost-share common area lighting and management-owned appliance recycling or replacement measures. The upgrade cost-share and savings are based on the percentage of LI occupants dwelling in the multifamily facility.

3.5.1 Participation and Reported Savings by Customer Segment

Table 3-33 presents the participation counts, reported energy and demand savings, and incentive payments for LIEEP in PY13 by customer segment.

Table 3-33: LIEEP Participation and Reported Impacts

Parameter	Residential LI	Total
PY13 # Participants	4,211	4,211
PYRTD MWh/yr	2,534	2,534
PYRTD MW/yr	0.27	0.27
PY13 Incentives ($1,000)	$975	$975

Source: Guidehouse analysis

3.5.2 Gross Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct a gross impact evaluation for LIEEP in PY13 and applied the historic realization rates from PY11 and PY10 for the different stratum. Table 3-34 shows the reported energy savings in PY13, and Table 3-35 shows the reported demand savings in PY13.

Table 3-34: LIEEP Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
MF Site-Other Measure	438	93%	0.42	21%
MF Site-Refrigerators	341	100%	-	0%
SF Site-Other Measure	1,444	78%	0.38	6%
SF Site-Refrigerators	311	100%	-	0%
Program Total	**2,534**	**86%**		**5%**

Source: Guidehouse analysis

Table 3-35: LIEEP Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
MF Site-Other Measure	0.04	94%	0.41	21%
MF Site-Refrigerators	0.06	100%	-	0%
SF Site-Other Measure	0.12	75%	0.48	9%
SF Site-Refrigerators	0.05	100%	-	0%
Program Total	**0.27**	**88%**		**5%**

Source: Guidehouse analysis

3.5.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct a net impact evaluation for Residential LIEEP in PY13. Guidehouse does not plan to conduct NTG assessment during Phase IV for the LIEEP. Per SWE's Phase IV Evaluation Framework Section 3.4 guidance, Guidehouse will assume and assign a NTG ratio of 1.0 for LI programs because free ridership and spillover are not anticipated among LI participants due to income constraints.

3.5.3.1 HIM Research

Guidehouse did not conduct HIM research for LIEEP in PY13.

3.5.4 Verified Savings Estimates

In Table 3-36, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for LIEEP in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-36: LIEEP PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	2,534	0.27
PYVTD Gross	2,179	0.24
PYVTD Net	2,179	0.24
RTD	2,534	0.27
VTD Gross	2,179	0.24
VTD Net	2,179	0.24

Source: Guidehouse analysis

3.5.5 Process Evaluation

Guidehouse did not conduct process evaluation research for LIEEP during PY13 and plans to complete it in PY14.

3.5.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-37. TRC benefits in Table 3-37 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-37: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ 975		$ 975	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (975)		$ (975)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 32	$ 17	$ 32	$ 17
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 1,077	$ -	$ 1,077
11	EDC Evaluation Costs	$ 28		$ 28	
12	SWE Audit Costs	$ 62		$ 62	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 1,243		$ 1,243	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,243		$ 1,243	
15	Total NPV Lifetime Electric Energy Benefits	$ 397		$ 397	
16	Total NPV Lifetime Electric Capacity Benefits	$ 115		$ 115	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (38)		$ (38)	
19	Total NPV Lifetime Water Impacts	$ 88		$ 88	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 562		$ 562	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.45		0.45	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-38 presents program financials and cost-effectiveness on a net savings basis. Per the SWE's guidance, NTGR for LI programs will be a deemed value of 1.0 due to the assumption that there is no free ridership or spillover due to cost constraints.

Table 3-38: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ 975		$ 975	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (975)		$ (975)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 32	$ 17	$ 32	$ 17
8	Administration and Management	$ 27	$ -	$ 27	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 1,077	$ -	$ 1,077
11	EDC Evaluation Costs	$ 28		$ 28	
12	SWE Audit Costs	$ 62		$ 62	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 1,243		$ 1,243	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,243		$ 1,243	
15	Total NPV Lifetime Electric Energy Benefits	$ 397		$ 397	
16	Total NPV Lifetime Electric Capacity Benefits	$ 115		$ 115	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (38)		$ (38)	
19	Total NPV Lifetime Water Impacts	$ 88		$ 88	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 562		$ 562	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.45		0.45	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.5.7 Status of Recommendations

There were no impact or process related findings for this program in PY13.

3.6 Residential Behavioral

The Residential Behavioral Energy Efficiency Program (R-BEEP) influences behavior changes in customers by providing information via personalized energy reports to participants. The program provides these HERs to participants via mail, email, and via access through the Duquesne Light website. These reports provide participants information about their recent energy use and compare the usage to that of similar homes. The reports also provide participants with energy-saving tips, some of which are tailored to the participants' circumstances. Other studies have shown this information stimulates participants to reduce their energy use, creating average energy savings in the 1%-2% range. Furthermore, these reports provide information on other Duquesne Light energy efficiency programs, which helps influence customers to participate in those programs and install energy efficient equipment.

Duquesne Light launched the R-BEEP in PY4 to target high use residential customers. The current program participation levels include 12,424 customers from the 2012 market rate wave, 8,230 customers from the 2015 LI wave, 33,200 customers from the 2015 market rate wave, 72,237 customers from the 2021 digital wave, 12,368 customers from the 2021 LI wave, and 67,985 customers from the 2021 non-digital wave (based on PY13 monthly averages). The 2021 digital and 2021 non-digital waves are both market rate waves. The 2018 LI wave did not receive reports in PY13 and therefore is excluded from this report. Savings for the 2015 and 2021 LI waves are reported and verified under the LI Behavioral Energy Efficiency Program (LI-BEEP). The administration, implementation, and evaluation for those LI participants is similar to their market rate participant counterparts. Section 3.7 details the LI evaluation results.

A participant is defined as a customer receiving HERs during the program year (i.e., PY13). The participant count represents the average number of unique participants who received HERs across each month of PY13. The program is an opt-out program in which the CSP, Oracle, enrolls participants in the program based on a randomized control trial (RCT) program design. Enrolled customers can opt out of the program by calling or emailing the program implementer. To preserve the RCT design, opt-out customers are included in the analysis.

In the RCT design, eligible customers are randomly assigned to treatment and control groups. Due to random assignment, any difference in usage between treatment customers (i.e., the program participants) and control customers is a result of participation in the program.

3.6.1 Participation and Reported Savings by Customer Segment

Table 3-39 presents the participation counts, reported energy and demand savings, and incentive payments for HERs in PY13 by customer segment for the market rate waves. LI behavioral energy efficiency participant results are reflected in LI-BEEP, as Section 3.7 shows.

Table 3-39: R-BEEP Participation and Reported Impacts

Parameter	Residential (Non-LI)	Total
PY13 # Participants	185,846	185,846
PYRTD MWh/yr	5,137	5,137
PYRTD MW/yr	0.40	0.40
PY13 Incentives ($1,000)	-	-

Source: Guidehouse analysis

3.6.2 Gross Impact Evaluation

The main methodological issue for the impact evaluation is to estimate the counterfactual energy use by households participating in R-BEEP. In other words, the impact evaluation compares actual energy usage against the estimated energy that participating households would have used in the absence of the program. The program used an RCT experimental design, meaning that households were randomly allocated to the control and treatment groups. This eliminated the selection bias that complicates the evaluation of many behavioral programs. The random assignment of households to the treatment and control groups means the control group should serve as a robust baseline against which the energy use of the treatment households can be compared to estimate savings from enrollment in R-BEEP.

Guidehouse estimated program savings by adhering to the SWE's guidance described by the Framework.[10] The evaluation team used a monthly lagged dependent variable (LDV) model. This model uses only post-enrollment program observations and replaces the household fixed-effect with the household's energy use in the same calendar month of the pre-program year to account for household-level variation in energy use. The model takes the form Equation 1 shows.

Equation 1. LDV Model Specification

$$\boldsymbol{kWh_{im} = \sum_{m=1}^{12} \beta_{1m} yrmo_m + \sum_{m=1}^{12} \beta_{2m} yrmo_m \cdot kWh_{im-12} + \sum_{m=1}^{12} \beta_{3m} yrmo_m \cdot treatment_{im} + \varepsilon_{im}}$$

Where:

kWh_{im} is customer *i*'s average daily energy usage in bill *m*.
β_{1m} is the coefficient on the bill year-month *m*.
$yrmo_m$ is the indicator variable equal to 1 for each year-month in the analysis.
β_{2m} is the coefficient on the home-specific pre-program usage term, which is interacted with bill month.
kWh_{im-12} is customer *i*'s average daily energy usage from the 12-month period prior to the program launch.

[10] SWE Framework. https://www.puc.pa.gov/media/1584/swe-phaseiv_evaluation_framework071621.pdf

β_{3m}	is the estimated treatment effect in kilowatt-hours per day per customer. This is the main parameter of interest. Estimated separately for each month and year.
$treatment_{im}$	is the treatment indicator variable. Equal to 1 when the treatment is in effect for the treatment group and 0 otherwise.
ε_{im}	is the error term, clustered by customer.

The LDV model is the preferred model used for reporting savings. As a check on the robustness of the savings estimates, Guidehouse also ran a linear fixed-effects regression (LFER) model. Due to the experimental design of the program, the two models should generate similar results. In the LFER model, average daily consumption by participant and nonparticipant *i* in billing period *m* is denoted by kWh_{im}. This is referred to as a fixed-effects model because it includes a household-specific fixed-effects term. Equation 2 presents the equation for this model.

Equation 2. Fixed-Effects Regression Model

$$kWh_{im} = \beta_i + \sum_{m=1}^{12} \beta_{1m} yrmo_m + \sum_{m=1}^{12} \beta_{2m} yrmo_m \cdot treatment_{im} + \varepsilon_{im}$$

Where:

β_i	is the household-specific fixed-effect that implicitly captures all customer-specific effects on electricity use that do not change over time. The calculation of the fixed-effect term does not require knowledge of which characteristics at each household are unchanged.
β_{1m}	is the coefficient on the bill year-month *m.*
β_{2m}	is the estimated treatment effect in kilowatt-hours per day. This is the main parameter of interest. Estimated separately for each month and year.

All other variables are defined above.

An advantage of the LFER model is that the time-invariant characteristics (observed and unobserved) are excluded from the model through the household fixed-effect term. The model's drawback is that it is less precise because the household-level fixed-effect term relies exclusively on within-customer variation. The explanatory powers of time-invariant characteristics are lost because those terms are eliminated from the model. Guidehouse found the LFER model corroborated the savings found from the LDV model.

The evaluation team deployed specific data management methodologies to prepare billing data for the regressions. These methodologies are informed by Section 6.1.4 of the Phase IV Evaluation Framework and feedback Guidehouse received from the SWE during evaluations in Phase III. Before calendarization, Guidehouse removed accounts with an inactive date prior to the PY13 evaluation period. A small number of accounts had multiple inactive dates. Guidehouse corrected for this by taking the maximum of inactive dates per account, consistent with the approach used in Phase III. Monthly billing data were calendarized by expanding the billing periods (which follow variable meter read schedules) to daily data and then collapsing them into a common calendar basis. Each month of usage data represents an aggregation of the usage data from the bills that contain data for that month. Estimated reads, which are infrequent for Duquesne Light, were handled by summing the consecutive estimated reads with the first actual read that followed and dividing that aggregated use across the number of days

since the previous actual read. Participants and nonparticipants who moved out of Duquesne Light territory during PY13 were included in the regression analysis until move-out occurred and monthly billing data ceased. There is a monotonically decreasing number of participants per month for each cohort.

Guidehouse calculated participant counts following a standard approach where the last available month of billing data is calculated for each account and the household is assumed to be active for all months prior. This participant counting approach is used to obtain an average participant count across all months of the program year. A customer is considered a participant through their latest bill in PY13 so long as their account was still active.

Table 3-40 summarizes the sampling strategy for the PY13 evaluation. Both regression models use billing data from all treatment and control households enrolled in R-BEEP. The sampling strategy is a census approach where data from all households are used in the analysis, as Table 3-40 shows.

Table 3-40. R-BEEP Gross Impact Sample Design for PY13

Stratum	Population Size	Achieved Sample Size	Evaluation Activity
R-BEEP	185,846	185,846	Regression analysis
Program Total	**185,846**	**185,846**	

Source: Guidehouse analysis

The verified ex post energy savings for R-BEEP in PY13 were 5,227 MWh, after accounting for double-counted savings with other Duquesne Light energy efficiency programs and persistence from prior years. Guidehouse calculated the peak demand savings by dividing the total energy savings for the year (in megawatt-hours) by 8,760 hours, then multiplying by the peak demand multiplier. After applying the line loss factor, this yields 0.38 MW of peak demand savings. Table 3-41 and Table 3-42 summarize ex ante R-BEEP energy and demand savings, respectively. Appendix B provides additional details.

Table 3-41: R-BEEP Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
R-BEEP	5,137	102%	-	-
Program Total	**5,137**	**102%**	**-**	**-**

Source: Guidehouse analysis

Table 3-42: R-BEEP Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
R-BEEP	0.40	94%	-	-
Program Total	**0.40**	**94%**	**-**	**-**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and to the observed realization rates:

- Energy savings per participant home were verified higher than the CSP's reported estimate.
  - The CSP did not complete a detailed double-counted savings analysis. Instead, they made assumptions based on Phase III evaluations.
    - Double-counted savings made up 21% of measured savings from the regression analysis.
  - The CSP did not account for persistence from prior years using an identical method as Guidehouse.
    - Persistence made up 31% of measured savings from the regression analysis, impacting legacy waves only.

Based on SWE guidance, Guidehouse counts verified savings regardless of statistical significance. Confidence intervals are large relative to the magnitude of verified savings, which can result in high or low realization rates despite no statistically significant difference between the CSP's reported estimate and Guidehouse's verified estimate.

Behavioral Program and Component Absolute Precision

Guidehouse calculated the absolute precision results for the R-BEEP waves. Section 6.1.1.1 of the Phase IV Evaluation Framework requires the program-level verification for these behavioral programs to achieve an absolute precision of ±0.5% at the 95% confidence level (two-tailed), while individual waves may have a wider margin of error. Appendix B provides regression details, precisions, and error estimates.

Table 3-41 or Table 3-42 do not reflect the standard errors from the regression analysis. Instead, those tables reflect the uncertainty associated with the sampling (i.e., relative precision at the 85% confidence level). Guidehouse analyzed all R-BEEP data via a census approach and did not use sampling. There is no sampling uncertainty.

3.6.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct a net impact evaluation for R-BEEP in PY13. Guidehouse does not plan to conduct NTG assessment during Phase IV for this program.

Free ridership and participant spillover are incorporated in the results of the regression analysis due to the RCT design of R-BEEP. Section 2.2.2 of the SEE Action protocol states the following:

> *RCTs eliminate this free-rider concern during the study period because the treatment and control groups each contain the same number of free riders through the process of random assignment to the treatment or control groups. When the two groups are compared, the energy savings from the free riders in the control group cancel out the energy savings from the free riders in the treatment group, and the resulting estimate of program energy savings is an unbiased estimate of the savings caused by the program (the true program savings).*
>
> *[Participant spillover], in which participants engage in additional energy efficiency actions outside of the program as a result of the program, is also automatically captured by an RCT design for energy use that is measured within a household.*

However, the RCT design does not account for nonparticipant spillover. Section 2.2.2 of the SEE Action protocol continues as follows:

> *[Nonparticipant spillover] issues in which a program influences the energy use of non-program participants are not addressed by RCTs. In these cases in which nonparticipant spillover exists, an evaluation that relies on RCT design could underestimate the total program-influenced savings.*

Free ridership and spillover are incorporated into the results of the R-BEEP regression analysis based on customer billing records. Nonparticipant spillover is not included in the regression analysis, but the industry standard approach is to assume that nonparticipant spillover is small for this type of program. It would be primarily driven by conversations participants may have with nonparticipant Duquesne Light customers, which are expected to have a relatively small impact on nonparticipant energy savings. The conservative approach used by Guidehouse assumes that nonparticipant spillover is 0% and the NTG ratio for R-BEEP is 100%. As a result, the net and gross savings estimates are the same for R-BEEP. There is no NTG sample for R-BEEP.

The team did not consider a sample for the net impact analysis, and net impacts equal the gross impacts. The NTG ratio is assumed to be 100%.

3.6.3.1 HIM Research

Guidehouse did not conduct HIM research for R-BEEP in PY13.

3.6.4 Verified Savings Estimates

In Table 3-43, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for R-BEEP in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-43: R-BEEP PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	5,137	0.40
PYVTD Gross	5,227	0.38
PYVTD Net	5,227	0.38
RTD	5,137	0.40
VTD Gross	5,227	0.38
VTD Net	5,227	0.38

Source: Guidehouse analysis

3.6.5 Process Evaluation

Guidehouse did not conduct process evaluation research for R-BEEP during PY13 and plans to complete it in PY15.

3.6.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-44. TRC benefits in Table 3-44 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-44: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 6	$ 5	$ 6	$ 5
8	Administration and Management	$ 45	$ -	$ 45	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 499	$ -	$ 499
11	EDC Evaluation Costs	$ 7		$ 7	
12	SWE Audit Costs	$ 14		$ 14	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 576		$ 576	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 576		$ 576	
15	Total NPV Lifetime Electric Energy Benefits	$ 225		$ 225	
16	Total NPV Lifetime Electric Capacity Benefits	$ 70		$ 70	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 294		$ 294	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.51		0.51	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-45 presents program financials and cost-effectiveness on a net savings basis.

Table 3-45: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 6	$ 5	$ 6	$ 5
8	Administration and Management	$ 45	$ -	$ 45	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 499	$ -	$ 499
11	EDC Evaluation Costs	$ 7		$ 7	
12	SWE Audit Costs	$ 14		$ 14	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 576		$ 576	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 576		$ 576	
15	Total NPV Lifetime Electric Energy Benefits	$ 225		$ 225	
16	Total NPV Lifetime Electric Capacity Benefits	$ 70		$ 70	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 294		$ 294	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.51		0.51	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.6.7 Status of Recommendations

The impact evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-46 presents a summary of the findings with a response from Duquesne Light and their plans to address the recommendation in program delivery.

Table 3-46. Residential Behavioral Findings and Recommendations

Findings	Recommendations
Reported Savings	
• Accounting for persistence yields significantly reduced first-year savings for legacy waves that have been exposed to HER messaging for more than 2 years. Persistence made up 31% of measured savings from the regression analysis in PY13 and applied to two of the four active waves. This multi-year persistence perspective is a departure from prior phases of Act 129, which assumed a 1-year measure life for R-BEEP.	• Guidehouse recommends that the CSP carefully monitor savings throughout Phase IV to ensure Duquesne meets its savings goal. In particular, the CSP should consider the implications to verified savings in later years as the 2021 digital and 2021 non-digital waves begin to accrue persistence.
Duquesne Light Response: Duquesne Light will work with the CSP to plan for shifts in savings as new waves begin to accrue persistence in later years of the phase.	

Source: Guidehouse analysis

3.7 LI Behavioral

The LI-BEEP targets qualified LI customers (i.e., households at or below 150% of federal poverty income guidelines). For LI-BEEP, verified savings attributable to the LI sector are reflected in Duquesne Light's progress toward the Phase IV LI carveout goal.

In the same manner as the market rate R-BEEP, LI-BEEP influences behavior changes in customers by providing information via HERs to participants. The administration, implementation, and evaluation for LI participants is similar to their market rate participant counterparts. Section 3.6 details the market rate evaluation results.

LI-BEEP participation is defined as a customer under the LI rate class and receiving HERs during the program year. The participant count represents the average number of unique participants who received HERs across each month of PY13. Current program participation levels include 8,230 customers from the 2015 LI wave and 12,368 customers from the 2021 LI wave (based on PY13 monthly averages). The 2018 LI wave did not receive reports in PY13 and therefore is excluded from this report.

3.7.1 Participation and Reported Savings by Customer Segment

Table 3-47 presents the participation counts, reported energy and demand savings, and incentive payments for LI-BEEP in PY13 by customer segment.

Table 3-47: LI-BEEP Participation and Reported Impacts

Parameter	Residential LI	Total
PY13 # Participants	20,598	20,598
PYRTD MWh/yr	931	931
PYRTD MW/yr	0.03	0.03
PY13 Incentives ($1,000)	-	-

Source: Guidehouse Analysis

3.7.2 Gross Impact Evaluation

Guidehouse completed LI-BEEP activities in coordination with the R-BEEP market rate program and applied the same methodologies Section 3.6 details.

The verified ex post energy savings for LI-BEEP in PY13 were 1,196 MWh, after accounting for double-counted savings with other Duquesne Light energy efficiency programs and persistence from prior years. Guidehouse calculated the peak demand savings by dividing the total energy savings for the year (in megawatt-hours) by 8,760 hours, then multiplying by the peak demand multiplier. After applying the LLF, this yields 0.1 MW of peak demand savings. Table 3-48 and Table 3-49 summarize ex ante LI behavioral energy efficiency energy and demand savings, respectively. Appendix B provides additional details.

Table 3-48: LI-BEEP Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
LI-BEEP	931	128%	-	-
Program Total	**931**	**128%**	**-**	**-**

Source: Guidehouse analysis

Table 3-49: LI-BEEP Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
LI HER	0.03	280%	-	-
Program Total	**0.03**	**280%**	**-**	**-**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and to the observed realization rates:

- The energy realization rate for LI-BEEP is 128%. Energy savings per participant home were verified higher than the CSP's reported estimate.
  - The CSP did not complete a detailed double-counted savings analysis. Instead, they made assumptions based on Phase III evaluations.
    - Double-counted savings made up 13% of measured savings from the regression analysis.
  - The CSP did not account for persistence from prior years using an identical method as Guidehouse.
    - Persistence made up 38% of measured savings from the regression analysis, impacting legacy waves only.

Based on SWE guidance, Guidehouse counts verified savings regardless of statistical significance. Confidence intervals are large relative to the magnitude of verified savings, contributing to a high realization rate despite no statistical difference between the CSP and Guidehouse estimates.

Behavioral Program and Component Absolute Precision

Guidehouse calculated the absolute precision results for the LI behavioral energy efficiency waves. Section 6.1.1.1.1 of the Phase IV Evaluation Framework requires the program-level verification for these behavioral programs to achieve an absolute precision of ±0.5% at the 95% confidence level (two-tailed), while individual waves may have a wider margin of error. Appendix B provides regression details, precisions, and error estimates.

Table 3-48 or Table 3-49 do not reflect errors. Instead, those tables reflect the uncertainty associated with the sampling (i.e., relative precision at the 85% confidence level). Guidehouse analyzed all LI-BEEP data via its census approach and did not use sampling. There is no sampling uncertainty to report.

3.7.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for LI-BEEP in PY13. Guidehouse does not plan to conduct NTG assessment during Phase IV for this program. Consistent with SWE's guidance, Guidehouse assumes NTG ratios to be 100% for this program due to the nature of the RCT approach (see Section 3.6).

3.7.3.1 HIM Research

Guidehouse did not conduct HIM research for LI-BEEP in PY13.

3.7.4 Verified Savings Estimates

In Table 3-50 the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for LI behavioral energy efficiency in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-50: PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	931	0.03
PYVTD Gross	1,196	0.10
PYVTD Net	1,196	0.10
RTD	931	0.03
VTD Gross	1,196	0.10
VTD Net	1,196	0.10

Source: Guidehouse analysis

3.7.5 Process Evaluation

Guidehouse did not conduct process evaluation research for LI-BEEP during PY13 and plans to complete it in PY15.

3.7.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-51. TRC benefits in Table 3-51 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-51: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 1	$ 1	$ 1
8	Administration and Management	$ 44	$ -	$ 44	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 76	$ -	$ 76
11	EDC Evaluation Costs	$ 2		$ 2	
12	SWE Audit Costs	$ 3		$ 3	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 127		$ 127	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 127		$ 127	
15	Total NPV Lifetime Electric Energy Benefits	$ 53		$ 53	
16	Total NPV Lifetime Electric Capacity Benefits	$ 18		$ 18	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 71		$ 71	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.56		0.56	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-52 presents program financials and cost-effectiveness on a net savings basis.

Table 3-52: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 1	$ 1	$ 1
8	Administration and Management	$ 44	$ -	$ 44	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 76	$ -	$ 76
11	EDC Evaluation Costs	$ 2		$ 2	
12	SWE Audit Costs	$ 3		$ 3	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 127		$ 127	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 127		$ 127	
15	Total NPV Lifetime Electric Energy Benefits	$ 53		$ 53	
16	Total NPV Lifetime Electric Capacity Benefits	$ 18		$ 18	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 71		$ 71	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.56		0.56	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.7.7 Status of Recommendations

The impact and process evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-53 presents a summary of the findings with a response from Duquesne Light and their plans to address the recommendation in program delivery.

Table 3-53. LI Behavioral Findings and Recommendations

Findings	Recommendations
Reported Savings	
• Accounting for persistence yields significantly reduced first-year savings for legacy LI-BEEP waves active in PY13. Persistence made up 38% of measured savings from the regression analysis in PY13 and applied to one of the two active waves. This multi-year persistence perspective is a departure from prior phases of Act 129, which assumed a 1-year measure life for LI-BEEP.	• Guidehouse recommends that the CSP carefully monitor LI savings throughout Phase IV to ensure Duquesne meets its savings goal. The CSP should plan for significant reductions in savings for waves entering their third year of exposure to HER messaging and structure the introduction of new waves accordingly.
Duquesne Light Response: Duquesne Light will work with the CSP to plan for shifts in savings as new waves begin to accrue persistence in later years of the phase.	

Source: Guidehouse analysis

3.8 Small Business Direct-Install

The Small Business Direct Install (SBDI) program targets Duquesne Light C&I customers with monthly demand less than 300 kW. The Phase III program acquired its projected 4-year saving goal in 2 years (PY8/9). The Small Commercial Direct Install program will continue this Phase III success in addressing sector-specific barriers to small and medium C&I customers. Barriers to program participation included limited capital resources, high cost of capital (interest rates), lack of expertise, communication barriers, and conflicting priorities. Customers in these segments are often subject to split-incentives, where electric bill-paying customers are tenants but not the owners of the properties at which they conduct their businesses. Owners do not pay the electric bills, so they are not motivated to upgrade energy-using equipment to save on electric bills; electric bill-paying tenants are not motivated to upgrade properties they do not own. The Phase III direct-install program design successfully addressed these barriers by providing no-cost efficiency upgrades, whereby landlords received no-cost building upgrades and small business tenants benefited from lower electric bills. For Phase IV, participating customers will receive a no-cost energy assessment and incentives that cover up to 80% of the resulting equipment and installation costs.[11] A limited quantity of energy savings products may be provided at the time of assessment at no cost.

During Phase IV, this program emphasizes very small businesses (micro-businesses), such as small local bakeries or hardware stores. This program works with cities and towns through community and economic development offices, and with local chambers of commerce and business associations to encourage customers to take part in the SBDI program. Third-party contractors then survey a customer's site, obtain written approval from the customer, and install energy efficiency equipment at their site. Used equipment is properly disposed of according to all relevant state, local, and federal regulations. Duquesne Light conducts random inspections of

[11] Measures include lighting, VFDs, and a variety of refrigeration measures and a full list is available here: https://www.duqenergyefficiency.com/sbdi

completed sites. This program is projected to account for approximately 6% of nonresidential program savings during Phase IV.

In addition to the SBDI program, Guidehouse is reporting the common area portion of the Small Multifamily Housing Retrofit Program (SMHR) under SBDI. This program consists of cost-share measures, including lighting, ventilation, and whole-building measures, installed in the common area portions of small multifamily buildings. In PY13, 100% of these savings were reported as part of the low income carveout.

3.8.1 Participation and Reported Savings by Customer Segment

Table 3-54 presents the participation counts, reported energy and demand savings, and incentive payments for SBDI in PY13 by customer segment.

Table 3-54: SBDI Participation and Reported Impacts

Parameter	Small C&I	GNI*	Total
PY13 # Participants	41	9	41
PYRTD MWh/yr	1,298	214	1,298
PYRTD MW/yr	0.21	0.04	0.21
PY13 Incentives ($1,000)	$361	$83	$361

**Small C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

3.8.2 Gross Impact Evaluation

Unique to PY13, there were several components to SBDI that will not be present in PY14 and beyond. Six projects, reported in PY13, were self-install schools projects that would previously have been reported as part of the Public Agency Partnership Program (PAPP). Guidehouse applied the realization rate for the PAPP program from PY12 to these projects. In addition to the SBDI program, Guidehouse is currently evaluating the Multifamily Housing Retrofit Program, consisting of common area energy efficiency measures in multifamily buildings, under the SBDI initiative. This program saw six participants in PY13, and Guidehouse is applying the realization rates from their PY12 evaluation of the MFHR program to PY13. This program will be evaluated fully in PY14 under the SBDI evaluation umbrella as a separate stratum.

SBDI showed lower-than-anticipated participation in Q3 and, consistent with the evaluation plan, Guidehouse chose to evaluate PY13 and PY14 as a single evaluation effort to ensure that there were enough projects to provide a representative sample moving forward. Because of this, realization rates from Phase III have been applied to the SBDI program for PY13.

Table 3-55 presents the gross impact results for energy, and Table 3-56 provides the gross impact results for demand.

Table 3-55: SBDI Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Large	170	99%	0.12	15%
Multifamily	598	108%	0.06	6%
PAPP	96	116%	0.31	10%
Small	435	96%	0.12	9%
Program Total	**1,298**	**103%**	**0.06**	**5%**

Source: Guidehouse analysis

Table 3-56: SBDI Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Large	0.00	102%	0.05	7%
Multifamily	0.12	112%	0.13	11%
PAPP	0.02	131%	0.29	11%
Small	0.06	99%	0.01	1%
Program Total	**0.21**	**109%**	**0.08**	**7%**

Source: Guidehouse analysis

3.8.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse conducted net impact evaluation for the SBDI program. However, program participation was significantly lower than expected in the sample design, and Guidehouse was unable to collect enough responses to generate defensible estimates that meet statistics targets. Therefore, Guidehouse plans to extend the online participant surveys into PY14 to collect additional data and will report on the results in PY14. Table 2-4 shows the NTG ratio applied to SBDI.

3.8.3.1 HIM Research

Guidehouse did not conduct HIM research for the SBDI program in PY13.

3.8.4 Verified Savings Estimates

In Table 3-57, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for Small Business Solutions in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-57: SBDI PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	1,298	0.21
PYVTD Gross	1,343	0.23
PYVTD Net	1,333	0.22
RTD	1,298	0.21
VTD Gross	1,343	0.23
VTD Net	1,333	0.22

Source: Guidehouse analysis

3.8.5 Process Evaluation

Guidehouse conducted process evaluation research for the SBDI program in PY13. This research focused on program awareness, satisfaction, and barriers to participation. The evaluation team interviewed the program manager and the CSP. The team also deployed an online survey to 19 program participants to obtain feedback about their experiences with the program delivery processes and opportunities for program improvement.[12] However, due to significantly lower program participation than expected, Guidehouse was unable to collect enough responses to generate defensible estimates that meet statistics targets. Therefore, Guidehouse plans to extend the online participant surveys into PY14 to collect additional data and will report on process evaluation results and recommendations in PY14.

3.8.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-58. TRC benefits in Table 3-58 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

[12] During sample design stages the team estimated 60 unique participants for this program with a target of 23 completed surveys. Guidehouse received 4 completed surveys from the SBDI program's participants.

Table 3-58: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 334		$ 334	
2	Rebates to Participants and Trade Allies	$ 361		$ 361	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (27)		$ (27)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 17	$ 15	$ 17	$ 15
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 256	$ -	$ 256
11	EDC Evaluation Costs	$ 17		$ 17	
12	SWE Audit Costs	$ 40		$ 40	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 367		$ 367	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 701		$ 701	
15	Total NPV Lifetime Electric Energy Benefits	$ 580		$ 580	
16	Total NPV Lifetime Electric Capacity Benefits	$ 245		$ 245	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 71		$ 71	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (39)		$ (39)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 856		$ 856	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.22		1.22	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-59 presents program financials and cost-effectiveness on a net savings basis. The NTGR applied in PY13 comes from the PY6 NTG evaluation conducted in Phase II.

Table 3-59: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 331		$ 331	
2	Rebates to Participants and Trade Allies	$ 358		$ 358	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (27)		$ (27)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 17	$ 15	$ 17	$ 15
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 256	$ -	$ 256
11	EDC Evaluation Costs	$ 17		$ 17	
12	SWE Audit Costs	$ 40		$ 40	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 367		$ 367	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 698		$ 698	
15	Total NPV Lifetime Electric Energy Benefits	$ 576		$ 576	
16	Total NPV Lifetime Electric Capacity Benefits	$ 243		$ 243	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 70		$ 70	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (39)		$ (39)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 850		$ 850	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.22		1.22	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.8.7 Status of Recommendations

There were no impact or process related findings for this program in PY13.

3.9 Small Business Solutions

The Small Business Solutions program offers rebates to offset the higher cost of high efficiency equipment compared to standard efficiency equipment. Program incentives promote customer indifference to the higher cost of high efficiency equipment and increase customer adoption of high efficiency equipment. The program's primary objective is to provide C&I customers an expedited, quantifiable, and simple-to-understand incentive offering that helps them save energy and money.

The Small Business Solutions program targets C&I customers having annual demand less than 300 kW. The Small Business Solutions program targets customer engagement channels to assist customers to overcome unique, segment specific barriers to energy efficiency program participation. The program offers two core participation tracks: prescriptive and custom. The prescriptive track offers a simplified method on pre-defined measures without requiring complex analysis and will generally include deemed and partially deemed measures[36] from the TRM. The custom track makes it possible to include more complex, site-specific measures and projects in the programs. Custom projects must be able to show specific and verifiable energy savings and costs using TRM protocols.

3.9.1 Participation and Reported Savings by Customer Segment

Table 3-60 presents the participation counts, reported energy and demand savings, and incentive payments for Small Business Solutions in PY13 by customer segment.

Table 3-60: Small Business Solutions Participation and Reported Impacts

Parameter	Small C&I	GNI*	Total
PY13 # Participants	191	23	191
PYRTD MWh/yr	6,134	703	6,134
PYRTD MW/yr	1.25	0.16	1.25
PY13 Incentives ($1,000)	$451	$68	$451

**Small C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

3.9.2 Gross Impact Evaluation

The Small and Large Business Solutions programs are projected to account for approximately 47% of all Duquesne Light's Phase IV savings (residential and non-residential). The realization rate for all three of its predecessor programs (Commercial Energy Program, Industrial Energy Program, and Express Efficiency) was consistently close to 100% during Phase III.

Similar to other nonresidential programs, the Small and Large Business Solutions programs will be evaluated on a specified schedule. As detailed in the evaluation plan, Guidehouse applied the PY12 realization rate for Express Efficiency to the PY13 Small Business Solutions program. Guidehouse evaluated a sample of projects in PY13, and the realization rates for these projects combined with projects evaluated in PY14 will be applied in PY14.

Because of the size of this initiative, Guidehouse is targeting an 85/15 confidence/precision level for the small and large programs individually over a 2-year period.

Table 3-61 presents the gross impact results for energy, and Table 3-62 presents the gross impact results for demand.

Table 3-61: Small Business Solutions Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Medium	1,175	106%	0.13	7%
Small	4,959	144%	0.33	22%
Program Total	**6,134**	**136%**	**0.28**	**73%**

Source: Guidehouse analysis

Table 3-62: Small Business Solutions Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Medium	0.20	109%	0.23	17%
Small	1.06	216%	0.04	5%
Program Total	**1.25**	**199%**	**0.04**	**18%**

Source: Guidehouse analysis

While realization rates from PY12 were applied to the PY13 ex ante savings, Guidehouse did evaluate a sample of projects from PY13, which will be included in the PY14 verified realization rates. These projects had a realization rate very close to 100% for both energy and demand, indicating that the implementer is accurately reporting savings for this program. Small discrepancies in fixture count and fixture Wattage were the primary factors affecting realization rates, and will be detailed in the PY14 evaluation report.

3.9.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for Small Business Solutions in PY13 and plans to complete this evaluation in PY14. Table 2-4 shows the NTG ratio applied to Small Business Solutions projects.

3.9.3.1 HIM Research

Guidehouse did not conduct HIM research for Small Business Solutions in PY13.

3.9.4 Verified Savings Estimates

In Table 3-63, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for Small Business Solutions in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-63: Small Business Solutions PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	6,134	1.25
PYVTD Gross	8,369	2.50
PYVTD Net	8,369	2.50
RTD	6,134	1.25
VTD Gross	8,369	2.50
VTD Net	8,369	2.50

Source: Guidehouse analysis

3.9.5 Process Evaluation

Guidehouse did not conduct process evaluation research for the Small Business Solutions Program in PY13 and plans to complete it in PY14.

3.9.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-64. TRC benefits in Table 3-64 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-64: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 963		$ 963	
2	Rebates to Participants and Trade Allies	$ 451		$ 451	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 512		$ 512	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 14	$ 15	$ 14	$ 15
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 511	$ -	$ 511
11	EDC Evaluation Costs	$ 18		$ 18	
12	SWE Audit Costs	$ 40		$ 40	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 620		$ 620	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,583		$ 1,583	
15	Total NPV Lifetime Electric Energy Benefits	$ 3,698		$ 3,698	
16	Total NPV Lifetime Electric Capacity Benefits	$ 2,692		$ 2,692	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 328		$ 328	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (382)		$ (382)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 6,335		$ 6,335	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	4.00		4.00	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-65 presents program financials and cost-effectiveness on a net savings basis. The NTGR applied in PY13 comes from the PY11 NTG evaluation conducted in Phase III.

Table 3-65: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 758		$ 758	
2	Rebates to Participants and Trade Allies	$ 355		$ 355	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 317		$ 317	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 14	$ 15	$ 14	$ 15
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 511	$ -	$ 511
11	EDC Evaluation Costs	$ 18		$ 18	
12	SWE Audit Costs	$ 40		$ 40	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 620		$ 620	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,378		$ 1,378	
15	Total NPV Lifetime Electric Energy Benefits	$ 2,913		$ 2,913	
16	Total NPV Lifetime Electric Capacity Benefits	$ 2,120		$ 2,120	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 258		$ 258	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (301)		$ (301)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 4,989		$ 4,989	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	3.62		3.62	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.9.7 Status of Recommendations

The impact evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-66 provides a summary of findings, along with Duquesne Light's plans to address the recommendation in program delivery.

Table 3-66. Small Business Solutions Findings and Recommendations

Findings	Recommendations
Reported Savings	
• The Small Business Solutions program showed realization rates very close to 100%, indicating that the CSP has accurately estimated savings for this program based on participation and project information.	• No recommendation
Duquesne Light Response: Accepted	

Source: Guidehouse analysis

3.10 Small Business Midstream Solutions

The Nonresidential Midstream Lighting program delivers incentives to end-use customers via C&I product distributors or manufacturers. End-use customers, property/facility managers, and installation contractors acting on behalf of C&I end-use customers purchase qualified products from a participating distributor. The program shows the impact of a midstream delivery method of energy efficient lighting using a buy-down pricing strategy. The participating distributors discount targeted product wholesale prices at the POS and in turn receive an incentive payment. The program design removes barriers to participation by providing a streamlined, simple solution for C&I customers and their contractors to receive the incented price for qualifying products with no additional effort on their part. This program is filed as two programs in Duquesne Light's Phase IV—one as a small C&I program and one as a large C&I program. However, to the customer and distributor there is only one program.

End-use customers installing the discounted equipment were identified by the participating distributors (based on self-reports from the buyers) to enable evaluation at the customer level. However, some of the end-use customers are not cognizant of their participation in a program and the normal level of cooperation with the evaluation's verification may be challenging. Further, customers may or may not keep track of where they have installed specific equipment that was obtained from the individual purchase selected for verification by the evaluation team. In Phase III, this has led to more difficulty in contacting and verifying midstream customers. Guidehouse addresses this issue by oversampling this program to ensure that statistical targets are met and working directly with the CSP and Duquesne Light to identify points of contact for this program.

In PY13, this program included only lighting measures, similar to the Midstream Lighting program in Phase III. In the phase's later program years, other measures (HVAC, refrigeration, and food service equipment) will be added to the program. Guidehouse will evaluate these portions of the program when they occur, due to differences in program design and expected results.

3.10.1 Participation and Reported Savings by Customer Segment

Table 3-67 presents the participation counts, reported energy and demand savings, and incentive payments for Small Business Midstream Solutions in PY13 by customer segment.

Table 3-67: Small Business Midstream Participation and Reported Impacts

Parameter	Small C&I	GNI	Total
PY13 # Participants	488	113	488
PYRTD MWh/yr	10,665	1,879	10,665
PYRTD MW/yr	2.13	0.32	2.13
PY13 Incentives ($1,000)	$1,502	$244	$1,502

**Small C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

3.10.2 Gross Impact Evaluation

The Phase IV plan for evaluating the program impacts includes sampling stratified by level of energy savings to achieve 85/15 confidence/precision for the initiative as a whole (i.e., the small and large C&I midstream programs combined).

Guidehouse assigned each project to various strata based on that project's energy savings. The large stratum includes projects in the upper portion of the Midstream program component's energy savings; the medium stratum includes projects in the middle portion of the Midstream energy savings; and the small stratum represents the bottom portion of the Midstream energy savings. Appendix E details the sample design for SBMS and LBMS. To date, all projects have been lighting only, with no HVAC measures included in the Midstream programs.

When randomly selecting sample projects, Guidehouse selected projects based on the energy savings (MWh) stratification of each project. Projects selected in the random sample received a site verification visit unless the project included 10 or fewer bulbs, in which case they received a phone verification.

Table 3-68 presents the gross impact results for energy, and Table 3-69 provides the gross impact results for demand.

Table 3-68: Small Business Midstream Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
SBMS - Large	3,206	40%	0.70	92%
SBMS - Medium	5,831	63%	0.46	32%

SBMS - Small	1,628	91%	0.95	92%
Program Total	**10,665**	**60%**		**14%**

Source: Guidehouse analysis

Table 3-69: Small Business Midstream Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
SBMS - Large	0.62	24%	0.78	103%
SBMS - Medium	1.18	86%	0.17	12%
SBMS - Small	0.32	115%	0.55	53%
Program Total	**2.13**	**72%**		**9%**

Source: Guidehouse analysis

Unlike previous years of Duquesne Light's Midstream Lighting programs, site visits for the PY13 evaluation found that many bulbs purchased through the program had not yet been installed as required by the program. The primary reason indicated by site contacts for uninstalled bulbs was difficulty finding the labor to install the bulbs after purchasing them. In all cases where lights were not yet installed, the lights were found on site in storage awaiting installation. Nearly half of sites (n=6) in Small Business Midstream had a portion of the purchased bulbs installed, with the remainder in storage awaiting installation.

After discussing the situation with the SWE, Guidehouse considered the lights that were not yet installed as unverified savings, and installed fixtures as verified savings. The unverified savings percentage from the evaluated projects was applied to the overall ex-ante savings for the program. These unverified savings, representing 38% of ex-ante energy savings and 42% of ex-ante demand savings, were included in the reported (ex-ante) savings, but not to the verified savings. Guidehouse will revisit these sites during the first half of PY14 to confirm whether these bulbs have been installed. If the lights have been installed, the updated, increased savings will be applied in PY14, increasing the realization rates for that year. If the bulbs have not been installed at the time of the follow-up visit, they will be considered to have zero verified savings and the realization rates for that site will remain unchanged. Table 3-70 shows a breakdown of unverified savings for the Small Business Midstream program in PY13.

Table 3-70. SMBS Unverified Savings

Component	Unverified Savings (MWh)	Unverified MWh Savings (% of reported)	Unverified Savings (MW)	Unverified MW Savings (% of reported)
SBMS - Large	1,354	42%	0.29	50%
SBMS - Medium	1,884	32%	0.33	30%
SBMS - Small	-	0%	-	0%
Program Total	**3,238**	**30%**	**0.61**	**27%**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and led to the observed realization rates.

- At nearly 50% of evaluated Small Business Midstream sites (n=6) Guidehouse found that some or all lighting measures purchased through the program had not yet been installed. These sites will be revisited to confirm whether bulbs have been installed. This one factor lowered realization rates for this program by 38% for energy and 42% for demand.
- Of the remaining seven sites, four had major discrepancies between customer-reported HOU and the deemed (ex-ante) HOU used to calculate savings. This led to a high realization rate for one site and low realization rate for the other three.
- Three sites had additional controls installed on the fixtures. This led to a high realization rate for two sites where the controls were installed at the time of the fixture retrofit, and a low realization rate at the third where the controls had been present on the pre-retrofit fixtures.
- One site had the incorrect baseline Wattage listed. The baseline Wattage was for a high bay fixture, where the fixture was a low-bay T8. This led to a ~50% drop in savings for this stie.

3.10.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse conducted net impact evaluation for the Small Nonresidential Midstream Solutions program in PY13. Guidehouse estimated NTG for both Small and Large Business Midstream Solutions based on results from trade ally interviews. Guidehouse combined its research for Small and Large Business Midstream programs into one effort because distributors serve customers of all sizes regardless of which program customers participate.

Guidehouse completed 13 interviews with lighting, HVAC, and food service distributors, who provided inputs to a battery of NTG questions. Table 3-71 shows the Small and Large Business Midstream Solutions sample size and response rate. Table 3-72 shows the results of the analysis. If individual participants' contact information can be obtained, Guidehouse plans to also conduct NTG assessment based on participants' responses in PY15 and triangulate those results with NTG assessment based on distributor interviews, which will be repeated in PY15. Guidehouse's free ridership research was based on the methodology described in Appendix F.

Table 3-71: Small and Large Business Midstream Solutions Distributor Interview Sample Design

Component	Population Size	Targeted Sample Size	Achieved Sample Size	Response Rate
Small and Large Nonresidential Midstream Solutions	31	12	13	42%

Source: Guidehouse analysis

Table 3-72: Small and Large Business Midstream Solutions Distributor Net Impact Evaluation Results

Component	PYVTD	Free Ridership (%)	Spillover (%)	NTG Ratio	Relative Precision (@ 85% CL)
Small and Large Nonresidential Midstream Solutions	15,356	28%	0%	72%	26%

Source: Guidehouse analysis

3.10.3.1 HIM Research

Guidehouse did not conduct HIM research for measures implemented during PY13 for the Midstream program.

3.10.4 Verified Savings Estimates

Due to program design, distributors serve customers of all sizes regardless of which program customers participate in. Therefore, Guidehouse applied realization rates and NTG ratios to the energy and demand savings for both Large and Small Midstream Solutions to calculate verified savings estimates. Table 3-73 presents the verified savings estimates for both Small and Large Business Midstream Solutions in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-73: Small Business Midstream PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	10,665	2.13
PYVTD Gross	6,438	1.54
PYVTD Net	5,659	1.35
RTD	10,665	2.13
VTD Gross	6,438	1.54
VTD Net	5,659	1.35

*Savings include both SBMS and LBMS, as they are evaluated as a single initiative.

Source: Guidehouse analysis

3.10.5 Process Evaluation

Guidehouse did not conduct process evaluation for Nonresidential Small Business Midstream Solutions in PY13 and plans to complete it in PY15.

3.10.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-74. TRC benefits in Table 3-74 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-74: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 1,700		$ 1,700	
2	Rebates to Participants and Trade Allies	$ 1,502		$ 1,502	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 198		$ 198	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 12	$ 9	$ 12	$ 9
8	Administration and Management	$ 21	$ -	$ 21	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 892	$ -	$ 892
11	EDC Evaluation Costs	$ 12		$ 12	
12	SWE Audit Costs	$ 26		$ 26	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 972		$ 972	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 2,672		$ 2,672	
15	Total NPV Lifetime Electric Energy Benefits	$ 2,874		$ 2,874	
16	Total NPV Lifetime Electric Capacity Benefits	$ 1,671		$ 1,671	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 488		$ 488	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (386)		$ (386)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 4,648		$ 4,648	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.74		1.74	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-76 presents program financials and cost-effectiveness on a net savings basis.

Table 3-75: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 1,494		$ 1,494	
2	Rebates to Participants and Trade Allies	$ 1,320		$ 1,320	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 153		$ 153	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 12	$ 9	$ 12	$ 9
8	Administration and Management	$ 21	$ -	$ 21	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 892	$ -	$ 892
11	EDC Evaluation Costs	$ 12		$ 12	
12	SWE Audit Costs	$ 26		$ 26	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 972		$ 972	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 2,466		$ 2,466	
15	Total NPV Lifetime Electric Energy Benefits	$ 2,526		$ 2,526	
16	Total NPV Lifetime Electric Capacity Benefits	$ 1,469		$ 1,469	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 429		$ 429	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (339)		$ (339)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 4,085		$ 4,085	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.66		1.66	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.10.7 Status of Recommendations

The impact and process evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-76 summarizes the findings and recommendations for Small Business Midstream Solutions; each table also includes summaries of how Duquesne Light plans to address the recommendation in program delivery.

Table 3-76. Small Business Midstream Program Findings and Recommendations

Findings	Recommendations
Impact	
• Approximately 25% of projects (n=6, representing ~20% of evaluated savings) had some or all light fixtures/bulbs remaining in storage at the time of evaluation. The most commonly-cited reason for this was a lack of labor availability for installation. Two sites also had equipment (lift) issues resulting in delayed installation.	• The CSP should revisit these sites to ensure the lighting is installed. Moving forward, Guidehouse recommends the CSP follow up with a higher percentage of projects sooner and/or more often to ensure purchased lighting is installed and savings are realized.
Duquesne Light Response: Accepted.	

Source: Guidehouse analysis

3.11 Small Business Virtual Commissioning

The Virtual Commissioning (VCx) programs use a turnkey approach that targets system-based no- to low-cost operational savings for commercial customers and public facilities. These 100% pay-for-performance programs do not fit a traditional model that uses trade allies, mass marketing, or standardized prescriptive retrofits; rather, they provide a targeted, data-driven approach to energy efficiency engagement that effectively eliminates the need for enrollment forms, incentives, or administrative costs. This program is filed as two programs in Duquesne Light's Phase IV plan—one as a small C&I program and one as a large C&I program. However, to the customer and implementer there is only one program.

The Small Business Virtual Commissioning (SBVCx) program targets customers having annual maximum demand less than 300kW. The CSP for this program is Franklin Energy, who subcontracts out to a Virtual Commissioning specialist, Power TakeOff. The program used Advanced Metering Infrastructure (AMI) data analytics to identify and qualify customers with significant potential for energy savings. The identification process uses data modeling techniques to selectively pinpoint individual meters with significant potential for operational energy savings. Customers are then contacted by the CSP to help them understand their energy usage and provide them with personalized recommendations for low- to no-cost energy savings opportunities. Facilities that are confirmed to have implemented changes based on their recommendations are continuously monitored after participation to ensure savings persistence, and if a pre-determined level of savings drift is detected, the customer is re-engaged.

There was no participation in the SBVCx program in PY13, and therefore was not evaluated.

3.11.1 Participation and Reported Savings by Customer Segment

Table 3-77 presents the participation counts, reported energy and demand savings, and incentive payments for Small Business Virtual Commissioning in PY13 by customer segment.

Table 3-77: Small Business Virtual Commissioning Participation and Reported Impacts

Parameter	Small C&I	GNI	Total
PY13 # Participants	-	-	-
PYRTD MWh/yr	-	-	-
PYRTD MW/yr	-	-	-
PY13 Incentives ($1,000)	-	-	-

Source: Guidehouse analysis

3.11.2 Gross Impact Evaluation

SBVCx reported no savings in PY13, and per the PY13 Guidehouse Evaluation Plan was not evaluated.

3.11.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for SBVCx in PY13. Guidehouse plans to complete NTG evaluation in PY15 for this program.

3.11.3.1 HIM Research

Guidehouse did not conduct HIM research for SBVCx in PY13.

3.11.4 Verified Savings Estimates

SBVCx reported no savings in PY13, and therefore has reported no savings in Phase IV. Therefore, there are no verified savings estimates for this program in PY13.

3.11.5 Process Evaluation

Guidehouse did not conduct process evaluation for the Small Business Virtual Commissioning program in PY13 and plans to complete it in PY15.

3.11.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-78. TRC benefits in Table 3-78 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-78: Summary of Program Finances – Gross Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 4	$ 1	$ 4
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 32	$ -	$ 32
11	EDC Evaluation Costs	$ 3		$ 3	
12	SWE Audit Costs	$ 3		$ 3	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 65		$ 65	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 65		$ 65	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.00		0.00	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-79 presents program financials and cost-effectiveness on a net savings basis.

Table 3-79: Summary of Program Finances – Net Verified

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 4	$ 1	$ 4
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 32	$ -	$ 32
11	EDC Evaluation Costs	$ 3		$ 3	
12	SWE Audit Costs	$ 3		$ 3	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 65		$ 65	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 65		$ 65	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	0.00		0.00	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.11.7 Status of Recommendations

There were no impact or process related findings for this program in PY13.

3.12 Large Business Solutions

The Large Business Solutions (LBS) program offers rebates to offset the higher cost of high efficiency equipment compared to standard efficiency equipment. Program incentives promote customer indifference to the higher cost of high efficiency equipment and increase customer adoption of high efficiency equipment. The programs' primary objective is to provide C&I customers an expedited, quantifiable, and simple-to-understand incentive offering that helps them save energy and money. This program is filed as two programs in Duquesne Light's Phase IV—one as a small C&I program and one as a large C&I program. However, to the customer there is only one program.

The LBS program targets C&I customers having annual demand savings greater than or equal to 300 kW. The LBS program will employ targeted customer engagement channels to assist customers to overcome unique, segment specific barriers to energy efficiency program participation. The program offers two core participation tracks: prescriptive and custom. The prescriptive track offers a simplified method on pre-defined measures without requiring complex analysis and will generally include deemed and partially deemed measures[36] from the TRM. The custom track makes it possible to include more complex, site-specific measures and projects in the programs. Custom projects must be able to show specific and verifiable energy savings and costs using TRM protocols.

3.12.1 Participation and Reported Savings by Customer Segment

Table 3-80 and Table 3-81 present the participation counts, reported energy and demand savings, and incentive payments for LBS Commercial and LBS Industrial, respectively, in PY13 by customer segment.

Table 3-80: LBS Participation and Reported Impacts (Commercial)

Parameter	Large C&I	GNI	Total
PY13 # Participants	49	14	49
PYRTD MWh/yr	9,189	934	9,189
PYRTD MW/yr	1.71	0.18	1.71
PY13 Incentives ($1,000)	$645	$66	$645

**Large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

Table 3-81. LBS Participation and Reported Impacts (Industrial)

Parameter	Large C&I	GNI	Total
PY13 # Participants	13	0	13
PYRTD MWh/yr	2,142	0	2,142
PYRTD MW/yr	0.33	0	0.33
PY13 Incentives ($1,000)	$83	$0	$83

**Large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

3.12.2 Gross Impact Evaluation

The Small and Large Business Solutions programs are projected to account for approximately 47% of all Duquesne Light's Phase IV savings (residential and non-residential). The realization rate for all three of its predecessor programs (Commercial Energy Program, Industrial Energy Program, and Express Efficiency) was consistently close to 100% during Phase III.

Similar to other nonresidential programs, the Small and Large Business Solutions programs will be evaluated on a specified schedule. As detailed in the evaluation plan, the PY12 realization rate for large C&I was applied to the PY13 Large Business Solutions program. Guidehouse evaluated a sample of projects in PY13, and the results for these projects combined with projects evaluated in PY14 will be applied in PY14.

Because of the size of this initiative, the evaluation team is targeting an 85/15 confidence/precision level for the small and large programs individually over the 2-year periods.

Table 3-82 presents the gross impact results for energy, and Table 3-83 presents the gross impact results for demand.

Table 3-82: Large Business Solutions Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Commercial - Large	3,195	113%	0.11	12%
Commercial – Medium	4,804	106%	0.14	7%
Commercial - Small	1,190	144%	-	22%
Industrial - Large	823	99%	0.05	3%
Industrial - Medium	961	79%	0.46	31%
Industrial - Small	359	99%	0.02	1%

Program Total	**11,332**	**109%**	**0.07**	**5%**

Source: Guidehouse analysis

Table 3-83: Large Business Solutions Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
Commercial - Large	0.43	96%	-	29%
Commercial - Medium	1.07	109%	0.37	17%
Commercial - Small	0.21	216%	0.04	5%
Industrial - Large	0.10	75%	0.01	1%
Industrial - Medium	0.14	106%	0.33	22%
Industrial - Small	0.09	99%	0.13	9%
Program Total	**2.04**	**115%**	**0.19**	**7%**

Source: Guidehouse analysis

While realization rates from PY12 were applied to the PY13 ex ante savings, Guidehouse did evaluate a sample of projects from PY13, which will be included in the PY14 verified realization rates. These projects had a realization rate of very nearly 100% for both energy and demand, indicating that the implementer is accurately reporting savings for this program. Small discrepancies in fixture count and fixture Wattage were the primary factors affecting realization rates and will be detailed in the PY14 evaluation report.

3.12.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for LBS in PY13. Guidehouse will be conduct NTG evaluation in PY14 for this program. Table 2-4 shows the NTG ratio applied to LBS projects.

3.12.3.1 HIM Research

Guidehouse did not conduct HIM research for LBS in PY13.

3.12.4 Verified Savings Estimates

In Table 3-84 and Table 3-85, the realization rates and NTG ratios determined by Guidehouse are applied to the reported energy and demand savings estimates to calculate the verified savings estimates for LBS Commercial and LBS Industrial, respectively, in PY13. These totals are added to the verified savings achieved in previous program years to calculate the P4TD program impacts.

Table 3-84: Large Business Solutions (Commercial) PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)

PYRTD	9,189	1.71
PYVTD Gross	10,442	2.04
PYVTD Net	8,224	1.60
RTD	9,189	1.71
VTD Gross	10,442	2.04
VTD Net	8,224	1.60

Source: Guidehouse analysis

Table 3-85. Large Business Solutions (Industrial) PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	2,142	0.33
PYVTD Gross	1,933	0.31
PYVTD Net	1,175	0.19
RTD	2,142	0.33
VTD Gross	1,933	0.31
VTD Net	1,175	0.19

Source: Guidehouse analysis

3.12.5 Process Evaluation

Guidehouse did not conduct process evaluation research for the LBS program in PY13 and plans to complete it in PY14.

3.12.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-86 and Table 3-87 for LBS Commercial and LBS Industrial, respectively. TRC benefits in Table 3-86 and Table 3-87 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-86. Summary of Program Finances – Gross Verified (LBS Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 1,301		$ 1,301	
2	Rebates to Participants and Trade Allies	$ 645		$ 645	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 656		$ 656	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 45	$ 18	$ 45	$ 18
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 1,001	$ -	$ 1,001
11	EDC Evaluation Costs	$ 36		$ 36	
12	SWE Audit Costs	$ 81		$ 81	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 1,203		$ 1,203	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 2,504		$ 2,504	
15	Total NPV Lifetime Electric Energy Benefits	$ 4,648		$ 4,648	
16	Total NPV Lifetime Electric Capacity Benefits	$ 2,357		$ 2,357	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 356		$ 356	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (507)		$ (507)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 6,853		$ 6,853	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	2.74		2.74	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-87: Summary of Program Finances – Gross Verified (LBS Industrial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 135		$ 135	
2	Rebates to Participants and Trade Allies	$ 83		$ 83	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 52		$ 52	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 15	$ 14	$ 15	$ 14
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 391	$ -	$ 391
11	EDC Evaluation Costs	$ 17		$ 17	
12	SWE Audit Costs	$ 39		$ 39	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 498		$ 498	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 633		$ 633	
15	Total NPV Lifetime Electric Energy Benefits	$ 882		$ 882	
16	Total NPV Lifetime Electric Capacity Benefits	$ 355		$ 355	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 33		$ 33	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (150)		$ (150)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 1,121		$ 1,121	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.77		1.77	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-88 and Table 3-89 presents program financials and cost-effectiveness on a net savings basis for LBS Commercial and LBS Industrial, respectively. The NTGR applied in PY13 comes from the PY11 NTG evaluation conducted in Phase III.

Table 3-88: Summary of Program Finances – Net Verified (LBS Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 1,025		$ 1,025	
2	Rebates to Participants and Trade Allies	$ 508		$ 508	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 407		$ 407	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 45	$ 18	$ 45	$ 18
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 1,001	$ -	$ 1,001
11	EDC Evaluation Costs	$ 36		$ 36	
12	SWE Audit Costs	$ 81		$ 81	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 1,203		$ 1,203	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 2,228		$ 2,228	
15	Total NPV Lifetime Electric Energy Benefits	$ 3,661		$ 3,661	
16	Total NPV Lifetime Electric Capacity Benefits	$ 1,856		$ 1,856	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 280		$ 280	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (400)		$ (400)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 5,397		$ 5,397	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	2.42		2.42	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-89. Summary of Program Finances – Net Verified (LBS Industrial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 82		$ 82	
2	Rebates to Participants and Trade Allies	$ 50		$ 50	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 19		$ 19	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 15	$ 14	$ 15	$ 14
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 391	$ -	$ 391
11	EDC Evaluation Costs	$ 17		$ 17	
12	SWE Audit Costs	$ 39		$ 39	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 498		$ 498	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 580		$ 580	
15	Total NPV Lifetime Electric Energy Benefits	$ 536		$ 536	
16	Total NPV Lifetime Electric Capacity Benefits	$ 216		$ 216	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 20		$ 20	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (91)		$ (91)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 681		$ 681	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	1.17		1.17	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.12.7 Status of Recommendations

The impact evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-90 provides a summary of findings, along with Duquesne Light's plans to address the recommendation in program delivery.

Table 3-90. Large Business Solutions Findings and Recommendations

Findings	Recommendations
Reported Savings	
• The Large Business Solutions program showed realization rates very close to 100%, indicating that the CSP has accurately estimated savings for this program based on participation and project information.	• No recommendation
Duquesne Light Response: Accepted	

Source: Guidehouse analysis

3.13 Large Business Midstream Solutions

The Large Business Midstream Solutions (LBMS) program delivers incentives to end-use customers via C&I product distributors or manufacturers. End-use customers, property/facility managers, and installation contractors acting on behalf of C&I end-use customers purchase qualified products from a participating distributor. The participating distributors discount targeted product wholesale prices at the POS and in turn receive an incentive payment. The program design removes barriers to participation by providing a streamlined, simple solution for C&I customers and their contractors to receive the incented price for qualifying products with no additional effort on their part. This program is filed as two programs in Duquesne Light's Phase IV—one as a small C&I program and one as a large C&I program. However, to the customer and distributor there is only one program.

End-use customers installing the discounted equipment are identified by the participating distributors (based on self-reports from the buyers) to enable evaluation at the customer level. However, some of the end-use customers may not be cognizant of their participation in a program and the normal level of cooperation with the evaluation's verification may be challenging. Further, customers may or may not keep track of where they have installed specific equipment that was obtained from the individual purchase selected for verification by the evaluation team. In the past, this has led to more difficulty in contacting and verifying midstream customers. Guidehouse has addressed this issue by oversampling this program to ensure that statistical targets are met and working directly with the CSP and Duquesne Light to identify points of contact for this program.

In PY13, this program included only lighting measures, similar to the Midstream Lighting program in Phase III. In the phase's later program years, other measures (HVAC, refrigeration, and food service equipment) may be added to the program. Guidehouse will evaluate these portions of the program when they occur, due to differences in program design and expected results.

3.13.1 Participation and Reported Savings by Customer Segment

Table 3-91 and Table 3-92 presents the participation counts, reported energy and demand savings, and incentive payments for LBMS Commercial and LBMS Industrial, respectively, in PY13 by customer segment.

Table 3-91: LBMS Participation and Reported Impacts (Commercial)

Parameter	Large C&I	GNI	Total
PY13 # Participants	89	45	89
PYRTD MWh/yr	3,359	2,036	3,359
PYRTD MW/yr	0.58	0.30	0.58
PY13 Incentives ($1,000)	$439	$282	$439

**Large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

Table 3-92. LBMS Participation and Reported Impacts (Industrial)

Parameter	Large C&I	GNI	Total
PY13 # Participants	39	0	39
PYRTD MWh/yr	2,841	0	2,841
PYRTD MW/yr	0.61	0	0.61
PY13 Incentives ($1,000)	$370	$0	$370

**Large C&I are the total savings associated with their respective sector, including projects that fall under GNI. GNI values have been provided for informational purposes only and are presented as ex-anti savings (PYRTD).*

Source: Guidehouse analysis

3.13.2 Gross Impact Evaluation

The Phase IV plan for evaluating the program impacts includes sampling stratified by level of energy savings to achieve 85/15 confidence/precision for the initiative as a whole (i.e., the small and large C&I programs combined).

Guidehouse assigned each project to various strata based on that project's energy savings. The large stratum includes projects in the upper portion of the Midstream program component's energy savings; the medium stratum includes projects in the middle portion of the Midstream energy savings; and the small stratum represents the bottom portion of the Midstream energy savings. Appendix E details the sample design for SBMS and LBMS. To date, there have not been any HVAC measures included in the Midstream programs.

When randomly selecting sample projects, Guidehouse selected projects based on the energy savings (MWh) stratification of each project. Projects selected in the random sample received a site verification visit unless the project included 10 or fewer bulbs.

Table 3-93 presents the gross impact results for energy, and Table 3-94 presents the gross impact results for demand. While Commercial and Industrial LBMS savings are reported separately, they were evaluated as one initiative, with realization rates calculated at the stratum level (Large, Medium, and Small) but not the

Table 3-93: Large Business Midstream Gross Impact Results for Energy

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
LBMS – Large (Commercial)	1,189	154%	0.64	51%
LBMS – Medium (Commercial)	1,744	128%	0.25	18%
LBMS – Small (Commercial)	427	158%	1.73	71%
LBMS – Large (Industrial)	1,546	154%	0.64	51%
LBMS – Medium (Industrial)	1,066	128%	0.25	18%
LBMS – Small (Industrial)	230	158%	1.73	71%
Program Total*	**6,202**	**143%**		**14%**

*Program Total includes both SBMS and LBMS, as they are evaluated as a single initiative.

Source: Guidehouse analysis

Table 3-94: Large Business Midstream Gross Impact Results for Demand

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
LBMS – Large (Commercial)	0.22	98%	0.42	34%
LBMS – Medium (Commercial)	0.29	100%	0.12	9%
LBMS – Small (Commercial)	0.08	124%	2.65	108%
LBMS – Large (Industrial)	0.35	98%	0.42	34%
LBMS – Medium (Industrial)	0.23	100%	0.12	9%
LBMS – Small (Industrial)	0.04	124%	2.65	108%
Program Total	**1.21**	**1.01%**		**9%**

Source: Guidehouse analysis

Unlike previous years of Duquesne Light's Midstream Lighting programs, site visits for the PY13 evaluation found that many bulbs purchased through the program had not yet been installed as required by the program. The primary reason indicated by site contacts for uninstalled bulbs was difficulty finding the labor to install the bulbs after purchasing them. In all cases where lights were not yet installed, the lights were found on site in storage awaiting installation.

After discussing the situation with the SWE, Guidehouse considered the lights that were not yet installed as unverified savings, and installed fixtures as verified savings. The unverified savings percentage from the evaluated projects was applied to the overall ex-ante savings for the program. These unverified savings, representing 16% of ex-ante energy and demand savings, were included in the reported (ex-ante) savings, but not to the verified savings. Guidehouse will revisit these sites during the first half of PY14 to confirm whether these bulbs have been installed. If the lights have been installed, the updated, increased savings will be applied in PY14, increasing the realization rates for that year. If the bulbs have still not been installed at the time of the follow-up visit, they will be considered to have zero verified savings and the realization rates for that site will remain unchanged. Table 3-95 shows the breakdown of unverified savings for the Large Business Midstream Program in PY13.

Table 3-95: LBMS Unverified Savings

Component	Unverified Savings (MWh)	Unverified kWh Savings (% of reported)	Unverified Savings (MWW)	Unverified kW Savings (% of reported)
LBMS - Large	466	17%	0.10	17%
LBMS - Medium	-	0%	-	0%
LBMS - Small	102	16%	0.03	22%
Program Total	**569**	**9%**	**0.12**	**10%**

Source: Guidehouse analysis

The following factors led to variation between the reported and verified savings and led to the observed realization rates.

- At approximately 20% of evaluated Large Business Midstream sites (n=5) Guidehouse found that some or all lighting measures purchased through the program had not yet been installed. These sites will be revisited to confirm whether bulbs have been installed. This one factor lowered realization rates for this program by 16% for energy and demand.
- Of the remaining 20 sites, 15 had major discrepancies between customer-reported HOU and the deemed (ex-ante) HOU used to calculate savings. Since the deemed HOU is used, this discrepancy is expected. For 12 of these sites, the change in HOU resulted in a high realization rate for energy, increasing the overall realization rate for the initiative by approximately 40% overall. This difference was particularly notable in four parking garages and exterior locations that used deemed hours of use for Institutional/Public Service.
- Four sites had additional controls installed on the retrofit fixtures. This led to a high realization rate for all of these sites (an approximate 30% increase in energy savings).
- Six sites in Large Business Midstream Solution had an incorrect efficient fixture Wattage listed in the database used to calculate savings. These fixture wattages were too low by a factor of ten (i.e., 2.1 Watts instead of 21 Watts). This led to a lower realization rate for these sites. Since the efficient Wattage affects the overall savings less than the baseline Wattage, on average, this was a relatively small (~10%) drop in realization rate for these sites. This affected projects primarily early in the program year, and appears to have been corrected in later projects.
- Two verified fixtures had the incorrect fixture type/lumen bin combination in listed in the PMRS database. This led to a significant increase in realization rate for one site and a decrease for the second.

3.13.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse conducted net impact evaluation for LBMS in PY13. Guidehouse estimated NTG for both Small and Large Business Midstream Solutions based on results from trade ally interviews. Guidehouse combined its research for Small and Large Business Midstream programs into one effort because distributors serve

customers of all sizes regardless of which program customers participate. Table 3-71 and Table 3-72 describe the sample design, analysis, and results of the evaluation.

3.13.3.1 HIM Research

Guidehouse did not conduct HIM research for measures implemented during PY13 for the Midstream program.

3.13.4 Verified Savings Estimates

Due to program design, distributors serve customers of all sizes regardless of which program customers participate in. Therefore, Guidehouse applied realization rates and NTG ratios to the energy and demand savings for both Large and Small Midstream Solutions to calculate verified savings estimates.

Table 3-96: Commercial Large Business Midstream PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	3,359	0.58
PYVTD Gross	4,727	0.60
PYVTD Net	4,155	0.52
RTD	3,359	0.58
VTD Gross	4,727	0.60
VTD Net	4,155	0.52

Source: Guidehouse analysis

Table 3-97: Industrial Large Business Midstream PY13 and P4TD Savings Summary

Savings Type	Energy (MWh/yr)	Demand (MW/yr)
PYRTD	2,841	0.61
PYVTD Gross	4,098	0.61
PYVTD Net	3,602	0.54
RTD	2,841	0.61
VTD Gross	4,098	0.61
VTD Net	3,602	0.54

Source: Guidehouse analysis

3.13.5 Process Evaluation

Guidehouse did not conduct process evaluation for Large Business Midstream Solutions program in PY13 and plans to complete it in PY15.

3.13.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness is presented in Table 3-98 and Table 3-99 for LBMS Commercial and LBMS Industrial, respectively. TRC benefits in Table 3-98 and Table 3-99 were calculated using gross verified impacts. NPV PY13 costs and benefits

are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-98: Summary of Program Finances – Gross Verified (LBMS Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 698		$ 698	
2	Rebates to Participants and Trade Allies	$ 439		$ 439	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 259		$ 259	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 7	$ 12	$ 7	$ 12
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 360	$ -	$ 360
11	EDC Evaluation Costs	$ 11		$ 11	
12	SWE Audit Costs	$ 24		$ 24	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 436		$ 436	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,134		$ 1,134	
15	Total NPV Lifetime Electric Energy Benefits	$ 2,068		$ 2,068	
16	Total NPV Lifetime Electric Capacity Benefits	$ 692		$ 692	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 258		$ 258	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (229)		$ (229)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 2,789		$ 2,789	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	2.46		2.46	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-99. Summary of Program Finances – Gross Verified (LBMS Industrial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 356		$ 356	
2	Rebates to Participants and Trade Allies	$ 370		$ 370	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (14)		$ (14)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 3	$ 5	$ 3	$ 5
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 251	$ -	$ 251
11	EDC Evaluation Costs	$ 5		$ 5	
12	SWE Audit Costs	$ 10		$ 10	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 296		$ 296	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 652		$ 652	
15	Total NPV Lifetime Electric Energy Benefits	$ 1,862		$ 1,862	
16	Total NPV Lifetime Electric Capacity Benefits	$ 710		$ 710	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 86		$ 86	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (295)		$ (295)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 2,364		$ 2,364	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	3.62		3.62	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-100 and Table 3-101 presents program financials and cost-effectiveness on a net savings basis for LBMS Commercial and LBMS Industrial, respectively.

Table 3-100: Summary of Program Finances – Net Verified (LBMS Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 613		$ 613	
2	Rebates to Participants and Trade Allies	$ 386		$ 386	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ 200		$ 200	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 7	$ 12	$ 7	$ 12
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 360	$ -	$ 360
11	EDC Evaluation Costs	$ 11		$ 11	
12	SWE Audit Costs	$ 24		$ 24	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 436		$ 436	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 1,049		$ 1,049	
15	Total NPV Lifetime Electric Energy Benefits	$ 1,818		$ 1,818	
16	Total NPV Lifetime Electric Capacity Benefits	$ 608		$ 608	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 227		$ 227	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (201)		$ (201)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 2,452		$ 2,452	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	2.34		2.34	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-101. Summary of Program Finances – Net Verified (LBMS Industrial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ 313		$ 313	
2	Rebates to Participants and Trade Allies	$ 325		$ 325	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ (11)		$ (11)	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 3	$ 5	$ 3	$ 5
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 251	$ -	$ 251
11	EDC Evaluation Costs	$ 5		$ 5	
12	SWE Audit Costs	$ 10		$ 10	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 296		$ 296	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 609		$ 609	
15	Total NPV Lifetime Electric Energy Benefits	$ 1,637		$ 1,637	
16	Total NPV Lifetime Electric Capacity Benefits	$ 624		$ 624	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ 76		$ 76	
18	Total NPV Lifetime Fossil Fuel Impacts	$ (259)		$ (259)	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ 2,078		$ 2,078	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	3.41		3.41	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

3.13.7 Status of Recommendations

The impact and NTG evaluation activities in PY13 led to the following findings and recommendations from Guidehouse to Duquesne Light. Table 3-102 summarizes the findings and recommendations for the program, along with Duquesne Light's plans to address the recommendation in program delivery.

Table 3-102. Large Business Midstream Program Findings and Recommendations

Findings	Recommendations
Reported Savings	
• Approximately 25% of projects (n=5, representing ~17% of evaluated savings for LBMS) had some or all light fixtures/bulbs remaining in storage at the time of evaluation. The most commonly-cited reason for this was a lack of labor availability for installation. Two sites also had equipment (lift) issues resulting in delayed installation.	• The CSP should revisit these sites to ensure the lighting is installed. Moving forward, Guidehouse recommends the CSP follow up with a higher percentage of projects sooner and/or more often to ensure purchased lighting is installed and savings are realized.
• Two verified fixtures had an incorrect fixture type and lumen bin listed in the PMRS database, which led to an incorrect baseline Wattage being applied to these fixtures.	• CSP should review their fixture database to ensure that all fixtures are categorized correctly.
Duquesne Light Response: Accepted	

Source: Guidehouse analysis

3.14 Large Business Virtual Commissioning

The Virtual Commissioning (VCx) programs use a turnkey approach that targets system-based no- to low-cost operational savings for commercial customers and public facilities. These 100% pay-for-performance programs do not fit a traditional model that uses trade allies, mass marketing, or standardized prescriptive retrofits; rather, they provide a targeted, data-driven approach to energy efficiency engagement that effectively eliminates the need for enrollment forms, incentives, or administrative costs. This program is filed as two programs in Duquesne Light's Phase IV plan—one as a small C&I program and one as a large C&I program. However, to the customer and implementer there will be only one program.

The Large Business Virtual Commissioning (LBVCx) program targets customers having annual maximum demand equal to or greater than 300 kW. Similar to the SBVCx program, the CSP is Franklin Energy, who subcontracts out to a Virtual Commissioning specialist, Power TakeOff. The programs use AMI data analytics to identify and qualify customers with significant potential for energy savings. The identification process uses data modeling techniques to selectively pinpoint individual meters with significant potential for operational energy savings. Customers are then contacted by the CSP to help them understand their energy usage and provide them with personalized recommendations for low- to no-cost energy savings opportunities. Facilities that are confirmed to have implemented changes based on their recommendations are continuously monitored after participation to ensure savings persistence, and if a pre-determined level of savings drift is detected, the customer is re-engaged.

There was no participation in the LBVCx program in PY13, and therefore was not evaluated.

3.14.1 Participation and Reported Savings by Customer Segment

Table 3-103 presents the participation counts, reported energy and demand savings, and incentive payments for LBVCx in PY13 by customer segment.

Table 3-103: Large Business Virtual Commissioning Participation and Reported Impacts

Parameter	Large C&I	GNI	Total
PY13 # Participants	-	-	-
PYRTD MWh/yr	-	-	-
PYRTD MW/yr	-	-	-
PY13 Incentives ($1,000)	-	-	-

Source: Guidehouse analysis

3.14.2 Gross Impact Evaluation

The LBVCx program reported no savings in PY13 and was not evaluated.

3.14.3 Net Impact Evaluation

Per the PY13 Guidehouse Evaluation Plan, Guidehouse did not conduct net impact evaluation for LBVCx in PY13. Guidehouse plans to complete NTG evaluation in PY15 for this program.

3.14.3.1 HIM Research

Guidehouse did not conduct HIM research for LBVCx in PY13.

3.14.4 Verified Savings Estimates

LBVCx reported no savings in PY13, and therefore has reported no savings in Phase IV. There are no verified savings estimates for this program in PY13.

3.14.5 Process Evaluation

Guidehouse did not conduct process evaluation research for the LBVCx program in PY13 and plans to complete it in PY15.

3.14.6 Program Finances and Cost-Effectiveness Reporting

A detailed breakdown of program finances and cost-effectiveness are presented in Table 3-104 and Table 3-105 for LBVCx Commercial and LBVCx Industrial, respectively. TRC benefits in Table 3-104 and Table 3-105 were calculated using gross verified impacts. NPV PY13 costs and benefits are expressed in 2021 dollars. NPV costs and benefits for P4TD financials are expressed in the 2021 dollars.

Table 3-104: Summary of Program Finances – Gross Verified (LBVCx Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 2	$ 1	$ 2
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 17	$ -	$ 17
11	EDC Evaluation Costs	$ 1		$ 1	
12	SWE Audit Costs	$ 2		$ 2	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 45		$ 45	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 45		$ 45	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.0**		**0.0**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-105. Summary of Program Finances – Gross Verified (LBVCx Industrial)

Row	Cost Category*	PYTD ($1,000)	P4TD ($1,000)
1	**Incremental Measure Costs (IMCs)**	$ -	$ -
2	Rebates to Participants and Trade Allies	$ -	$ -
3	Upstream/Midstream Incentives	$ -	$ -
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -	$ -
5	Direct Installation Program Materials and Labor	$ -	$ -
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -	$ -
		EDC / **CSP**	**EDC** / **CSP**
7	Program Design	$ 1 / $ 1	$ 1 / $ 1
8	Administration and Management	$ 22 / $ -	$ 22 / $ -
9	Marketing	$ - / $ -	$ - / $ -
10	Program Delivery	$ - / $ 8	$ - / $ 8
11	EDC Evaluation Costs	$ 1	$ 1
12	SWE Audit Costs	$ -	$ -
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 32	$ 32
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 32	$ 32
15	Total NPV Lifetime Electric Energy Benefits	$ -	$ -
16	Total NPV Lifetime Electric Capacity Benefits	$ -	$ -
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -	$ -
18	Total NPV Lifetime Fossil Fuel Impacts	$ -	$ -
19	Total NPV Lifetime Water Impacts	$ -	$ -
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -	$ -
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.0**	**0.0**

Table 3-106 and Table 3-107 present program financials and cost-effectiveness on a net savings basis for LBVCx Commercial and LBVCx Industrial, respectively.

Table 3-106: Summary of Program Finances – Net Verified (LBVCx Commercial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 2	$ 1	$ 2
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 17	$ -	$ 17
11	EDC Evaluation Costs	$ 1		$ 1	
12	SWE Audit Costs	$ 2		$ 2	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 45		$ 45	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 45		$ 45	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.0**		**0.0**	

* Rows 1-13 are presented in nominal dollars (PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025); P4TD = $2021

Source: Guidehouse analysis

Table 3-107: Summary of Program Finances – Net Verified (LBVCx Industrial)

Row	Cost Category*	PYTD ($1,000)		P4TD ($1,000)	
1	**Incremental Measure Costs (IMCs)**	$ -		$ -	
2	Rebates to Participants and Trade Allies	$ -		$ -	
3	Upstream/Midstream Incentives	$ -		$ -	
4	Material Cost for Self-Install Programs (EE&C Kits)	$ -		$ -	
5	Direct Installation Program Materials and Labor	$ -		$ -	
6	Participant Costs (Row 1 minus the sum of Rows 2 through 5)	$ -		$ -	
		EDC	**CSP**	**EDC**	**CSP**
7	Program Design	$ 1	$ 1	$ 1	$ 1
8	Administration and Management	$ 22	$ -	$ 22	$ -
9	Marketing	$ -	$ -	$ -	$ -
10	Program Delivery	$ -	$ 8	$ -	$ 8
11	EDC Evaluation Costs	$ 1		$ 1	
12	SWE Audit Costs	$ -		$ -	
13	**Program Overhead Costs (Sum of rows 7 through 12)**	$ 32		$ 32	
14	**Total NPV TRC Costs (Sum of rows 1 and 13)**	$ 32		$ 32	
15	Total NPV Lifetime Electric Energy Benefits	$ -		$ -	
16	Total NPV Lifetime Electric Capacity Benefits	$ -		$ -	
17	Total NPV Lifetime Operation and Maintenance (O&M) Benefits	$ -		$ -	
18	Total NPV Lifetime Fossil Fuel Impacts	$ -		$ -	
19	Total NPV Lifetime Water Impacts	$ -		$ -	
20	**Total NPV TRC Benefits (Sum of rows 15 through 19)**	$ -		$ -	
21	**TRC Benefit-Cost Ratio (Row 20 divided by Row 14)**	**0.0**		**0.0**	

Source: Guidehouse analysis

3.14.7 Status of Recommendations

There were no impact or process related findings for this program in PY13.

4. Portfolio Finances and Cost Recovery

This section provides an overview of the expenditures associated with Duquesne Light's portfolio and the recovery of those costs from ratepayers.

4.1 Program Finances

Program-specific and portfolio total finances for PY13 are shown in Table 4-1. The columns in Table 4-1 and Table 4-2 are adapted from the 'Direct Program Cost' categories in the Commission's EE&C Plan template[13] for Phase IV. Non-incentives include EDC Materials, Labor, and Administration costs (including costs associated with an EDC's own employees) as well as ICSP Materials, Labor, and Administration costs (including both the program implementation contractor and the costs of any other outside vendors and EDCs employs to support program delivery). The dollar figures shown in Table 4-1 and Table 4-2 are based on EDC tracking of expenditures with no adjustments to account for inflation.[14]

Table 4-1: PY13 Program and Portfolio Total Finances

Program	Incentives	Non-Incentives	Total Cost
Res Downstream Incentives	$86	$926	$1,012
Res Midstream Incentives	$0	$73	$73
Res Upstream Lighting	$805	$390	$1,195
Appliance Recycling	$33	$789	$822
Low Income Energy Efficiency	$975	$1,181	$2,156
Res Behavioral EE	$0	$562	$562
Low Income Behavioral EE	$0	$124	$124
Small Business Direct Install	$695	$327	$1,022
Small Business Downstream	$1,414	$580	$1,994
Small Business Midstream	$3,202	$946	$4,148
Small Business VCx	$0	$62	$62
Large Commercial Downstream	$1,946	$1,122	$3,068
Large Commercial Midstream	$1,137	$412	$1,549
Large Commercial VCx	$0	$43	$43
Large Industrial Downstream	$218	$459	$677
Large Industrial Midstream	$726	$286	$1,012
Large Industrial VCx	$0	$32	$32
Common Portfolio Costs			**N/A**
Portfolio Total	**$11,236**	**$8,314**	**$19,550**
SWE Costs[15]	**N/A**	**N/A**	**$396**

[13] https://www.puc.pa.gov/pcdocs/1676672.docx

[14] The cost-recovery of program expenses through riders generally happens promptly so that costs are being recovered from ratepayers in the same dollars that they are incurred.

[15] SWE costs are outside of the 2% spending cap

Total	**$11,236**	**$8,314**	**$19,946**

Source: Guidehouse analysis

Program-specific and portfolio total finances since the inception of Phase IV are shown in Table 4-2.

Table 4-2: P4TD Program and Portfolio Total Finances

Program	Incentives	Non-Incentives	Total Cost
Res Downstream Incentives	$86	$926	$1,012
Res Midstream Incentives	$0	$73	$73
Res Upstream Lighting	$805	$390	$1,195
Appliance Recycling	$33	$789	$822
Low Income Energy Efficiency	$975	$1,181	$2,156
Res Behavioral EE	$0	$562	$562
Low Income Behavioral EE	$0	$124	$124
Small Business Direct Install	$695	$327	$1,022
Small Business Downstream	$1,414	$580	$1,994
Small Business Midstream	$3,202	$946	$4,148
Small Business VCx	$0	$62	$62
Large Commercial Downstream	$1,946	$1,122	$3,068
Large Commercial Midstream	$1,137	$412	$1,549
Large Commercial VCx	$0	$43	$43
Large Industrial Downstream	$218	$459	$677
Common Portfolio Costs			**N/A**
Portfolio Total	**$11,236**	**$8,314**	**$19,550**
SWE Costs[16]	**N/A**	**N/A**	**$396**
Total	**$11,236**	**$8,314**	**$19,946**

Source: Guidehouse analysis

4.2 Cost Recovery

Act 129 allows Pennsylvania EDCs to recover EE&C plan costs through a cost-recovery mechanism. Duquesne Light's cost-recovery charges are organized separately by four customer sectors to ensure that the electric rate classes that finance the programs are the rate classes that receive the direct energy conservation benefits. Cost recovery is governed by tariffed rate class, so it is necessarily tied to the way customers are metered and charged for electric service. Readers should be mindful of the differences between Table 4-3 and Section 2.3. For example, the LI customer segment is a subset of Duquesne Light's residential tariff(s) and therefore not listed in Table 4-3.

[16] Statewide Evaluation costs are outside of the 2% spending cap

Table 4-3: EE&C Plan Expenditures by Cost-Recovery Category[17] ($1,000)

Cost Recovery Sector	Rate Classes Included	PY13 Spending	P4TD Spending
Residential	RS,RH,RA	$ 5,364	$ 5,364
Small/Medium Commercial and Industrial	GS,GM, GMH	$ 4,343	$ 4,343
Large Commercial	GL, GLH, L	$ 2,772	$ 2,772
Large Industrial	GL, GLH, L, HVPS	$ 1,276	$ 1,276
Portfolio Total		**$ 13,755**	**$ 13,755**

Source: Guidehouse analysis

[17] Includes SWE costs

Appendix A. Site Inspection Summary

Table A-1: PY13 Site Visit Summary

Program	Inspection Firm	Number of Inspections Conducted	Number of Sites with Discrepancies from Reported Values	Summary of Common Discrepancies and Explanation of Discrepancy
SBMS	Karpinski	13	13**	Installation rate (labor shortages), HOU (deemed vs customer-confirmed), Control Type (unknown in ex ante calculations)
LBMS	Karpinski	25	25**	Installation rate (labor shortages), HOU (deemed vs customer-confirmed), Control Type (unknown in ex ante calculations)
SBS*	Karpinski	2*	1	Fixture QTY (within 5% of reported)
LBS*	Karpinski	10	3	HOU (different space type than recorded) Fixture QTY (within 5% of reported)
SBDI*	Karpinski	3	**2**	Fixture Wattage (within 5% of reported) Fixture QTY (within 5% of reported)
TOTAL		**53**	**44**	

Source: Guidehouse analysis

Appendix B. Behavioral Energy Efficiency Program Impact Evaluation Detail

B.1 Data Preparation and Participant Counts

The evaluation team deployed specific data management methodologies to prepare billing data for the regressions, consistent with the steps outlined in Section 6.1.4 of the Phase IV Evaluation Framework. These methodologies are partially informed by feedback Guidehouse received from the SWE during previous evaluations. Based on an issue of multiple inactive dates for some accounts identified in PY12, Guidehouse removed accounts with a maximum inactive date prior to the start of the evaluation period. Monthly billing data were calendarized by expanding the billing periods (which follow variable meter read schedules) to daily data and then collapsing them into a common calendar basis. Each month of usage data represents an aggregation of the usage data from the bills that contain data for that month. Estimated reads, which are infrequent for Duquesne Light, were handled by summing the consecutive estimated reads with the first actual read that followed and dividing that aggregated use across the number of days since the previous actual read. Participants and nonparticipants who moved out of Duquesne Light territory during PY13 were included in the regression analysis until move-out occurred and monthly billing data ceased. There is a monotonically decreasing number of participants per month for each cohort.

Guidehouse calculated participant counts following a standard approach where the last available month of billing data is calculated for each account and the household is assumed to be active for all months prior. This participant counting approach is used to obtain an average participant count across all months of the program year. Table B-1 shows the number of treatment group homes by cohort and month.

Table B-1: Active Participant Counts by Wave

Month	2012 Market Rate	2015 Market Rate	2021 Digital	2021 Non-Digital	2015 LI	2021 LI
Jun 2021	12,719	34,234	-	-	8,635	-
Jul 2021	12,662	34,057	-	-	8,587	-
Aug 2021	12,602	33,839	-	-	8,498	-
Sep 2021	12,550	33,581	-	-	8,391	-
Oct 2021	12,492	33,404	74,675	69,761	8,335	12,889
Nov 2021	12,431	33,217	74,395	69,554	8,241	12,817
Dec 2021	12,372	33,034	73,479	68,860	8,175	12,622
Jan 2022	12,325	32,866	72,565	68,217	8,104	12,463
Feb 2022	12,286	32,733	71,855	67,669	8,034	12,304
Mar 2022	12,258	32,602	71,160	67,190	7,974	12,147
Apr 2022	12,213	32,485	70,330	66,620	7,926	11,962
May 2022	12,172	32,353	69,434	66,010	7,855	11,741
Average	**12,424**	**33,200**	**72,237**	**67,985**	**8,230**	**12,368**

Source: Guidehouse analysis

B.2 Regression Output

The following tables in Appendix B show the regression results for the four waves that compose R-BEEP and the two waves that compose LI-BEEP.

Table B-2: R-BEEP Wave Regression Savings Details

Month	2012 Market Rate		2015 Market Rate		2021 Digital		2021 Non-Digital	
	Treatment Coefficient	Cluster Robust Standard Error	Treatment Coefficient	Cluster Robust Standard Error	Treatment Coefficient	Cluster Robust Standard Error	Treatment Coefficient	Cluster Robust Standard Error
Jun 2021	-0.71	0.15	-0.39	0.13	-	-	-	-
Jul 2021	-0.69	0.17	-0.40	0.15	-	-	-	-
Aug 2021	-0.70	0.17	-0.44	0.15	-	-	-	-
Sep 2021	-0.60	0.14	-0.28	0.12	-	-	-	-
Oct 2021	-0.60	0.12	-0.35	0.11	-0.04	0.05	-0.05	0.04
Nov 2021	-0.53	0.13	-0.41	0.11	-0.06	0.06	-0.05	0.05
Dec 2021	-0.64	0.15	-0.35	0.12	-0.13	0.07	-0.01	0.05
Jan 2022	-0.79	0.18	-0.36	0.14	-0.25	0.07	0.03	0.06
Feb 2022	-0.75	0.18	-0.43	0.14	-0.28	0.07	-0.02	0.06
Mar 2022	-0.63	0.14	-0.40	0.12	-0.13	0.06	-0.06	0.05
Apr 2022	-0.54	0.12	-0.30	0.10	-0.23	0.05	-0.05	0.04
May 2022	-0.62	0.12	-0.35	0.11	-0.21	0.05	-0.02	0.04

Source: Guidehouse analysis

Table B-3: LI-BEEP Wave Regression Savings Details

Month	2015 LI		2021 LI	
	Treatment Coefficient	Cluster Robust Standard Error	Treatment Coefficient	Cluster Robust Standard Error
Jun 2021	-0.56	0.23	-	-
Jul 2021	-0.46	0.25	-	-
Aug 2021	-0.39	0.26	-	-
Sep 2021	-0.50	0.22	-	-
Oct 2021	-0.44	0.20	-0.04	0.05
Nov 2021	-0.65	0.24	-0.06	0.06
Dec 2021	-0.70	0.26	-0.13	0.07
Jan 2022	-0.82	0.30	-0.25	0.07
Feb 2022	-0.73	0.29	-0.28	0.07
Mar 2022	-0.66	0.24	-0.13	0.06
Apr 2022	-0.57	0.20	-0.23	0.05
May 2022	-0.45	0.18	-0.21	0.05

Source: Guidehouse analysis

Table B-4: R-BEEP Wave Regression Savings Percent Details

Month	2012 Market Rate		2015 Market Rate		2021 Digital		2021 Non-Digital	
	Treatment Coefficient	Absolute Precision	Treatment Coefficient	Absolute Precision	Treatment Coefficient	Absolute Precision	Treatment Coefficient	Absolute Precision
Jun 2021	1.86%	0.78%	1.31%	0.84%	-	-	-	-
Jul 2021	1.60%	0.78%	1.17%	0.84%	-	-	-	-
Aug 2021	1.64%	0.78%	1.30%	0.84%	-	-	-	-
Sep 2021	1.79%	0.84%	1.06%	0.92%	-	-	-	-
Oct 2021	2.25%	0.88%	1.62%	0.96%	0.25%	0.57%	0.30%	0.53%
Nov 2021	1.87%	0.92%	1.85%	1.00%	0.33%	0.63%	0.32%	0.57%
Dec 2021	1.98%	0.92%	1.44%	0.98%	0.63%	0.63%	0.06%	0.57%
Jan 2022	2.23%	1.02%	1.36%	1.04%	1.09%	0.65%	-0.15%	0.59%
Feb 2022	2.27%	1.08%	1.76%	1.10%	1.33%	0.63%	0.13%	0.61%
Mar 2022	2.31%	1.02%	1.95%	1.10%	0.75%	0.61%	0.39%	0.59%
Apr 2022	2.14%	0.96%	1.56%	1.06%	1.34%	0.59%	0.34%	0.57%
May 2022	2.34%	0.92%	1.66%	1.02%	1.13%	0.55%	0.14%	0.55%

Source: Guidehouse analysis

Table B-5: LI-BEEP Wave Regression Savings Percent Details

Month	2015 LI		2021 LI	
	Treatment Coefficient	Absolute Precision	Treatment Coefficient	Absolute Precision
Jun 2021	2.18%	1.71%	-	-
Jul 2021	1.57%	1.71%	-	-
Aug 2021	1.35%	1.74%	-	-
Sep 2021	2.14%	1.82%	-	-
Oct 2021	2.14%	1.88%	-0.17%	1.25%
Nov 2021	2.82%	2.02%	-0.35%	1.39%
Dec 2021	2.82%	2.04%	0.42%	1.25%
Jan 2022	2.94%	2.14%	1.92%	1.22%
Feb 2022	2.77%	2.18%	2.18%	1.20%
Mar 2022	2.96%	2.14%	1.66%	1.16%
Apr 2022	2.87%	1.98%	1.12%	1.14%
May 2022	2.34%	1.84%	0.89%	1.04%

Source: Guidehouse analysis

Table B-6: BEEP Wave Monthly Regression Savings (MWh/yr)

Month	2012 Market Rate	2015 Market Rate	2021 Digital	2021 Non-Digital	2015 LI	2021 LI
Jun 2021	271	403	-	-	146	-
Jul 2021	271	420	-	-	122	-
Aug 2021	274	464	-	-	103	-
Sep 2021	227	284	-	-	127	-
Oct 2021	231	361	104	101	113	-14
Nov 2021	198	412	135	112	160	-31
Dec 2021	244	356	294	25	177	42
Jan 2022	302	365	561	-64	206	217
Feb 2022	257	397	572	45	165	208
Mar 2022	241	408	297	130	162	144
Apr 2022	197	289	476	103	134	81
May 2022	233	347	448	47	109	63

Savings are prior to any overlap or persistence adjustments.

Source: Guidehouse analysis

Table B-7: BEEP Wave Average Daily Use

Wave	Average Daily Use (kWh)
2012 Market Rate	32.0
2015 Market Rate	25.0
2021 Digital	19.2
2021 Non-Digital	17.0
2015 LI	23.7
2021 LI	23.3

Source: Guidehouse analysis

B.3 Overlap Analysis Detail

To the extent that the behavioral energy efficiency waves increase participation in other programs, some savings from the evaluation's regression analysis could be double-counted if appropriate adjustments are not made. Double counting can be avoided for downstream programs that track participation at the customer level by generating estimates of uplift—that is, the increase in participation in a given program among R-BEEP and LI-BEEP participants. This is also known as the overlap savings.

To estimate uplift, Guidehouse followed the Phase IV Evaluation Framework guidance on completing dual participation analyses. The Phase IV Evaluation Framework conveys that exposure to the HER messaging often motivates participants to take advantage of other Duquesne Light program offerings that may be promoted through HER promotional materials. This exposure creates a situation where households in the treatment groups tend to participate in other programs at a higher rate than households in the control groups. The Phase IV Evaluation Framework methodology calls for program-specific uplift calculations, and the SWE requests those values be reported.

The evaluation team estimated aggregate uplift across residential programs. From a theoretical standpoint, the program uplift, which is associated with suggestions provided in the HERs, may be allocated to either R-BEEP (or LI-BEEP for the LI behavioral energy efficiency waves) or the other program involved in its realization since the savings would not have occurred in the absence of either program. However, the industry standard approach is to subtract the amount of the overlap savings from the Behavioral Program savings; the team followed this approach. This approach is also consistent with the detailed methodology described in Section 6.1.8.1 of the Phase IV Evaluation Framework.

Guidehouse calculated downstream overlap savings using reported values from other Duquesne Light energy efficiency programs. If those savings exceeded 5% of gross verified HER savings, the evaluation team examined downstream overlap savings at the program and measure level. If a single program, initiative, or measure exceeded 20% of total downstream double-counted savings and the realization rate for the applicable measure(s) was outside the range of 90% to 110%, the team used the verified savings values (rather than reported savings values) for the applicable measure(s) in the downstream overlap savings calculation. No measures installed in PY13 met these criteria. Verified savings values were applied for energy efficiency kits installed in PY9 and PY10.

Guidehouse's overlap analysis also accounts for upstream programs, in particular the upstream lighting component of the Residential Energy Efficiency Program. Calculating overlap savings from upstream programs is complicated by the fact that participation is not tracked at the customer level and the approaches described previously for specific homes are infeasible. Per Section 6.1.8.2 of the Phase IV Evaluation Framework, the team used the Framework's assumed upstream reduction factor dependent on the number of years of activity for the given wave. That reduction factor was subtracted from the estimate of energy savings for each wave after downstream overlap savings had been removed.

Table B-8 the upstream reduction factors. Table B-9 shows how adjustments are applied to the regression results to arrive at the final verified savings values. Table B-9 also separates incremental first-year savings from persistent savings from prior years, as described in Section 3.6, in addition to incremental peak demand impacts.

Table B-8: Upstream Adjustment Factors

Years Since Cohort Inception	Default Upstream Reduction Factor	Waves
1	0.75%	2021 Digital, 2021 LI, 2021 Non-Digital
2	1.50%	-
3	2.25%	-
4 and beyond	3.00%	2012 Market Rate, 2015 LI, 2015 Market Rate

Source: Phase IV Evaluation Framework

Table B-9. Savings Adjustments and Final Savings

Wave	Regression Savings (MWh/yr)	Downstream Dual Participation Savings (MWh/yr)	Upstream Dual Participation Savings (MWh/yr)	Persistence (MWh/yr)	Incremental Savings (MWh/yr)	Incremental Peak Demand Savings* (MW/yr)
2012 Market Rate	2,945.61	-522.95	-72.68	-1419.27	930.71	0.17
2015 Market Rate	4,504.84	-1540.79	-88.93	-1924.49	950.63	0.18
2021 Digital	2,887.44	-10.88	-21.58	0.00	2,854.98	0.00
2021 Non-Digital	498.82	-4.83	-3.70	0.00	490.29	0.00
2015 LI	1,725.65	-269.60	-43.68	-923.66	488.71	0.09
2021 LI	712.19	0.00	-5.34	0.00	706.85	0.00

* Column 7 represents incremental peak demand savings before adjusting for transmission and distribution losses.

Source: Guidehouse analysis

B.4 Peak Demand Analysis

To estimate peak demand savings, Guidehouse used an energy-to-demand factor derived from historical loadshapes, as described in Section 6.1.6.1 of the Phase IV Evaluation Framework. Guidehouse obtained the historical 8760 reference load shape averaged across all residential customers in the Duquesne Light service territory for the five calendar years including 2017 to

2021. Guidehouse then calculated the reference load shape as total usage for all residential customers divided by the total number of residential customers for each hour of the year. Oracle calculates the reference load shape using customer AMI data provided by Duquesne Light.[18, 19]

From the refence load shape, the peak demand multiplier is calculated by first calculating the average annual load (kW), during all hours & days in the year. Then, average summer peak load (kW), during the TRM-defined peak period of non-holiday weekdays from 2:00 p.m.-6:00 p.m. in June, July, and August is calculated. Finally, the peak demand multiplier is calculated as the ratio of the average summer peak load to average annual load.

Guidehouse calculated the peak demand multiplier individually for each calendar year, then calculated the 5-year simple average of the peak demand multipliers.

Values for average annual load, average summer peak load, and peak demand multiplier from 2017 to 2021 are presented in Table B-10.

Table B-10: Peak Demand Multiplier, 2017 to 2021

Year	Average Annual Load (kW)	Average Summer Peak Load (kW)	Peak Demand Multiplier
2017	0.88	1.37	1.57
2018	0.93	1.40	1.50
2019	0.89	1.39	1.57
2020	0.91	1.67	1.83
2021	0.92	1.54	1.67
5-year Average	**0.91**	**1.48**	**1.63**

Source: Guidehouse analysis

Because the methodology uses the same reference load shape for all Residential and LI-BEEP cohorts, the peak demand multiplier will be identical for all cohorts throughout Phase IV. The Phase IV Duquesne Light peak demand multiplier is 1.63.

[18] The reference load shape data is calculated from the customer AMI data provided to Oracle by Duquesne Light to be consistent with the data used for selecting tips that appear in the HERs and the billing data used for the energy impact evaluation. Publicly available data, such as that available at https://www.duquesnedsp.com/Documents/LoadandOtherData.aspx, may undergo a different data cleaning process.

[19] The reference load shape data was 99.7% complete. Missing observations tended to occur in groups by day (e.g., all 24 hours of a day were missing). Guidehouse identified 8 observations with an abnormally high customer count and 89 observations with an abnormally low customer count, representing 0.2% of all observations. Guidehouse did not remove these observations from the calculation.

Appendix C. PY13 and P4TD Summary by Customer Segment and LI Carveout

Table C-1 presents a summary of the programs, components/initiatives and customer segments that contribute to the LI carveout in PY13 and P4TD.

Table C-1: Summary of LI Carveout Energy Savings (MWh/Year)

Program	Customer Segment	PYVTD Gross (MWh/yr)	VTD Gross (MWh/yr)
LIEEP	Low Income	2,179	2,179
LI-BEEP	Low Income	1,196	1,196
SBDI	Small Business Multifamily	636	636
Total		**4,011**	**4,011**

Source: Guidehouse analysis

Appendix D. Summary of Program-Level Impacts, Cost-Effectiveness and HIM NTG

D.1 Program and Component-Level Impacts Summary

A summary of energy impacts by program and component through PY13 are presented in Table D-1.

Table D-1: Incremental Annual Energy Savings by Program & Initiative (MWh/Year)

Program	Component	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Residential Downstream Incentives	Rebates	152	149	122	152	149	122
Residential Downstream Incentives	Energy Efficiency Education	1,382	950	627	1,382	950	627
Residential Midstream Incentives		N/A	N/A	N/A	N/A	N/A	N/A
Residential Upstream Incentives	Appliances	371	649	649	371	649	649
Residential Upstream Incentives	LEDs	1,010	1,010	434	1,010	1,010	434
Residential Appliance Recycling	Freezers	55	52	24	55	52	24
Residential Appliance Recycling	Refrigerators	277	324	151	277	324	151
Residential Appliance Recycling	Other	15	15	7	15	15	7
Residential LI Energy Efficiency	MF Site-Other Measure	438	406	406	438	406	406
Residential LI Energy Efficiency	MF Site-Refrigerators	341	341	341	341	341	341
Residential LI Energy Efficiency	SF Site-Other Measure	1,444	1,122	1,122	1,444	1,122	1,122
Residential LI Energy Efficiency	SF Site-Refrigerators	311	311	311	311	311	311
Residential Behavioral		5,137	5,227	5,227	5,137	5,227	5,227
LI Behavioral		931	1,196	1,196	931	1,196	1,196
SBDI	Large	170	169	168	170	169	168
SBDI	MF	598	646	641	598	646	641
SBDI	PAPP	96	111	110	96	111	110
SBDI	Small	435	417	414	435	417	414
Small Business Solutions	Medium	1,175	1,249	1,249	1,175	1,249	1,249

Program	Component	PYRTD (MWh/yr)	PYVTD Gross (MWh/yr)	PYVTD Net (MWh/yr)	RTD (MWh/yr)	VTD Gross (MWh/yr)	VTD Net (MWh/yr)
Small Business Solutions	Small	4,959	7,120	7,120	4,959	7,120	7,120
Small Business Midstream Solutions	Large	3,206	1,292	1,136	3,206	1,292	1,136
Small Business Midstream Solutions	Medium	5,831	3,662	3,219	5,831	3,662	3,219
Small Business Midstream Solutions	Small	1,628	1,484	1,304	1,628	1,484	1,304
SBVCx		N/A	N/A	N/A	N/A	N/A	N/A
Large Business Solutions	Commercial - Large	3,195	3,625	3,625	3,195	3,625	3,625
Large Business Solutions	Commercial - Medium	4,804	5,108	5,108	4,804	5,108	5,108
Large Business Solutions	Commercial - Small	1,190	1,709	1,709	1,190	1,709	1,709
Large Business Solutions	Industrial - Large	823	817	817	823	817	817
Large Business Solutions	Industrial - Medium	961	762	762	961	762	762
Large Business Solutions	Industrial - Small	359	355	355	359	355	355
Large Business Midstream Solutions	Commercial - Large	1,189	1,825	1,825	1,189	1,825	1,825
Large Business Midstream Solutions	Commercial - Medium	1,744	2,230	2,230	1,744	2,230	2,230
Large Business Midstream Solutions	Commercial - Small	427	672	672	427	672	672
Large Business Midstream Solutions	Industrial - Large	1,546	2,373	2,373	1,546	2,373	2,373
Large Business Midstream Solutions	Industrial - Medium	1,066	1,362	1,362	1,066	1,362	1,362
Large Business Midstream Solutions	Industrial - Small	230	362	362	230	362	362
LBVCx		N/A	N/A	N/A	N/A	N/A	N/A
Portfolio Total		**47,496**	**49,101**	**41,355**	**47,492**	**49,101**	**41,355**

Source: Guidehouse analysis

A summary of the peak demand impacts by energy efficiency program and Component through the current reporting period are presented in Table D-2.

Table D-2: Peak Demand Savings by Energy Efficiency Program & Component/Initiative (MW/Year)

Program	Component	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Residential Downstream Incentives	Rebates	0.01	0.01	0.01	0.01	0.01	0.01
Residential Downstream Incentives	Energy Efficiency Education	0.29	0.28	0.18	0.29	0.28	0.18
Residential Midstream Incentives		N/A	N/A	N/A	N/A	N/A	N/A
Residential Upstream Incentives	Appliances	0.10	0.18	0.18	0.10	0.18	0.18
Residential Upstream Incentives	LEDs	0.14	0.14	0.06	0.14	0.14	0.06
Residential Appliance Recycling	Freezers	0.01	0.01	0.00	0.01	0.01	0.00
Residential Appliance Recycling	Refrigerators	0.05	0.06	0.03	0.05	0.06	0.03
Residential Appliance Recycling	Other	0.01	0.01	0.00	0.01	0.01	0.00
Residential LI Energy Efficiency	MF Site-Other Measure	0.04	0.04	0.04	0.04	0.04	0.04
Residential LI Energy Efficiency	MF Site-Refrigerators	0.06	0.06	0.06	0.06	0.06	0.06
Residential LI Energy Efficiency	SF Site-Other Measure	0.12	0.09	0.09	0.12	0.09	0.09
Residential LI Energy Efficiency	SF Site-Refrigerators	0.05	0.05	0.05	0.05	0.05	0.05
Residential Behavioral		0.40	0.38	0.38	0.40	0.38	0.38
LI Behavioral		0.03	0.10	0.10	0.03	0.10	0.10
SBDI	Large	0.00	0.00	0.00	0.00	0.00	0.00
SBDI	MF	0.12	0.13	0.13	0.12	0.13	0.13
SBDI	PAPP	0.02	0.03	0.03	0.02	0.03	0.03
SBDI	Small	0.06	0.06	0.06	0.06	0.06	0.06
Small Business Solutions	Medium	0.20	0.22	0.22	0.20	0.22	0.22
Small Business Solutions	Small	1.06	2.28	2.28	1.06	2.28	2.28
Small Business Midstream Solutions	Large	0.62	0.15	0.13	0.62	0.15	0.13
Small Business Midstream Solutions	Medium	1.18	1.02	0.90	1.18	1.02	0.90

Program	Component	PYRTD (MW/yr)	PYVTD Gross (MW/yr)	PYVTD Net (MW/yr)	RTD (MW/yr)	VTD Gross (MW/yr)	VTD Net (MW/yr)
Small Business Midstream Solutions	Small	0.32	0.37	0.33	0.32	0.37	0.33
SBVCx		N/A	N/A	N/A	N/A	N/A	N/A
Large Business Solutions	Commercial - Large	0.43	0.41	0.41	0.43	0.41	0.41
Large Business Solutions	Commercial - Medium	1.07	1.17	1.17	1.07	1.17	1.17
Large Business Solutions	Commercial - Small	0.21	0.46	0.46	0.21	0.46	0.46
Large Business Solutions	Industrial - Large	0.10	0.07	0.07	0.10	0.07	0.07
Large Business Solutions	Industrial - Medium	0.14	0.15	0.15	0.14	0.15	0.15
Large Business Solutions	Industrial - Small	0.09	0.09	0.09	0.09	0.09	0.09
Large Business Midstream Solutions	Commercial - Large	0.22	0.21	0.21	0.22	0.21	0.21
Large Business Midstream Solutions	Commercial - Medium	0.29	0.29	0.29	0.29	0.29	0.29
Large Business Midstream Solutions	Commercial - Small	0.08	0.10	0.10	0.08	0.10	0.10
Large Business Midstream Solutions	Industrial - Large	0.35	0.34	0.34	0.35	0.34	0.34
Large Business Midstream Solutions	Industrial - Medium	0.23	0.23	0.23	0.23	0.23	0.23
Large Business Midstream Solutions	Industrial - Small	0.04	0.05	0.05	0.04	0.05	0.05
LBVCx		N/A	N/A	N/A	N/A	N/A	N/A
Portfolio Total		**8.14**	**9.21**	**7.58**	**8.14**	**9.21**	**7.58**

Source: Guidehouse analysis

D.2 Program-Level Cost-Effectiveness Summary

Table D-3 shows the TRC ratios by program and for the portfolio. The benefits in Table D-3 were calculated using gross verified impacts. Costs and benefits are expressed in 2021 dollars.

Table D-3: PY13 Gross TRC Ratios by Program ($1,000)[1]

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Res Downstream Incentives	$589	$1,025	0.57	($436)
Res Midstream Incentives	$0	$74	0.00	($74)
Res Upstream Lighting	$916	$1,033	0.89	($117)
Appliance Recycling	$85	$803	0.11	($718)
Low Income Energy Efficiency	$562	$1,243	0.45	($681)
Res Behavioral EE	$294	$576	0.51	($282)
Low Income Behavioral EE	$71	$127	0.56	($56)
Residential Subtotal	**$2,517**	**$4,881**	**0.52**	**($2,364)**
Small Business Direct Install	$856	$701	1.22	$156
Small Business Downstream	$6,335	$1,583	4.00	$4,753
Small Business Midstream	$4,648	$2,672	1.74	$1,976
Small Business VCx	$0	$65	0.00	($65)
Large Commercial Downstream	$6,853	$2,504	2.74	$4,349
Large Commercial Midstream	$2,789	$1,134	2.46	$1,656
Large Commercial VCx	$0	$45	0.00	($45)
Large Industrial Downstream	$1,121	$633	1.77	$488
Large Industrial Midstream	$2,364	$652	3.62	$1,712
Large Industrial VCx	$0	$32	0.00	($32)
Nonresidential Subtotal	**$24,967**	**$10,020**	**2.49**	**$14,947**
Portfolio Total	**$27,484**	**$14,901**	**1.84**	**$12,583**

[1] Costs and benefits are expressed as follows PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025

Source: Guidehouse analysis

Table D-4 presents PY13 cost-effectiveness using net verified savings to calculate benefits.

Table D-4: PY13 Net TRC Ratios by Program ($1,000)[1]

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Res Downstream Incentives	$401	$1,001	0.40	($600)
Res Midstream Incentives	$0	$74	0.00	($74)
Res Upstream Lighting	$598	$816	0.73	($217)
Appliance Recycling	$40	$801	0.05	($762)
Low Income Energy Efficiency	$562	$1,243	0.45	($681)
Res Behavioral EE	$294	$576	0.51	($282)
Low Income Behavioral EE	$71	$127	0.56	($56)
Residential Subtotal	**$1,967**	**$4,638**	**0.42**	**($2,671)**
Small Business Direct Install	$850	$698	1.22	$152
Small Business Downstream	$4,989	$1,378	3.62	$3,611
Small Business Midstream	$4,085	$2,466	1.66	$1,619
Small Business VCx	$0	$65	0.00	($65)
Large Commercial Downstream	$5,397	$2,228	2.42	$3,170
Large Commercial Midstream	$2,452	$1,049	2.34	$1,402
Large Commercial VCx	$0	$45	0.00	($45)
Large Industrial Downstream	$681	$580	1.17	$101
Large Industrial Midstream	$2,078	$609	3.41	$1,469
Large Industrial VCx	$0	$32	0.00	($32)
Nonresidential Subtotal	**$20,533**	**$9,150**	**2.24**	**$11,383**
Portfolio Total	**$22,500**	**$13,788**	**1.63**	**$8,712**

[1] Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025

Source: Guidehouse analysis

Table D-5: summarizes cost-effectiveness by program for Phase IV of Act 129. Cost and benefits are expressed in 2021 dollars.

Table D-5: P4TD Gross TRC Ratios by Program ($1,000)[1]

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Res Downstream Incentives	$589	$1,025	0.57	($436)
Res Midstream Incentives	$0	$74	0.00	($74)
Res Upstream Lighting	$916	$1,033	0.89	($117)
Appliance Recycling	$85	$803	0.11	($718)
Low Income Energy Efficiency	$562	$1,243	0.45	($681)
Res Behavioral EE	$294	$576	0.51	($282)
Low Income Behavioral EE	$71	$127	0.56	($56)
Residential Subtotal	**$2,517**	**$4,881**	**0.52**	**($2,364)**
Small Business Direct Install	$856	$701	1.22	$156
Small Business Downstream	$6,335	$1,583	4.00	$4,753
Small Business Midstream	$4,648	$2,672	1.74	$1,976
Small Business VCx	$0	$65	0.00	($65)
Large Commercial Downstream	$6,853	$2,504	2.74	$4,349
Large Commercial Midstream	$2,789	$1,134	2.46	$1,656
Large Commercial VCx	$0	$45	0.00	($45)
Large Industrial Downstream	$1,121	$633	1.77	$488
Large Industrial Midstream	$2,364	$652	3.62	$1,712
Large Industrial VCx	$0	$32	0.00	($32)
Nonresidential Subtotal	**$24,967**	**$10,020**	**2.49**	**$14,947**
Portfolio Total	**$27,484**	**$14,901**	**1.84**	**$12,583**

[1] Costs and benefits are expressed as follows PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025

Source: Guidehouse analysis

Table D-6 presents P4TD cost-effectiveness results using net verified savings to calculate benefits. Cost and benefits are expressed in 2021 dollars.

Table D-6: P4TD Net TRC Ratios by Program ($1,000)[1]

Program	TRC NPV Benefits	TRC NPV Costs	TRC Ratio	TRC Net Benefits (Benefits – Costs)
Res Downstream Incentives	$401	$1,001	0.40	($600)
Res Midstream Incentives	$0	$74	0.00	($74)
Res Upstream Lighting	$598	$816	0.73	($217)
Appliance Recycling	$40	$801	0.05	($762)
Low Income Energy Efficiency	$562	$1,243	0.45	($681)
Res Behavioral EE	$294	$576	0.51	($282)
Low Income Behavioral EE	$71	$127	0.56	($56)
Residential Subtotal	**$1,967**	**$4,638**	**0.42**	**($2,671)**
Small Business Direct Install	$850	$698	1.22	$152
Small Business Downstream	$4,989	$1,378	3.62	$3,611
Small Business Midstream	$4,085	$2,466	1.66	$1,619
Small Business VCx	$0	$65	0.00	($65)
Large Commercial Downstream	$5,397	$2,228	2.42	$3,170
Large Commercial Midstream	$2,452	$1,049	2.34	$1,402
Large Commercial VCx	$0	$45	0.00	($45)
Large Industrial Downstream	$681	$580	1.17	$101
Large Industrial Midstream	$2,078	$609	3.41	$1,469
Large Industrial VCx	$0	$32	0.00	($32)
Nonresidential Subtotal	**$20,533**	**$9,150**	**2.24**	**$11,383**
Portfolio Total	**$22,500**	**$13,788**	**1.63**	**$8,712**

[1] Costs and benefits are expressed as follows: PY13 = 2021, PY14 = 2022, PY15 = 2023, PY16 = 2024, PY17 = 2025

Source: Guidehouse analysis

D.3 HIM NTG

Findings from NTG research are not used to adjust compliance savings in Pennsylvania. Instead, NTG research provides directional information for program planning purposes. Table D-7 presents NTG findings for HIMs studied in PY13. [20]

Table D-7: HIM NTG

HIM	Free ridership	Spillover	NTG Ratio
Smart Thermostats	34%	13%	79%

Source: Guidehouse analysis

D.4 Program-Level Comparison of Performance to Approved EE&C Plan

Table D-8 presents PY13 expenditures, by program, compared with the budget estimates set forth in the EE&C plan for PY13. All the dollars in Table D-8 are presented in 2021 dollars.

Table D-8: Comparison of PY13 Expenditures to Phase IV EE&C Plan ($1,000)

Program	PY13 Budget from EE&C Plan	PY13 Actual Expenditures	Ratio (Actual/Plan)
Res Downstream Incentives	$1,068	$1,036	0.97
Res Midstream Incentives	$41	$74	1.82
Res Upstream Lighting	$715	$1,211	1.70
Appliance Recycling	$491	$833	1.69
Low Income Energy Efficiency	$2,847	$2,218	0.78
Res Behavioral EE	$544	$576	1.06
Low Income Behavioral EE	$101	$127	1.26
Small Business Direct Install	$1,688	$1,062	0.63
Small Business Downstream	$1,621	$2,034	1.25
Small Business Midstream	$1,100	$4,174	3.79
Small Business VCx	$277	$65	0.23
Large Commercial Downstream	$3,443	$3,149	0.91
Large Commercial Midstream	$1,048	$1,573	1.50
Large Commercial VCx	$154	$45	0.29
Large Industrial Downstream	$1,523	$716	0.47
Large Industrial Midstream	$425	$1,022	2.40
Large Industrial VCx	$71	$32	0.45

[20] The Phase IV Evaluation Framework provides guidance to the EDCs to oversample measure categories (technologies) of high importance, called HIMs, to help program planners make decisions concerning those measures. The SWE suggests that for each program year, each EDC identify three to five HIMs for study based on energy impact, level of uncertainty, prospective value, funding, or other parameters. The intent is to prioritize measure-level NTGRs for HIMs, but the EDCs are encouraged to also provide program-level NTG information (i.e., to oversample HIMs), but they may also include non-HIMs in the research, as appropriate.

Program	PY13 Budget from EE&C Plan	PY13 Actual Expenditures	Ratio (Actual/Plan)
TOTAL	**$17,156**	**$19,946**	**1.16**

Source: Guidehouse analysis

Table D-9: Comparison of PY13 Expenditures to Phase IV EE&C Plan ($1000)

Program	PY13 Budget from EE&C Plan	PY13 Actual Expenditures	Ratio (Actual/Plan)
Res Downstream Incentives	$1,068	$1,036	0.97
Res Midstream Incentives	$41	$74	1.82
Res Upstream Lighting	$715	$1,211	1.70
Appliance Recycling	$491	$833	1.69
Low Income Energy Efficiency	$2,847	$2,218	0.78
Res Behavioral EE	$544	$576	1.06
Low Income Behavioral EE	$101	$127	1.26
Small Business Direct Install	$1,688	$1,062	0.63
Small Business Downstream	$1,621	$2,034	1.25
Small Business Midstream	$1,100	$4,174	3.79
Small Business VCx	$277	$65	0.23
Large Commercial Downstream	$3,443	$3,149	0.91
Large Commercial Midstream	$1,048	$1,573	1.50
Large Commercial VCx	$154	$45	0.29
Large Industrial Downstream	$1,523	$716	0.47
Large Industrial Midstream	$425	$1,022	2.40
Large Industrial VCx	$71	$32	0.45
TOTAL	**$17,156**	**$19,946**	**1.16**

Source: Guidehouse analysis

Table D-10 presents P4TD expenditures, by program, compared to the budget estimates set forth in the EE&C plan through PY13. All the dollars in Table D-10 are presented in 2021 dollars.

Table D-10: Comparison of P4TD Expenditures to Phase IV EE&C Plan ($1,000)

Program	Phase IV Budget from EE&C Plan through PY13	P4TD Actual Expenditures	Ratio (Actual/Plan)
Res Downstream Incentives	$1,068	$1,036	0.97
Res Midstream Incentives	$41	$252	6.20
Res Upstream Lighting	$715	$989	1.38
Appliance Recycling	$491	$833	1.69

Program	Phase IV Budget from EE&C Plan through PY13	P4TD Actual Expenditures	Ratio (Actual/Plan)
Low Income Energy Efficiency	$2,847	$2,552	0.90
Res Behavioral EE	$544	$576	1.06
Low Income Behavioral EE	$101	$127	1.26
Small Business Direct Install	$1,688	$728	0.43
Small Business Downstream	$1,621	$2,034	1.25
Small Business Midstream	$1,100	$4,218	3.84
Small Business VCx	$277	$65	0.23
Large Commercial Downstream	$3,443	$3,149	0.91
Large Commercial Midstream	$1,048	$1,573	1.50
Large Commercial VCx	$154	$45	0.29
Large Industrial Downstream	$1,523	$716	0.47
Large Industrial Midstream	$425	$1,022	2.40
Large Industrial VCx	$71	$32	0.45
TOTAL	**$17,156**	**$19,946**	**1.16**

Source: Guidehouse analysis

Table D-11 compares PY13 verified gross program savings compared with the energy savings projections set forth in the EE&C plan.

Table D-11: Comparison of PY13 Actual Program Savings to EE&C Plan Projections for PY13

Program	EE&C Plan Projections for PY13	PY13 VTD Gross MWh Savings	Ratio (Actual/Plan)
Res Downstream Incentives	4,503	1,099	0.24
Res Midstream Incentives	113	-	-
Res Upstream Lighting	2,585	1,659	0.64
Appliance Recycling	2,364	391	0.17
Low Income Energy Efficiency	3,152	2,179	0.69
Res Behavioral EE	6,486	5,227	0.81
Low Income Behavioral EE	677	1,196	1.76
Small Business Direct Install	4,021	1,343	0.33
Small Business Downstream	8,727	8,369	0.96
Small Business Midstream	4,778	6,438	1.35
Small Business VCx	1,052	-	-
Large Commercial Downstream	14,826	10,442	0.70
Large Commercial Midstream	3,065	4,727	1.54
Large Commercial VCx	488	-	-
Large Industrial Downstream	6,881	1,933	0.28
Large Industrial Midstream	1,422	4,098	2.88
Large Industrial VCx	227	-	-
TOTAL	**65,367**	**49,101**	**0.75**

Source: Guidehouse analysis

Table D-12 compares Phase IV verified gross program savings with the energy savings projections set forth in the EE&C plan.

Table D-12: Comparison of Phase IV Actual Program Savings to EE&C Plan Projections for Phase IV

Program	EE&C Plan Through PY13	VTD Gross MWh Savings	Ratio (Actual/Plan)
Res Downstream Incentives	4,503	1,099	0.24
Res Midstream Incentives	113	-	-
Res Upstream Lighting	2,585	1,659	0.64
Appliance Recycling	2,364	391	0.17
Low Income Energy Efficiency	3,152	2,179	0.69
Res Behavioral EE	6,486	5,227	0.81
Low Income Behavioral EE	677	1,196	1.76
Small Business Direct Install	4,021	1,343	0.33
Small Business Downstream	8,727	8,369	0.96

Program	EE&C Plan Through PY13	VTD Gross MWh Savings	Ratio (Actual/Plan)
Small Business Midstream	4,778	6,438	1.35
Small Business VCx	1,052	-	-
Large Commercial Downstream	14,826	10,442	0.70
Large Commercial Midstream	3,065	4,727	1.54
Large Commercial VCx	488	-	-
Large Industrial Downstream	6,881	1,933	0.28
Large Industrial Midstream	1,422	4,098	2.88
Large Industrial VCx	227	-	-
TOTAL	**65,367**	**49,101**	**0.75**

Source: Guidehouse analysis

Appendix E. Evaluation Detail

E.1 Midstream Component – Small and Large Business Midstream Solutions

Guidehouse evaluated the SBMS and LBMS programs collectively as one initiative. Guidehouse calculated the minimum sample size needed to achieve at least 15% relative precision at 85% confidence level for calculating verified energy and demand savings. The population counts and sample sizes for the initiative are based on counts of unique projects identified by a unique Job ID (project) in the tracking database.

Guidehouse applied stratification based on total energy savings and assigned each project to various strata based on that project's energy savings. The large stratum includes projects in the upper portion of the Midstream program component's energy savings; the medium stratum includes projects in the middle portion of the Midstream energy savings; and the small stratum represents the bottom portion of the Midstream energy savings. Further, due to historical sampling practices, these programs were further sub stratified into LBMS and SBMS. When randomly selecting sample projects, Guidehouse selected projects based on the energy savings (MWh) stratification of each project.

Due to changes associated with Phase IV with implementation contractors and TRM updates and taking into consideration historic coefficient of variation (CV) values from the PY12 evaluation of energy and demand savings for this program component, Guidehouse sampled a higher proportion of LBMS projects, despite lower participation, to hit the required precision targets for energy and demand.

Table E-1: Midstream Sample Design

Stratum	Stratum Boundaries	Population (projects)	Historical CV (Energy)	Historical CV (demand)	Sampled Projects
LBMS - Large	MWh > 100	10	0.54	0.61	5
LBMS - Medium	10 ≤ MWh <100	83	0.68	0.82	6
LBMS - Small	MWh < 10	315	1.84	1.87	14
SBMS - Large	MWh > 100	21	0.25	0.10	3
SBMS - Medium	10 ≤ MWh <100	207	0.47	0.38	6
SBMS - Small	MWh < 10	719	0.75	0.9	4
Program Total		**1,355**			**38**

Source: Guidehouse analysis

Table E-2: Midstream Initiative Results (Energy)

Component	PYRTD MWh/yr	Energy Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
SBMS - Large	3,206	40%	0.70	92%
SBMS - Medium	5,831	63%	0.46	32%
SBMS - Small	1,628	91%	0.97	93%
LBMS – Large (Commercial)	1,189	154%	0.64	51%
LBMS – Medium (Commercial)	1,744	128%	0.25	18%
LBMS – Small (Commercial)	427	158%	1.74	71%
LBMS – Large (Industrial)	1,546	154%	0.64	51%
LBMS – Medium (Industrial)	1,066	128%	0.25	18%
LBMS – Small (Industrial)	230	158%	1.74	71%
Program Total*	**16,865**	**90%**		**14%**

Source: Guidehouse analysis

Table E-3: Midstream Initiative Results (Demand)

Component	PYRTD MW/yr	Demand Realization Rate	Sample C_v or Error Ratio	Relative Precision at 85% C.L.
SBMS - Large	0.62	24%	0.78	103%
SBMS - Medium	1.18	86%	0.17	12%
SBMS - Small	0.32	115%	0.55	53%
LBMS – Large (Commercial)	0.22	98%	0.42	34%
LBMS – Medium (Commercial)	0.29	100%	0.12	9%
LBMS – Small (Commercial)	0.08	124%	2.65	108%
LBMS – Large (Industrial)	0.35	98%	0.42	34%
LBMS – Medium (Industrial)	0.23	100%	0.12	9%
LBMS – Small (Industrial)	0.04	124%	2.65	108%
Program Total	**3.32**	**83%**		**10%**

Source: Guidehouse analysis

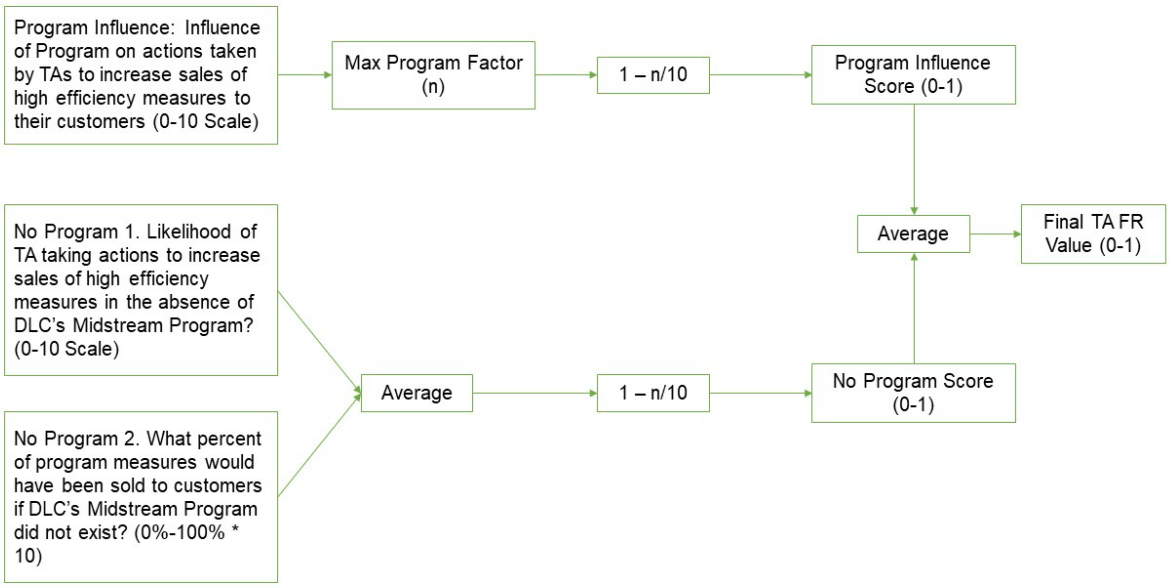
Appendix F. Free Ridership Evaluation for Small and Large Business Midstream Program

This section describes the evaluation method that Guidehouse used for assessing free ridership for the Small and Large Business Midstream Program. It follows general guidelines provided in the SWE's Phase IV Evaluation Framework, Section 3.4 Net Impact Evaluation and Section 3.4.1.5 Approaches for Midstream and Upstream Programs. Guidehouse conducted distributor interviews to assess the program's level of impact on stocking and sales of the incentivized energy efficient products.

Guidehouse designed the following method to assess participant free ridership from a trade ally (TA) perspective, demonstrated in diagram Figure F-1. Based on distributor responses, Guidehouse estimated a Program Influence score and a No Program score. The obtained free ridership estimates for each distributor were then weighted by the energy savings claimed by each distributor in PY13.

- **Program Influence (PI) score:** an estimate of the Program's influence on the TA.
    - Influence of the Program on the actions taken by a TA to increase the sales of high efficiency measures to their customers.
- **No Program (NP) score:** an estimate of the percentage of measures distributors would have sold to their customers if the program did not exist. This score is comprised of two parameters:
    - Likelihood of taking actions reported to increase the sales of high efficiency measures if the program did not exist
    - Percent of program measures sold that would have been sold to customers if program did not exist

Figure F-1: TA Free Ridership Protocol



Source: Guidehouse analysis

Appendix G. Respondent Demographics

Table G-1 shows respondents' demographics for the RDIP rebate participant survey conducted in PY13.

Table G-1: PY13 Survey Demographics for RDIP

Program		RDIP Rebate	
Sample Size (n)		59	
		Count	%
Household	Members in Household (Average)	2.3	
Age	Under 18	0	0%
	18 to 24	0	0%
	25 to 34	8	14%
	35 to 44	14	24%
	45 to 54	9	15%
	55 to 64	11	19%
	65 or over	15	25%
	Don't Know	0	0%
	Refused	2	3%
Home Size	Less than 1,000 SF	4	7%
	1,000 SF to 1,500 SF	9	15%
	1,500 SF to 2,000 SF	18	31%
	2,000 SF to 2,500 SF	10	17%
	2,500 SF to 3,000 SF	7	12%
	3,000 SF or more	6	10%
	Don't Know	3	5%
	Refused	2	3%
Household Income	Under $14,999	0	0%
	$15,000 to $17,999	1	2%
	$18,000 to $23,999	0	0%
	$24,000 to $29,999	1	2%
	$30,000 to $36,999	2	3%
	$37,000 to $42,999	1	2%
	$43,000 to $49,999	2	3%
	$50,000 to $74,999	7	12%
	$75,000 to $99,999	7	12%
	$100,000 or more	22	37%
	Don't Know	0	0%
	Refused	16	27%

Source: Guidehouse analysis

guidehouse.com