2018 Michigan Public Power Agency Final Impact Evaluation Report

Report for the 2018 Energy Waste Reduction Programs

Date: June 1, 2019

Table of contents

List of tables

1 EXECUTIVE SUMMARY

The Michigan Public Power Agency Energy Efficiency Service Committee (MPPA EE Service Committee) is a group of 18 Michigan municipal electric utilities that was formed to mutually verify the annual savings of similar Energy Waste Reduction (EWR) programs as required by the State of Michigan's 2008 Public Act 295[1] (PA 295) Section 71. PA 342 of 2016.

The evaluation of MPPA EE Service Committee 2018 EWR programs was conducted in the fourth quarter of 2018 and the first quarter of 2018. The evaluation estimated verification rates (i.e., the measures that were installed and operating as planned) using statistical sampling of participants across participating municipal utilities. These estimates were then applied to the participation parameters of specific member utilities.

This report presents the verification of energy savings for the EWR programs implemented by the utilities. Results for each individual utility can be found in the Appendices.

[1] http://www.legislature.mi.gov/documents/2007-2008/publicact/pdf/2008-PA-0295.pdf

2 INTRODUCTION

The MPPA EE Service Committee is a group of 22 Michigan municipal electric utilities (for a list of the 18 participating utilities, see Appendix A) that was formed to mutually verify the annual savings of similar Clean and Renewable Energy and Energy Waste Reduction (EWR) programs as required by the State of Michigan's 2008 Public Act 295 (PA 295) Section 71 of PA 342 of 2016 (3)(i), which amended 2008 Public Act of 295. The legislation aims to accomplish the following objective, "The *overall goal of an energy waste reduction plan shall be to help the provider's customers reduce energy waste and to reduce the future costs of provider service to customers. In particular, an electric provider's energy waste reduction plan shall be designed to delay the need for constructing new electric generating facilities and thereby protect consumers from incurring the costs of such construction."*

The ultimate goal of the evaluation was specified as the verification of incremental energy (kWh) savings for the MPPA EE Service Committee members' EWR programs. The MPPA EE Service Committee chose to accept the savings estimates from the Michigan Energy Measures Database (MEMD). The MEMD contain values that were current at the time the associated EWR plans were approved by the Michigan Public Service Commission (MPSC), or engineering estimates current at the time the EWR plans were approved by the MPSC for measures not included in the MEMD. Accordingly, the objectives of the evaluation are to verify that measures are installed and operating as planned and to deliver a final annual report that provides the energy savings for each utility.

This report presents the verification results for the 18 MPPA member utilities. A recapitulation of the estimates of savings for programs implemented by the MPPA members utilities are presented in APPENDIX B through APPENDIX S. APPENDIX T through APPENDIX W provide supporting documentation, analytical approaches, as well as generic descriptions of programs that MPPA EE Service Committee members may have implemented.

3 VERIFICATION OF SAVINGS ESTIMATES

The 2018 verified savings estimates for the residential and commercial programs were prepared for each of the member utilities. Results are presented in APPENDIX B through APPENDIX S.

APPENDIX A. MPPA ENERGY EFFICIENCY SERVICE COMMITTEE UTILITIES

UTILITIES

The following 18 municipal utilities with EWR programs evaluated include:

- Bay City Electric Light & Power (BCELP)
- City of Charlevoix Electric System
- Chelsea Electric Department
- Croswell Light & Power Department * Associate Members*
- Eaton Rapids City Electric Department
- Grand Haven Board of Light & Power
- Hart Hydro-Electric
- Holland Board of Public Works (BPW)
- Lowell Light & Power
- The City of Niles Utility Department
- Paw Paw Village
- City of Petoskey Department of Public Works
- Portland Electric Department
- City of St. Louis Electric Department
- City of Sturgis Electric Department
- Traverse City Light & Power (TCL&P)
- Wyandotte Municipal Services
- Zeeland Board of Public Works (BPW)

APPENDIX B. BAY CITY ELECTRIC LIGHT & POWER VERIFICATION REPORT

This section presents the verification results for the 2018 Bay City Electric Light & Power Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 1 presents the 2018 results by program for Bay City Electric Light & Power.

Low Income Program deemed savings estimate is 189,346 kWh. Based on the analysis of the program the verified gross savings estimate is 177,209 kWh. The variance associated with this estimate is ±8,311 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program the deemed savings estimate is 89,579 kWh. Based on the analysis of the program the verified gross savings estimate is 80,872 kWh. The variance associated with this estimate is ±9,426 kWh.

Appliance Recycling Program the deemed savings estimate is 253,243 kWh. Based on the analysis of the program the verified gross savings estimate is 222,221 kWh. The variance associated with this estimate is ±20,867 kWh.

Efficient Lighting Program the deemed savings estimate is 309,314 kWh. Based on the analysis of the program the verified gross savings estimate is 297,158 kWh. The variance associated with this estimate is ±5,052 kWh.

Residential Educational Services program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 1 for the gross savings.

Residential Pilot Program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 1 for the gross savings.

Business Services:

Commercial and Industrial Program the reported deemed savings estimate was 1,808,732 kWh. Based on the analysis of the program the verified gross savings estimate is 1,549,360 kWh. The variance associated with this estimate is ±416,778 kWh.

Business Educational Services this program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 1 for the gross savings.

Pilot/Emerging Technology Services this program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 1 for the gross savings.

Table 1. Bay City Electric Light & Power, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	182,172	189,346	177,209
	Lighting	421,141	309,314	297,158
	High Efficiency Appliances & HVAC	89,579	89,579	80,872
	Appliance Recycling	151,828	253,243	222,221
	Multi-family Services	-	-	-
	Educational Services	33,129	33,106	33,106
	Pilot Programs	55,214	40,794	40,794
	Subtotal - Residential	**933,063**	**958,303**	**851,359**
Commercial	Prescriptive Program	780,151	1,500,987	1,285,746
	Custom Program	338,600	307,745	263,614
	Small Business Direct Install	-	-	-
	Educational Services	52,321	16,696	16,696
	Pilot/Emerging Technology	87,201	45,887	45,887
	Subtotal - Commercial & Industrial	**1,258,273**	**1,871,315**	**1,611,943**
	Total Program Portfolio	**2,191,336**	**2,824,351**	**2,463,302**

APPENDIX C. CHARLEVOIX ELECTRIC SYSTEM VERIFICATION REPORT

This section presents the verification results for the 2018 Charlevoix Electric System Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 2. Charlevoix Electric System., EWR Program Goals, Claimed and Verified Savings (kWh) presents the program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 25,565 kWh. Based on the analysis of the program the verified gross savings estimate is 23,926 kWh. The variance associated with this estimate is ±1,122 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program the deemed savings estimate is 14,573 kWh. Based on the analysis of the program the verified gross savings estimate is 13,157 kWh. The variance associated with this estimate is ±1,037 kWh.

Appliance Recycling Program the deemed savings estimate is 18,835 kWh. Based on the analysis of the program the verified gross savings estimate is 16,528 kWh. The variance associated with this estimate is ±1,552 kWh.

Efficient Lighting Program deemed savings estimate is 114,408 kWh. Based on the analysis of the program the verified gross savings estimate is 111,696 kWh. The variance associated with this estimate is ±1,869 kWh.

Residential Educational Services program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 2 for the gross savings.

Business Services:

Commercial and Industrial Program reported deemed savings estimate was 329,155 kWh. Based on the analysis of the program the verified gross savings estimate is 294,274 kWh. The variance associated with this estimate is ±75,846 kWh.

Business Educational Services this program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 2 for the gross savings.

Table 2. Charlevoix Electric System., EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	21,087	25,565	23,926
	Lighting	90,670	114,408	111,696
	High Efficiency Appliances & HVAC	10,318	14,573	13,157
	Appliance Recycling	12,853	18,835	16,528
	Multi-family Services	-	-	-
	Educational Services	4,957	4,957	4,957
	Pilot Programs	8,262	-	-
	Subtotal - Residential	**148,148**	**178,338**	**170,263**
Commercial & Industrial	Prescriptive Program	148,561	310,071	295,653
	Custom Program	124,121	19,084	18,197
	Small Business Direct Install	-	-	-
	Educational Services	12,320	12,320	12,320
	Pilot/Emerging Technology	20,534	-	-
	Subtotal - Commercial & Industrial	**305,535**	**341,475**	**294,274**
	Total Program Portfolio	***453,683***	***519,813***	***464,538***

APPENDIX D. CHELSEA LIGHT & POWER DEPARTMENT VERIFICATION REPORT

This section presents the verification results for the 2018 Chelsea Light & Power Dept. Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 3 presents the program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 5,253 kWh. Based on the analysis of the program the verified gross savings estimate is 4,916 kWh. The variance associated with this estimate was ±231 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 13,378 kWh. Based on the analysis of the program the verified gross savings estimate is 12,078 kWh. The variance associated with this estimate is ±952 kWh.

Appliance Recycling Program the deemed savings estimate is 15,838 kWh. Based on the analysis of the program the verified gross savings estimate is 13,898 kWh. The variance associated with this estimate is ±1,305 kWh.

Efficient Lighting Program deemed savings estimate is 100,996 kWh. Based on the analysis of the program the verified gross savings estimate is 97,027 kWh. The variance associated with this estimate is ±1,649 kWh.

Residential Educational Services program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 3 for the gross savings.

Business Services:

Commercial and Industrial Program reported deemed savings estimate was 783,405 kWh. Based on the analysis of the program the verified gross savings estimate is 671,065 kWh. The variance associated with this estimate is ±180,516 kWh.

Business Educational Services this program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 3 for the gross savings.

Pilot/Emerging Technology Services this program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 3 for the gross savings.

Table 3. Chelsea Electric Dept., EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	4,256	5,253	4,916
	Lighting	122,010	100,996	97,027
	High Efficiency Appliances & HVAC	5,524	13,378	12,078
	Appliance Recycling	1,441	15,838	13,898
	Multi-family Services	-	-	-
	Educational Services	4,722	4,722	4,722
	Pilot Programs	7,870	7,870	7,870
	Subtotal - Residential	**145,825**	**148,057**	**140,511**
Commercial & Industrial	Prescriptive Program	368,133	258,100	221,088
	Custom Program	86,489	525,305	449,976
	Small Business Direct Install	-	-	-
	Educational Services	18,271	18,271	18,271
	Pilot/Emerging Technology	30,452	30,452	30,452
	Subtotal - Commercial & Industrial	**503,344**	**832,128**	**719,788**
	Total Program Portfolio	**649,169**	**980,185**	**860,299**

APPENDIX E. CITY OF CROSWELL VERIFICATION REPORT

This section presents the verification results for the 2018 City of Croswell Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 4 presents the program goals and claimed and verified savings for the following programs:

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 934 kWh. Based on the analysis of the program the verified gross savings estimate is 843 kWh. The variance associated with this estimate is ±66 kWh.

Efficient Lighting Program deemed savings estimate is 450 kWh. Based on the analysis of the program the verified gross savings estimate is 432 kWh. The variance associated with this estimate is ±7kWh.

Business Services:

Commercial and Industrial Program reported deemed savings estimate was 239,301 kWh. Based on the analysis of the program the verified gross savings estimate is 204,985 kWh. The variance associated with this estimate is ±55,141 kWh.

Table 4. City of Croswell, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	5,960	-	-
	Lighting	51,745	450	432
	High Efficiency Appliances & HVAC	2,111	934	843
	Appliance Recycling	646	-	-
	Multi-family Services	-	-	-
	Educational Services	2,191	-	-
	Pilot Programs	3,651	-	-
	Subtotal - Residential	**66,304**	**1,384**	**1,275**
Commercial & Industrial	Prescriptive Program	179,140	192,168	164,611
	Custom Program	50,521	47,133	40,374
	Small Business Direct Install	-	-	-
	Educational Services	8,577	-	-
	Pilot/Emerging Technology	14,296	-	-
	Subtotal - Commercial & Industrial	**252,534**	**239,301**	**204,985**
	Total Program Portfolio	**318,838**	**240,685**	**206,260**

APPENDIX F. CITY OF EATON RAPIDS VERIFICATION REPORT

This section presents the verification results for the 2018 City of Eaton Rapids Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 5 presents the program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate was 19,786 kWh. Based on the analysis of the program the verified gross savings estimate is 18,518 kWh. The variance associated with this estimate is ±868 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 1,566 kWh. Based on the analysis of the program the verified gross savings estimate is 1,414 kWh. The variance associated with this estimate is ±111 kWh.

Appliance Recycling Program the deemed savings estimate is 1,135 kWh. Based on the analysis of the program the verified gross savings estimate is 996 kWh. The variance associated with this estimate is ±94 kWh.

Efficient Lighting Program deemed savings estimate is 148,978 kWh. Based on the analysis of the program the verified gross savings estimate is 143,123 kWh. The variance associated with this estimate is ±2,433 kWh.

Residential Educational Services program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 5 for the gross savings.

Residential Pilot Program has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 5 for the gross savings.

Business Services:

Commercial and Industrial Program deemed savings estimate was 438,933 kWh. Based on the analysis of the program the verified gross savings estimate is 375,990 kWh. The variance associated with this estimate is ±101,141 kWh.

Table 5. City of Eaton Rapids, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	15,901	19,786	18,518
	Lighting	159,882	148,978	143,123
	High Efficiency Appliances & HVAC	5,882	1,566	1,414
	Appliance Recycling	3,976	1,135	996
	Multi-family Services	-	-	-
	Educational Services	6,726	6,726	6,726
	Pilot Programs	11,210	11,210	11,210
	Subtotal - Residential	**203,577**	**189,401**	**181,987**
Commercial & Industrial	Prescriptive Program	305,486	438,933	375,990
	Custom Program	114,638	-	-
	Small Business Direct Install	-	-	-
	Educational Services	16,118	-	-
	Pilot/Emerging Technology	26,864	-	-
	Subtotal - Commercial & Industrial	**463,107**	**438,933**	**375,990**
	Total Program Portfolio	**666,684**	**628,334**	**557,977**

APPENDIX G. GRAND HAVEN BOARD OF LIGHT & POWER VERIFICATION REPORT

This section presents the verification results for the 2018 Grand Haven Board of Light & Power (BLP) Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 6 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 1,143 kWh. Based on the analysis of the program the verified gross savings estimate is 1,070 kWh. The variance associated with this estimate is ±50 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 156,829 kWh. Based on the analysis of the program the verified gross savings estimate is 141,585 kWh. The variance associated with this estimate is ±11,157 kWh.

Appliance Recycling Program the deemed savings estimate is 75,409 kWh. Based on the analysis of the program the verified gross savings estimate is 66,171 kWh. The variance associated with this estimate is ±6,213 kWh.

Efficient Lighting Program deemed savings estimate is 307,964 kWh. Based on the analysis of the program the verified gross savings estimate is 295,861 kWh. The variance associated with this estimate is ±5,030 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 6 for the gross savings by program.

Residential Pilot Programs has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 6 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 2,640,923 kWh. Based on the analysis of the program the verified gross savings estimate is 2,262,214 kWh. The variance associated with this estimate is ±608,536 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 6 for the gross savings by program.

Table 6. Grand Haven BLP, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
	Low Income Services	74,591	1,143	1,070
Residential	Lighting	403,195	307,964	295,861
	High Efficiency Appliances & HVAC	52,109	156,829	141,585
	Appliance Recycling	30,311	75,409	66,171
	Multi-family Services	-	-	-
	Educational Services	25,718	27,130	27,130
	Pilot Programs	42,864	58,162	58,162
	Subtotal - Residential	**628,787**	**626,637**	**589,979**
Commercial & Industrial	Prescriptive Program	835,330	2,318,278	2,006,470
	Custom Program	375,030	322,645	279,249
	Small Business Direct Install	-	-	-
	Educational Services	68,532	-	-
	Pilot/Emerging Technology	114,219	62,790	62,790
	Subtotal - Commercial & Industrial	**1,393,111**	**2,703,713**	**2,348,509**
	Total Program Portfolio	**2,021,899**	**3,330,350**	**2,938,488**

APPENDIX H. HART HYDRO ELECTRIC VERIFICATION REPORT

This section presents the verification results for the 2018 Hart Hydro Electric Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 7 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 5,428 kWh. Based on the analysis of the program the verified gross savings estimate is 5,080 kWh. The variance associated with this estimate is ±238 kWh.

Residential Services:

High-Efficiency Products (Appliances/ HVAC) Program deemed estimate was 790 kWh. Based on the analysis of the program the verified gross savings estimate is 713 kWh. The variance associated with this estimate is ±56 kWh.

Appliance Recycling Program the deemed savings estimate is 2,270 kWh. Based on the analysis of the program the verified gross savings estimate is 1,992 kWh. The variance associated with this estimate is ±187 kWh.

Efficient Lighting Program deemed savings estimate is 37,197 kWh. Based on the analysis of the program the verified gross savings estimate is 35,735 kWh. The variance associated with this estimate is ±607 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 7 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate is 268,565 kWh. Based on the analysis of the program the verified gross savings estimate is 230,053 kWh. The variance associated with this estimate is ±61,884 kWh.

Table 7. Hart Hydro Electric, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	4,777	5,428	5,080
	Lighting	34,427	37,197	35,735
	High Efficiency Appliances & HVAC	3,379	790	713
	Appliance Recycling	2,588	2,270	1,992
	Multi-family Services	-	-	-
	Educational Services	1,948	1,948	1,948
	Pilot Programs	3,246		
	Subtotal - Residential	**50,365**	**47,633**	**45,468**
Commercial & Industrial	Prescriptive Program	172,276	245,741	210,502
	Custom Program	72,648	0	-
	Small Business Direct Install	-	-	-
	Educational Services	10,936	-	-
	Pilot/Emerging Technology	18,227	-	-
	Subtotal - Commercial & Industrial	**274,087**	**245,741**	**210,502**
	Total Program Portfolio	**324,452**	**293,374**	**255,970**

APPENDIX I. HOLLAND BOARD OF PUBLIC WORKS VERIFICATION REPORT

This section presents the verification results for the 2018 Holland Board of Public Works Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 8 presents program goals and claimed and verified savings for the following programs:

Low Income Program Total Program deemed savings estimate is 492,966 kWh. Based on the analysis of the program the verified gross savings estimate is 461,367 kWh. The variance associated with this estimate is ±21,638 kWh.

Residential Services:

High-Efficiency Products (Appliances) Program deemed estimate is 350,352 kWh. Based on the analysis of the program the verified gross savings estimate is 316,298 kWh. The variance associated with this estimate is ±24,924 kWh.

Appliance Recycling Program the deemed savings estimate is 329,789 kWh. Based on the analysis of the program the verified gross savings estimate is 289,390 kWh. The variance associated with this estimate is ±27,174 kWh.

Efficient Lighting Program & Kits deemed savings estimate is 329,051 kWh. Based on the analysis of the program the verified gross savings estimate is 316,119 kWh. The variance associated with this estimate is ±5,374 kWh.

Energy Star New Homes Program deemed estimate is 4,940 kWh, due to the low volume of program participation among all utilities, the activity did not merit the cost of a verification. DNV GL performed a certification of the program, the gross savings certified at kWh. The variance associated with this estimate is zero.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 8 for the gross savings by program.

Residential Pilot Programs has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 8 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 10,555,192 kWh. Based on the analysis of the program the verified gross savings estimate is 9,041,577 kWh. The variance associated with this estimate is ±2,432,184 kWh.

Business Pilot/Emerging Technology has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 8 for the gross savings by program.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 8 for the gross savings by program.

Table 8. Holland Board of Public Works, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	202,927	492,966	461,367
	Lighting	988,774	329,051	316,119
	High Efficiency Appliances & HVAC	77,533	350,352	316,298
	New Home Construction	4,000	4,940	4,940
	Appliance Recycling	69,588	329,789	289,390
	Multi-family Services	9,268	-	-
	Educational Services	283,686	196,024	196,024
	Pilot Programs	189,124	502,555	502,555
	Subtotal - Residential	**1,824,900**	**2,205,677**	**2,086,693**
Commercial & Industrial	Prescriptive & Custom Program	3,907,897	10,555,191	9,503,893
	Custom Program	1,222,389	-	-
	Small Business Direct Install	-	-	-
	Educational Services	114,787	30,940	30,940
	Pilot/Emerging Technology	229,574	431,376	431,376
	Subtotal - Commercial & Industrial	**5,474,647**	**11,017,508**	**9,503,893**
	Total Program Portfolio	**7,299,547**	**13,223,185**	**11,590,586**

APPENDIX J. LOWELL LIGHT & POWER VERIFICATION REPORT

This section presents the verification results for the 2018 Lowell Light & Power Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 9 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 12,714 kWh. Based on the analysis of the program the verified gross savings estimate is 12,714 kWh. The variance associated with this estimate is zero.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 4,720 kWh. Based on the analysis of the program the verified gross savings estimate is 4,261 kWh. The variance associated with this estimate is ±336 kWh.

Appliance Recycling Program the deemed savings estimate is 49,836 kWh. Based on the analysis of the program the verified gross savings estimate is 43,731 kWh. The variance associated with this estimate is ± ±4,106 kWh.

Efficient Lighting Program deemed savings estimate is 75,186 kWh. Based on the analysis of the program the verified gross savings estimate is 72,231 kWh. The variance associated with this estimate is ±1,228 kWh.

Business Services:

Commercial and Industrial Program deemed savings estimate was 541,795 kWh. Based on the analysis of the program the verified gross savings estimate is 464,102 kWh. The variance associated with this estimate is ±124,843 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 9 for the gross savings by program.

Table 9. Lowell Light & Power, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	8,557	12,714	12,714
	Lighting	92,121	75,186	72,231
	High Efficiency Appliances & HVAC	8,351	4,720	4,261
	Appliance Recycling	8,715	49,836	43,731
	Multi-family Services	-	-	-
	Educational Services	7,702	7,702	7,702
	Pilot Programs	12,837	12,837	12,837
	Subtotal - Residential	**138,283**	**162,994**	**153,476**
Commercial & Industrial	Prescriptive Program	240,985	453,810	388,733
	Custom Program	95,183	87,985	75,368
	Small Business Direct Install	-	-	-
	Educational Services	25,054	25,054	25,054
	Pilot/Emerging Technology	41,757	21,550	21,550
	Subtotal - Commercial & Industrial	**402,979**	**588,399**	**510,705**
	Total Program Portfolio	**541,262**	**751,393**	**664,181**

APPENDIX K. NILES UTILITY DEPT. VERIFICATION REPORT

This section presents the verification results for the 2018 Niles Utility Dept. Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 10 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 49,459 kWh. Based on the analysis of the program the verified gross savings estimate is 46,289 kWh. The variance associated with this estimate is ±2,171 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 11,397 kWh. Based on the analysis of the program the verified gross savings estimate is 10,290 kWh. The variance associated with this estimate is ±811 kWh.

Appliance Recycling Program the deemed savings estimate is 39,905 kWh. Based on the analysis of the program the verified gross savings estimate is 35,017 kWh. The variance associated with this estimate is ±3,288 kWh.

Efficient Lighting Program deemed savings estimate is 160,591 kWh. Based on the analysis of the program the verified gross savings estimate is 154,129 kWh. The variance associated with this estimate is ±2,620 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 10 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 583,295 kWh. Based on the analysis of the program the verified gross savings estimate is 499,651 kWh. The variance associated with this estimate is ±134,406 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 10 for the gross savings by program.

Business Pilot/Emerging Technology Programs has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 10 for the gross savings by program.

Table 10. Niles Utility Dept., EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	36,856	49,459	46,289
	Lighting	362,227	160,591	154,129
	High Efficiency Appliances & HVAC	24,010	11,397	10,290
	Appliance Recycling	24,962	39,905	35,017
	Multi-family Services	-	-	-
	Educational Services	19,847	19,847	19,847
	Pilot Programs	33,078	-	-
	Subtotal - Residential	**500,980**	**281,199**	**265,571**
Commercial & Industrial	Prescriptive Program	390,043	495,256	424,236
	Custom Program	169,286	88,040	75,415
	Small Business Direct Install	-		
	Educational Services	25,963	25,963	25,963
	Pilot/Emerging Technology	43,272	-	-
	Subtotal - Commercial & Industrial	**628,564**	**609,259**	**525,614**
	Total Program Portfolio	**1,129,544**	**890,458**	**791,185**

APPENDIX L. PAW PAW VILLAGE VERIFICATION REPORT

This section presents the verification results for the 2018 Paw Paw Village Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 11 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 6,654 kWh. Based on the analysis of the program the verified gross savings estimate is 6,227 kWh. The variance associated with this estimate is ±292 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 2,200 kWh. Based on the analysis of the program the verified gross savings estimate is 1,987 kWh. The variance associated with this estimate is ±157 kWh (±%).

Appliance Recycling Program the deemed savings estimate is 7,945 kWh. Based on the analysis of the program the verified gross savings estimate is 6,972 kWh. The variance associated with this estimate is ±655 kWh.

Efficient Lighting Program deemed savings estimate is 73,200 kWh. Based on the analysis of the program the verified gross savings estimate is 70,323 kWh. The variance associated with this estimate is ±1,195 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 11 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 218,207 kWh. Based on the analysis of the program the verified gross savings estimate is 186,916 kWh. The variance associated with this estimate is ±50,280 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 11 for the gross savings by program.

Table 11. Paw Paw Village, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	**Low Income Services**	**5,334**	**6,654**	**6,227**
	Lighting	85,345	73,200	70,323
	High Efficiency Appliances & HVAC	2,289	2,200	1,987
	Appliance Recycling	-	7,945	6,972
	Multi-family Services	-	-	-
	Educational Services	3,453	3,453	3,453
	Pilot Programs	5,754	-	-
	Subtotal - Residential	102,175	93,452	88,962
Commercial & Industrial	**Prescriptive Program**	**122,013**	**218,207**	**186,916**
	Custom Program	35,835	0	-
	Small Business Direct Install		-	-
	Educational Services	5,771	5,771	5,771
	Pilot/Emerging Technology	9,619	-	192,687
	Subtotal - Commercial & Industrial	**173,239**	**223,978**	**213,831**
	Total Program Portfolio	**275,413**	**317,430**	**281,649**

APPENDIX M. CITY OF PETOSKEY VERIFICATION REPORT

This section presents the verification results for the 2018 City of Petoskey Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 12 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 18,035 kWh. Based on the analysis of the program the 16,879 verified gross savings estimate is 16,879 kWh. The variance associated with this estimate is ±792 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 45,478 kWh. Based on the analysis of the program the verified gross savings estimate is 41,058 kWh. The variance associated with this estimate is ±3,235 kWh.

Appliance Recycling Program the deemed savings estimate is 30,825 kWh. Based on the analysis of the program the verified gross savings estimate is 27,049 kWh. The variance associated with this estimate is ±2,540 kWh.

Efficient Lighting Program deemed savings estimate is 116,804 kWh. Based on the analysis of the program the verified gross savings estimate is 112,214 kWh. The variance associated with this estimate is ±1,908 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 12 for the gross savings by program.

Residential Pilot Programs has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 12 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 774,520 kWh. Based on the analysis of the program the verified gross savings estimate is 663,454 kWh. The variance associated with this estimate is ±178,469 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 12 for the gross savings by program.

Business Pilot/Emerging Technology Programs has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 12 for the gross savings by program.

Table 12. City of Petoskey, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	13,948	18,035	16,879
	Lighting	198,769	116,804	112,214
	High Efficiency Appliances & HVAC	2,730	45,478	41,058
	Appliance Recycling	-	30,825	27,049
	Multi-family Services	-	-	-
	Educational Services	6,843	6,843	6,843
	Pilot Programs	11,405	11,405	11,405
	Subtotal - Residential	**233,695**	**229,391**	**215,448**
Commercial & Industrial	Prescriptive Program	364,422	669,971	573,897
	Custom Program	47,576	104,549	89,557
	Small Business Direct Install			
	Educational Services	14,609	14,609	14,609
	Pilot/Emerging Technology	24,348	24,348	24,348
	Subtotal - Commercial & Industrial	**450,955**	**813,477**	**702,411**
	Total Program Portfolio	**684,650**	**1,042,868**	**917,859**

APPENDIX N. CITY OF PORTLAND LIGHT OF POWER BOARD VERIFICATION REPORT

This section presents the verification results for the 2018 City of Portland Light and Power Board Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 13 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 18,035 kWh. Based on the analysis of the program the verified gross savings estimate is 16,879 kWh. The variance associated with this estimate is ±792 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate was 25,799 kWh. Based on the analysis of the program the verified gross savings estimate is 23,292 kWh. The variance associated with this estimate is ±1,835 kWh.

Appliance Recycling Program the deemed savings estimate is 12,103 kWh. Based on the analysis of the program the verified gross savings estimate is 10,620 kWh. The variance associated with this estimate is ±997 kWh.

Efficient Lighting Program deemed savings estimate is 76,449 kWh. Based on the analysis of the program the verified gross savings estimate is 73,445 kWh. The variance associated with this estimate is ±1,249 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification was required. Therefore, the verified savings are 100%, see Table 13 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate was 114,758 kWh. Based on the analysis of the program the verified gross savings estimate is 98,302 kWh. The variance associated with this estimate is ±26,443 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 13 for the gross savings by program.

Table 13. City of Portland Light & Power Board, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	14,587	18,035	16,879
	Lighting	89,600	76,449	73,445
	High Efficiency Appliances & HVAC	5,504	25,799	23,292
	Appliance Recycling	2,371	12,103	10,620
	Multi-family Services	-	-	-
	Educational Services	4,188	4,188	4,188
	Pilot Programs	6,980	-	-
	Subtotal - Residential	**123,229**	**136,574**	**128,424**
Commercial & Industrial	Prescriptive Program	69,166	114,758	98,302
	Custom Program	36,023	0	-
	Small Business Direct Install	-	-	-
	Educational Services	4,548	4,548	4,548
	Pilot/Emerging Technology	7,581	-	-
	Subtotal - Commercial & Industrial	**117,319**	**119,306**	**102,850**
	Total Program Portfolio	**240,548**	**255,880**	**231,274**

APPENDIX O. CITY OF ST. LOUIS VERIFICATION REPORT

This section presents the verification results for the 2018 City of St. Louis Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 14 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 12,782 kWh. Based on the analysis of the program the verified gross savings estimate is 11,963 kWh. The variance associated with this estimate is ±561 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate is 5,508 kWh. Based on the analysis of the program the verified gross savings estimate is 4,973 kWh. The variance associated with this estimate is ±392 kWh.

Appliance Recycling Program the deemed savings estimate is 7,945 kWh. Based on the analysis of the program the verified gross savings estimate is 6,972 kWh. The variance associated with this estimate is ±655 kWh.

Efficient Lighting Program deemed savings estimate is 63,204 kWh. Based on the analysis of the program the verified gross savings estimate is 60,720 kWh. The variance associated with this estimate is ±1,032 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 14 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate is 151,551 kWh. Based on the analysis of the program the verified gross savings estimate is 129,818 kWh. The variance associated with this estimate is ±34,921 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 14 for the gross savings by program.

Table 14. City of St. Louis, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	10,499	12,782	11,963
	Lighting	61,912	63,204	60,720
	High Efficiency Appliances & HVAC	5,577	5,508	4,973
	Appliance Recycling	2,133	7,945	6,972
	Multi-family Services	-	-	-
	Educational Services	3,376	3,376	3,376
	Pilot Programs	5,626	-	-
	Subtotal - Residential	**89,123**	**92,815**	**88,004**
Commercial & Industrial	Prescriptive Program	91,365	120,258	103,013
	Custom Program	46,498	31,293	26,806
	Small Business Direct Install	-	-	-
	Educational Services	6,715	6,715	6,715
	Pilot/Emerging Technology	11,191	-	-
	Subtotal - Commercial & Industrial	**155,769**	**158,266**	**136,534**
	Total Program Portfolio	**244,892**	**251,081**	**224,537**

APPENDIX P. CITY OF STURGIS VERIFICATION REPORT

This section presents the verification results for the 2018 City of Sturgis Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 15 presents the reported the savings estimate for the following programs:

Low Income Program deemed savings estimate is 52,530 kWh. Based on the analysis of the program the verified gross savings estimate is 49,163 kWh. The variance associated with this estimate is ±2,306 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate is 8,118 kWh. Based on the analysis of the program the verified gross savings estimate is 8,541 kWh. The variance associated with this estimate is ±673 kWh.

Appliance Recycling Program the deemed savings estimate is 52,295 kWh. Based on the analysis of the program the verified gross savings estimate 45,889 kWh. The variance associated with this estimate is ±4,309 kWh.

Efficient Lighting Program deemed savings estimate is 109,207 kWh. Based on the analysis of the program the verified gross savings estimate is 105,131 kWh. The variance associated with this estimate is ±1,787.

Residential Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 15 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate is 1,253,323 kWh. Based on the analysis of the program the verified gross savings estimate is 1,073,597 kWh. The variance associated with this estimate is ±288,797 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 15 for the gross savings by program.

Table 15. City of Sturgis EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	44,580	52,530	49,163
	Lighting	257,403	109,207	105,131
	High Efficiency Appliances & HVAC	24,915	8,118	8,541
	Appliance Recycling	18,116	52,295	45,889
	Multi-family Services	-	-	-
	Educational Services	14,539	7,270	7,270
	Pilot Programs	24,232	-	-
	Subtotal - Residential	**383,784**	**229,420**	**215,993**
Commercial & Industrial	Prescriptive Program	749,109	1,208,619	1,035,303
	Custom Program	296,153	44,704	38,293
	Small Business Direct Install	-	-	-
	Educational Services	52,410	26,205	26,205
	Pilot/Emerging Technology	87,350	-	-
	Subtotal - Commercial & Industrial	**1,185,022**	**1,279,528**	**1,099,801**
	Total Program Portfolio	**1,568,806**	**1,508,948**	**1,315,795**

APPENDIX Q. TRAVERSE CITY LIGHT & POWER VERIFICATION REPORT

This section presents the verification results for the 2018 Traverse City Light & Power Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 16 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 19,354 kWh. Based on the analysis of the program the verified gross savings estimate is 18,113 kWh. The variance associated with this estimate is ±850 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate is 139,075 kWh. Based on the analysis of the program the verified gross savings estimate is 125,557 kWh. The variance associated with this estimate is ±9,894 kWh.

Appliance Recycling Program the deemed savings estimate is 48,263 kWh. Based on the analysis of the program the verified gross savings estimate 42,350 kWh. The variance associated with this estimate is ±3,977 kWh.

Efficient Lighting Program deemed savings estimate is 143,184 kWh. Based on the analysis of the program the verified gross savings estimate is 137,557 kWh. The variance associated with this estimate is ±2,338 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 16 for the gross savings by program.

Residential Pilot Program no claims were made for the residential pilot program.

Business Services:

Commercial and Industrial Program deemed savings estimate is 2,001,174 kWh. Based on the analysis of the program the verified gross savings estimate is 1,714,597 kWh. The variance associated with this estimate is ±288,797 kWh.

Business Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 16 for the gross savings by program.

Business Pilot/Emerging Technology Programs has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 16 for the gross savings by program.

Table 16.Traverse City Light & Power, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Revised Goal	Claimed	Verified
Residential	Low Income Services	50,601	19,354	18,113
	Lighting	267,303	143,184	137,557
	High Efficiency Appliances & HVAC	21,210	139,075	125,557
	Appliance Recycling	20,562	48,263	42,350
	Multi-family Services	-	-	-
	Educational Services	14,063	12,162	12,162
	Pilot Programs	23,439	-	-
	Subtotal - Residential	**397,178**	**371,714**	**335,739**
Commercial & Industrial	Prescriptive Program	1,147,840	2,001,174	1,714,206
	Custom Program	614,133	-	-
	Small Business Direct Install	-	-	-
	Educational Services	68,403	68,403	68,403
	Pilot/Emerging Technology	114,004	114,005	114,005
	Subtotal - Commercial & Industrial	**1,944,380**	**2,183,582**	**1,896,614**
	Total Program Portfolio	**2,341,558**	**2,555,296**	**2,232,352**

APPENDIX R. WYANDOTTE MUNICIPAL SERVICES VERIFICATION REPORT

This section presents the verification results for the 2018 Wyandotte Municipal Services Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 17 presents program goals and claimed and verified savings for the following programs:

Low Income Program was not implemented in 2018.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate is 32,727 kWh. Based on the analysis of the program the verified gross savings estimate is 29,546 kWh. The variance associated with this estimate is ±2,328 kWh.

Appliance Recycling Program deemed estimate is 142,898 kWh. Based on the analysis of the program the verified gross savings estimate 125,393 kWh. The variance associated with this estimate is ±11,774 kWh.

Efficient Lighting Program deemed savings estimate is 52,886 kWh. Based on the analysis of the program the verified gross savings estimate is 50,808 kWh. The variance associated with this estimate is ±864 kWh.

Business Services:

Commercial and Industrial Program deemed savings estimate is 709,249 kWh. Based on the analysis of the program the verified gross savings estimate is 607,543 kWh. The variance associated with this estimate is ±163,429 kWh.

Table 17. Wyandotte Municipal Services, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
	Low Income Services	105,508	-	-
	Lighting	622,166	52,886	50,808
	High Efficiency Appliances & HVAC	35,392	32,727	29,546
	Appliance Recycling	21,437	142,898	125,393
	Multi-family Services	-	-	-
	Educational Services	42,809	-	-
	Pilot Programs	71,349	-	-
Residential	**Subtotal - Residential**	**898,661**	**228,511**	**205,746**
	Prescriptive Program	395,215	617,584	529,022
	Custom Program	166,346	91,665	78,520
Commercial	Small Business Direct Install	-		
& Industrial	Educational Services	34,599	-	-
	Pilot/Emerging Technology	57,665	-	-
	Subtotal - Commercial & Industrial	**653,824**	**709,249**	**607,543**
	Total Program Portfolio	**1,552,486**	**937,760**	**813,289**

APPENDIX S. ZEELAND BOARD OF PUBLIC WORKS VERIFICATION REPORT

This section presents the verification results for the Zeeland Board of Public Works Energy Waste Reduction program portfolio. The results identify the goals the utility program sought to achieve at the beginning of the program year ("goal"), the estimated goals achieved ("claimed or deemed savings") and the gross verification rate which is the percentage of measures that are installed and operating as planned for each program ("gross verified and verification rate"). Table 18 presents program goals and claimed and verified savings for the following programs:

Low Income Program deemed savings estimate is 38,382 kWh. Based on the analysis of the program the verified gross savings estimate is 35,922 kWh. The variance associated with this estimate is ±1,685 kWh.

Residential Services:

High-Efficiency Products (HVAC & Appliances) Program deemed estimate is 101,810 kWh. Based on the analysis of the program the verified gross savings estimate is 91,914 kWh. The variance associated with this estimate is ±7,243 kWh.

Appliance Recycling Program deemed estimate is 68,495 kWh. Based on the analysis of the program the verified gross savings estimate 60,104 kWh. The variance associated with this estimate is ±5,644 kWh.

Efficient Lighting Program deemed savings estimate is 180,319 kWh. Based on the analysis of the program the verified gross savings estimate is 173,232 kWh. The variance associated with this estimate is ±2,945 kWh.

Residential Educational Services has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 18 for the gross savings by program.

Residential Pilot Program has stipulated savings. Accordingly, no verification is required. Therefore, the verified savings are 100%, see Table 18 for the gross savings by program.

Business Services:

Commercial and Industrial Program deemed savings estimate is 3,352,543 kWh. Based on the analysis of the program the verified gross savings estimate is 2,871,788 kWh. The variance associated with this estimate is ±772,511 kWh.

Table 18. Zeeland Board of Public Works, EWR Program Goals, Claimed and Verified Savings (kWh)

Category	Program	Goal	Claimed	Verified
Residential	Low Income Services	32,784	38,382	35,922
	Lighting	411,716	180,319	173,232
	High Efficiency Appliances & HVAC	21,782	101,810	91,914
	Appliance Recycling	-	68,495	60,104
	Multi-family Services	-	-	-
	Educational Services	18,062	107,443	107,443
	Pilot Programs	-	-	-
	Subtotal - Residential	**484,344**	**496,448**	**468,615**
Commercial & Industrial	Prescriptive Program	3,012,995	1,552,661	1,330,009
	Custom Program	289,071	1,799,882	1,541,779
	Small Business Direct Install	-	-	-
	Educational Services	116,164	-	-
	Pilot/Emerging Technology	-	-	-
	Subtotal - Commercial & Industrial	**3,418,229**	**3,352,543**	**2,871,788**
	Total Program Portfolio	**3,902,573**	**3,848,991**	**3,340,403**

APPENDIX T. PROGRAM DESCRIPTIONS

The utilities and MPPA EE Service Committee municipal utility members offered a variety of residential, commercial and industrial EWR programs. This appendix briefly and generically describes the programs that may have been offered by the individual utilities. The individual utilities determined which of the specific programs were offered to their customers, as well the appropriate implementation approach.

RESIDENTIAL PROGRAMS

Efficient Lighting Program: This program promotes the installation of ENERGY STAR LED-based lighting. The most common lamps dispersed through the program were LED 60w equivalent bulbs followed by LED night lights. The program also offers the following: LEDs: A-lamp, globe, flood (PAR-30) interior and exterior bulbs. The light bulbs are primarily distributed in the form of kits however distributions methods vary according to each utility's preference. The distribution methods may include: direct-install, mailed, drive-through give-away, rebates in-store promotion; special sales: internet orders; coupons; over the counter at the utility offices; or at events (i.e. home shows). The Efficient Lighting Program is marketed in various ways such as through the utility website and through return cards that were mailed out to customers.

Appliance Recycling Program: This program is offered in 2018 by some of the utilities after a brief one-year lapse in 2016 when there was no service recycling provider. Among the few utilities that are able to operate the program, it is designed to encourage customers to dispose of "second" refrigerators and encourages the accelerated retirement of older, inefficient "primary" refrigerators and freezers. The program also offers turnkey pick up and recycling services for room air conditioners and dehumidifiers.

High-Efficiency Appliances/ High-Efficiency HVAC (High Efficiency Products): This program provides incentives to customers to encourage them to replace their older, inefficient dehumidifiers and room air-conditioners with high-efficiency ENERGY STAR qualified units. This program also promotes heating and cooling technologies that can reduce electric energy use. The program focuses on the promotion of high-efficiency central air-conditioning and premium efficiency furnace motors that have high-efficiency motors (electrically commutated motors – ECMs). ECM motors save electric energy during the heating and cooling seasons.

Income Qualified Services Program: This program provides funding to customers living on limited incomes subsidizing the installation of cost-effective energy efficient electric measures. The delivery of the program is coordinated with local weatherization or Low-Income Assistance agencies. It includes primarily a mix of LED lamps and some utilities offer measures like smart power strips, water-saving aerators and pipe wrap insulation.

Multifamily Direct Install Program: The Multifamily program installs complimentary energy saving measures to reduce the amount of energy that is consumed not only in each unit but the property as a whole. The measures include LED light bulbs, aerators, and shower heads. The program is marketed to property managers, communities and property development companies by sending literature, holding events, completing energy assessments and social media marketing.

Education Services: This program provides informative and actionable educational materials to residential customers that educate customers on the benefits of energy efficiency and conservation. Such materials include brochures, fact sheets, workshops, web sites and online energy audits.

Pilot/Emerging Technology Program: Residential pilot programs pursue new initiatives such as residential-sized HVAC equipment optimization, advanced residential water heating technology or promotion of LED lighting technology in residential applications.

APPENDIX U. SAMPLE DESIGN

MPPA Energy Services Committee 2018 Energy Waste Reduction Program Verification Sample Design Report

Methodology: A sample was designed for each MPPA program, except the Multifamily program. Model based statistical sampling (MBSS) was used to guide the sample design. This technique uses a statistical model and its parameters to represent prior information about the population to be sampled. The model describes the nature of the variation in the relationship between a key target variable y of the study (called the dependent variable), in this case the verified amount of program energy savings and an explanatory variable x, in this case the tracking system estimate of savings. The model is used to help choose the sample size ("n") and to help formulate a sample design with near-optimal stratification for stratified ratio estimation. The model describes the trend and the variation around the trend, i.e., the conditional mean and standard deviation of y given x.

Equation 1. Primary and secondary equations

$$y_k = \beta x_k + \varepsilon_k$$
$$\sigma_k = sd(\varepsilon_k) = \sigma_0 x_k^{\gamma}$$

Equation 1 illustrates the primary and secondary equations of the model that are used in the sample design. Here xk>0 is the tracking system estimate of energy savings, and is known for each participant, k, in the population. The residuals are considered to be independent random variables with zero expected value and standard deviations following the secondary equation. There are three parameters in the model: β (beta), σ0 (sigma-naught), and γ (gamma). The coefficient beta is a fixed constant applied to the known tracking estimate xk to predict the verified savings yk. σk is the residual standard deviation of each unit k. Both the expected value σk and residual standard deviation σk generally vary from one unit to another depending on xk, following the primary and secondary equations of the model. In statistical terms, the ratio model is a heteroscedastic regression model with zero intercept. Gamma describes how the standard deviation varies in relationship to the tracking system estimate of savings.

Where:

D is the desired relative precision,

and z corresponds to the desired confidence level.

Equation 2. Initial sample size calculator

$$n_0 \approx \left(\frac{z\ er}{D} \right)^2$$

$$n = \frac{n_0}{1 + n_0 / N}$$

Using MBSS techniques in sample design minimizes the uncertainty of the results by controlling the variation of the sample. Accordingly, for the verification the initial sample size was determined using Equation 2. Sample size is based on an assumed "error ratio".

The true beta terms and true error ratios are not known. However, the sample can be designed using estimates of these parameters based on last years' evaluation results that determined "gross" verified savings. Last year's results were examined, and subjectively adjusted to be conservative when establishing this year's sample sizes.

Sample Design: Table 19 presents a recap of the sample design parameters and expected confidence intervals.

Table 19. Sample Design Parameters, Sample Sizes and Expected Confidence Intervals

Program	Beta β	Error Ratio ER	Assumed Population N	Sample Size 90/10 Confidence Level n	Study Sample Size and Confidence Interval n	Gross CI
Program						
Residential						
Appliance Pick Up	0.95	0.20	292	10	30	5.4%
High Efficiency Products	0.95	0.20	1,082	11	30	5.9%
Lighting	0.63	0.20	3,288	11	24	6.6%
Low Income	0.80	0.20	1,441	11	25	6.5%
C&I						
Prescriptive/Custom	0.89	0.15	303	6	15	6.5%

Table 19 shows that to achieve a ±10% confidence interval at the 90% confidence level the sample sizes range from 3 to 16. The sample sizes for the Lighting and Low Income were increased for the additional sample points for Bay City. Due to the uncertainty of the assumptions, the sample size for the C&L Prescriptive/Custom program was increased to assure adequate coverage. The Multifamily program had a minimal activity this year, and did not merit a sample design.

The increase in sample sizes for all programs manifests itself in lower expected confidence intervals for each sample. Table 19 shows the expected confidence intervals range from ±5.4% to ±6.5%

The next step in the sample design was to choose the number of strata. Typically, in evaluations such as these three strata are chosen (small, medium and large). Stratum boundaries are determined so there is approximately equal amount of variance in each stratum. To do this the tracking estimates of savings are sorted. The participant savings are raised to the assumed (xγ) gamma. This is a proxy for σi = σo xγ. The relative cumulative sum of the (xγ) is then calculated. The strata cut points identified as the multiples of

the cumulative sum divided by the number of strata. For the sample design for all programs, the value of gamma was assumed to be 0.8 An additional stratum was added for the Bay City sample points in the Lighting and Low Income Samples.

Table 20. Final 2018 Sample Design

			kWh Savings	
Strata	**N**	**n**	**Max**	**Total**
Residential				
Efficient Lighting				
1	1149	7	711	266,273
2	177	7	1,264	213,768
3	50	7	17,664	151,804
Bay	1036	22	9,101	437,607
Total	**2412**	**43**		**1,069,452**
High Efficiency Appliances				
1	1617	8	855	618,037
2	555	8	2,280	843,742
3	80	8	206,700	1,260,234
Total	**2252**	**24**		**2,722,013**
Low Income Qualified				
1	358	10	774	276,976
2	47	11	5,842	46,428
Bay	240	12	2396	128,962
Total	**645**	**33**		**452,366**
Commercial and Industrial				
Custom/Prescriptive				
1	191	7	59,280	3,263,156
2	42	7	268,715	4,317,610
3	11	7	666,769	5,356,030
4	1	1	1,128,554	1,128,554
Total	**245**	**22**		**14,065,350**

APPENDIX V. ANALYSIS METHODOLOGY

Model Based Statistical Sampling and analysis was the basis of the analysis. For each of the programs, an appropriate evaluation approach was developed. This section describes the methodologies used for each program's analysis approach.

Model Based Statistical Sampling and Analysis

This technique used a statistical model and its parameters to represent prior information about the population to be sampled. The model describes the nature of the variation in the relationship between a key target variable y of the study (called the dependent variable), in this case the actual amount of program energy savings and an explanatory variable x, in our case the tracking system estimate of savings. The model is used to help choose the sample size n and to help formulate a sample design with near-optimal stratification for stratified ratio estimation. The model describes the trend and the variation around the trend, i.e., the conditional mean and standard deviation of y given x.

The model is used as a guide to the sample design, but the results of the study itself are not strongly dependent on the accuracy of the model. Once the sample design is selected, the subsequent analysis of the data is usually based only on the sample design and not on the model used to develop the sample design. In particular, conventional stratified-sampling techniques can be used to analyze the sample data collected from an MBSS sample design. The resulting estimates will be almost unbiased in repeated sampling and the confidence intervals will also be valid, provided that the sample design is followed.

This technique used a statistical model and its parameters to represent prior information about the population to be sampled. The model describes the nature of the variation in the relationship between a key target variable y of the study (called the dependent variable), in this case the actual amount of program energy savings and an explanatory variable x, in our case the tracking system estimate of savings. The model is used to help choose the sample size n and to help formulate a sample design with near-optimal stratification for stratified ratio estimation. The model describes the trend and the variation around the trend, i.e., the conditional mean and standard deviation of y given x.

Equation 1. Primary and secondary equations

$$y_i = \beta\, x_i + \varepsilon_i$$
$$\sigma_i = sd(\varepsilon_i) = \sigma_0\ x_i^{\gamma}$$

Using MBSS techniques in sample design minimizes the uncertainty of the results by controlling the variation of the sample. Accordingly, for the verifications the initial sample size was determined using Equation 2. Sample size is based on an assumed "error ratio".

The true error ratios were not known. However, based on past experience, a high level of compliance should be expected.

The next step in the sample design is to choose the number of strata. Typically, in evaluations such as these three strata are chosen (small medium and large). Next, stratum boundaries are determined so there is approximately equal amount of variance in each stratum. To do this the tracking estimates of savings are sorted. The participant savings are raised to the assumed (xγ) gamma. This is a proxy for σi = σo xγ. The relative cumulative sum of the xγ is then calculated. The strata cut points identified as the multiples of the cumulative sum divided by the number of strata.

Equation 2. Initial sample size calculation

$$n_0 \approx \left(\frac{z\ er}{D} \right)^2$$

$$n_0 \approx \left(\frac{z\ er}{D} \right)^2 \quad n = \frac{n_0}{1 + n_0 / N}$$

Where:

D is the desired relative precision, and
z corresponds to the desired confidence level.

Equation 3. Combined ratio estimation

Ratio Estimate Mean Total

$$\hat{B}_0 = \frac{\sum_{i=1}^{n_0} w_i\ y_i}{\sum_{i=1}^{n_0} w_i\ x_i} \qquad \bar{y}_0 = \hat{B}_0\ \mu_{x0} \qquad \hat{Y}_0 = \hat{B}_0\ X_0$$

where $w_i = N_h / n_h$

Equation 4. Calculating the statistical precision

1. Calculate the residuals $e_i = y_i - \hat{B}_0\ x_i$
2. Calculate $se\left(\hat{B}_0\right) = \left(\frac{1}{\hat{X}_0} \right) \sqrt{\sum_{I=1}^{n_0} w_i \left(w_i - 1 \right) e_i^2}$

   with $\hat{X}_0 = \sum_{i=1}^{n_0} w_i\ x_i$
3. Then $se\left(\bar{y}_0\right) = se\left(\hat{B}_0\right) \mu_{x0}$ and $se\left(\hat{Y}_0\right) = se\left(\hat{B}_0\right) X_0$

APPENDIX W. VERIFICATION METHODOLOGY AND SURVEY INSTRUMENTS

This section describes the verification approach for the following programs:

- Appliance Recycling
- Residential Efficient Lighting Program
- High-Efficiency Appliances/ High-Efficiency HVAC Program (High Efficiency Products)
- Low Income Qualified Program

Customer verification data were collected for the Residential Efficient Lighting, High Efficiency Products and Income Qualified through the use of a CATI-telephone based surveys. A random sample was selected from all known and available participating efficient lighting and high efficiency product customers. The responses from the sampled customers determined the compliance rate (i.e., the percentage of measures that are installed and operating as planned) for each program.

The participants were asked:

- To verify if they participated in the program
- How many measures they received
- If they are using all the measures, and if not, how many are not in use

From the returned surveys, proportions of the measures that were installed and operating as intended were estimated to produce a verification rate at the measure level.

As described in Appendix D, Equation 3 was used to determine the verified savings, and Equation 4 was used to estimate the statistical precision of the estimate.

Commercial and Industrial Prescriptive and Custom Programs

For the verification, an energy engineer conducted a quality control inspection of commercial and industrial participants of the C&I Prescriptive and Custom Program. The engineer physically inspected all measures and commented on both the quality and the appropriateness for the participant. The inspector noted any problems with measure installation and recorded any customer comments expressing either satisfaction or dissatisfaction with the program, measures, and contractor services. The engineer inspected all of the measures or activities recorded in the participant's program file. A copy of the on-site inspection form can be found in APPENDIX BB.

The information gathered on site was used to verify the savings of the measures that were installed and operating as intended. The verified estimate of savings and the tracking system estimate of savings were used to develop a stratified ratio estimate of program savings.

APPENDIX X. APPLIANCE RECYCLING TELEPHONE SURVEY

MPPA Residential Appliance Recycling Program Survey

CATI Survey 30 November 2018

Survey house instructions

1. Text in bold should be read.

2. Text in brackets [ ] are instructions for interviewer, minor programming such as skips, or answer choices and should NOT be read.

3. Text in carrots < > are database variables that should be filled in on a case-by-case basis.

4. Text in double-carrots << >> are larger blocks of text that will change on a case-by-case basis depending on database variables.

5. Text in gray boxes is major programming instruction.

6. Unless specifically noted, do NOT read answer choices. [Don't know] and [Refused] should NEVER be read.

Programming Notes

1. Code multiple response questions as a series of variables that have a 0 or 1 value. One variable for each answer option. For example, R5_1 = 1 if the respondent answers "internet" to R5. R5_1 = 0 if the respondent does not answer "internet. Make separate 0/1 variables for the [Don't know] and [Refused] options as well.

Database variables

Variable Definition

(Unless otherwise noted, the database can contain more than one of each variable per respondent)

Customer_Name Contact name(s).

Utility Name Utility name(s): Bay City Electric Light & Power, Charlevoix Electric System, Chelsea Electric Department, Grand Haven Board of Light & Power Hart Hydro-Electric, Holland Board of Public Works, Lowell Light & Power, Niles Utility Department, City of Petoskey, Portland Light & Power Board, City of St. Louis, City of Sturgis, Village of Paw Paw, Zeeland Board of Public Works

Program Names Appliance Recycling (Pick up Program) Appliance Recycling (drop off only offered in the City of Sturgis)

AddressAddress where equipment was recycled from

Phone Number

Phone number

MeasName1, MeasName2

MeasName3

Text summarizing equipment type that was (Refrigerator, Freezer, Air Conditioning Unit, Dehumidifier)

MeasNameCount1,… X Text summarizing quantity of that equipment that was recycled

Recycling service provider Michigan Energy Options or Padnos or Arca

Stratum The strata each participant is assigned to either one or two,

INTRODUCTION

Intro1. May I speak with <Customer_Name>? Hello, my name is _____, and I'm calling on behalf of the Appliance Recycling Program offered through <utility>I'm calling to speak with you about some appliances your household recently recycled.

[IF NEEDED:] I'm not selling anything; I'd just like to ask your opinions. Your responses will be kept confidential and your individual responses will not be revealed to anyone.

[IF ASKED] You can verify the legitimacy of this research by calling Patrick Devon (517) 323-8919 Ext. 114

1 [AGREES TO PARTCIPATE] Intro2

2 [DOES NOT AGREE TO PARTCIPATE] TERMINATE

Intro2. Our records show that your household recycled some appliances through <utility>'s Appliance Recycling program services. Are you familiar with having appliances recycled in 2018?

Prompt if needed: They may have been picked by a company or dropped off at a recycling event back on <date of pick up>

1 [Yes] VG0 97 [Don’t know]

2 [No] Intro3 98 [Refused]

Intro3. Who could I speak to that would be familiar with the recycling process?

[RECORD FIRST and LAST NAME] Intro4

97 [Don’t know]

98 [Refused]

Intro4. Could I speak with <Intro3> now?

1 [Yes] Intro1 97 [Don’t know]

2 [No] Intro5 98 [Refused]

Intro5. When is a good time I could call back to reach <Intro3>?

[RECORD DAY and TIME] Call back later

98 [Refused] 97 [Don’t know]

Intro6. What is your name?

[RECORD FIRST and LAST NAME] VG0

98 [Refused] 97 [Don’t know]

VERIFY GROSS INSTALLATION

VG0. I have some questions about the equipment you recycled.

[IF MeasNameX=NULL GOTO A1]

VG1. Our records show your household had <Total_Measure_Cnt > < Measure_Name1>, Measure_Name2, Measure_Name3> recycled. Is that correct number of recycled appliances?

1 [Yes] GOTO VG2c 97 [Don’t know] GOTO Intro3 or T&T

2 [No] VG2a 98 [Refused]

VG2a. How many <MeasNameX> were recycled?

[RECORD VERBATIM] If ≠ <MeasNameCountX > the go to GOTO VG2b.

97 [Don't know] VG2c. 98 [Refused]

VG2b. Why were a different number of <MeasNameX> recycled?

[RECORD VERBATIM] VG2c

97 [Don't know] 98 [Refused]

VG2c. Before being recycled, was the <MeasNameX> being stored or used at < Address>?

1 [Address is incorrect – Record correct address] VG2d

2 [Address is correct] R0

97 [Don't know] 98 [Refused]

VG2d. Why were they recycled from a different address?

[RECORD VERBATIM]

RO

97 [Don't know] 98 [Refused]

OPERATIONAL

[Repeat for each <MeasNameX>]

RO. Was/were the <MeasNameCountX or VG2a# > <MeasNameX> you recycled in working condition?

1 [Yes –All] R1 97 [Don't know] R1

2 [No – none/or only some] R0a. 98 [Refused]

R0a. How many <MeasNameX> were in working condition?

[RECORD VERBATIM] R1

97 [Don't know] 98 [Refused]

R1. If the program had not offered the recycling service when it did, would you have still gotten rid of the <MeasNameCountX > <MeasNameX>, or would you have kept it/them?

[PROMPT FOR RESPONSE – READ OPTIONS IF NEEDED]

1 [Gotten rid of it or both] R2

2 [Kept one and got rid of one]

3 [Kept it or both] REPEAT VG0-R2 for each MeasNameX ELSE GO

97 [Don't know]

98 [Refused]

R2. How would you have gotten rid of it/them? [PROMPT FOR RESPONSE – READ OPTIONS IF NEEDED, ACCEPT MULTIPLES IF <MeasNameCountX >=1]

1 [Threw away / Took to Landfill] REPEAT VG0-R2 for each MeasNameX ELSE GO TO RO

2 [Took to recycling center]

3 [Donated to charity]

4 [Taken by installer of new one]

5 [Sold to used appliance dealer]

6 [Sold to private individual]

7 [Given it to friend/relative/private individual]

8 [Kept it - plugged in]

9 [Kept it - not plugged in]

10 [Disassembled it myself]

11 [Abandon it]

77 [Other (specify)]

97 [Don't know]

98 [Refused]

ATTRIBUTION

A1. What is the main reason you chose this recycling service to dispose of your appliance(s)? [ALLOW ONLY ONE RESPONSE]

1 [To get the program rebate] S1

2 [To save energy]

3 [Service was free]

4 [Proper disposal (recycled)]

5 [Convenience]

6 [Unwanted equipment]

7 [Old and outdated equipment]

8 [No longer needed]

9 [It came recommended]

77 [Other - SPECIFY]

97 [Don't Know] S1

98 [Refused]

Satisfaction

S1. How satisfied or dissatisfied were you with the recycling program?

1	1 – Very Dissatisfied	3	3
2	2	4	4
5	5- Very Satisfied	98	[Refused]
97	[Don't know]		

S5a. Why do you say that? [ALLOW MULTIPLE RESPONSES]

1	[Pick up times were inconvenient] FE1	6	[Shorter follow up survey]
2	[Equipment should not have to be working properly to quality for free service]	7	[Scheduling pickup was inconvenient]
3	[Increase the incentive]	77	[Other - SPECIFY] ()
4	[Drop the incentive/incentive not needed]	78	None
		97	[Don't Know]
		98	[Refused]
5	[Incentive check should be more timely]		

Closing statement

Those are all the questions I have for you today, unless you have something you would like to tell us regarding your experience with this program we are finished. Thank you for your time.

1	Record: D1	97	[Don't know]
2	No Comments		

D1. RECORD GENDER [DO NOT ASK.]

1	Male END_1	97	[Don't know]
2	Female		

APPENDIX Y. EFFICIENT LIGHTING TELEPHONE SURVEY

MPPA – Efficient Lighting Program CATI Survey

Final 09 Jan 2013

Survey house instructions

1. Text in bold should be read.

2. Text in brackets [ ] are instructions for interviewer, minor programming such as skips, or answer choices and should NOT be read.

3. Text in carrots < > are variables that should be filled in on a case-by-case basis.

4. Text in gray boxes is major programming instruction.

5. Unless specifically noted, do NOT read answer choices. [Don't know] and [Refused] should NEVER be read.

THIS TABLE MAY BE UPDATED ONCE THE SAMPLE DESIGN IS FINALIZED

Database variables

Variable Definition

Name Customer name

Address Address where equipment was installed

City City where equipment was installed

Municipal_Name Customer Utility

Program_Name Utility program name

MeasType1, MeasType2.

...10..x Original measure description (do not use) e.g., "17-101, LED 60w Equivalent"

MeasDesc1,

MeasDesc2..

…10 Cleaned measure description (do use).e.g., "LED 60w Equivalent"

Meas_qty1 Quantity of measures distributed by measure description.

Distributor Name Source that gave-away or installed the light bulbs.

** not all utilities provided this information.**

LED_QTY This is the sum of all LEDs (A-lamp and PAR) distributed to customers that need to be verified. If QTY is greater than 0, the LED battery should be delivered.

LED Night_QTY This is the sum of all LED nightlights distributed to customers that need to be verified. If QTY is greater than 0, the LED nightlight battery should be delivered.

CFL_QTY This is the sum of all CFLs distributed to customers that need to be verified. If QTY is greater than 0, the CFL battery should be delivered.

Program Name "Efficient Lighting Program" is the program name.

INTRODUCTION

Intro1. May I speak with < Name_2, Name_1>? Hello, my name is _____, and I'm calling on behalf of the Efficient Lighting Program run by your utility, <UTILITY>. I'm calling to talk to you about some energy efficient LED light bulbs that were purchased through a mail-in rebate, given to you at an event or directly installed at your home this year. [PROMPT IF NEEDED: You may have received things like LED light bulbs, LED night lights, etc. at <distributor name>]

[IF NEEDED] I'm not selling anything; I'd just like to ask your opinions. Your responses will be kept confidential and your individual responses will not be revealed to anyone.

[IF ASKED] You can verify the legitimacy of this research by calling Patrick Devon (517) 323-8919 Ext. 114

Intro2. Are you familiar with the LED light bulbs, distributed, or installed by the program? [PROMPT IF NEEDED: You may have received things like LED light bulbs, LED night lights, etc. from <Distributor name>]

1	[Yes]	Intro6		97	[Don't know]
2	[No]	Intro3		98	[Refused]

Intro3. Who could I speak to that would be familiar with that process?

[RECORD FIRST and LAST NAME] Intro4

97 [Don't know]

98 [Refused]

Intro4. Could I speak with <Intro3> now?

1	[Yes]	Intro1	97	[Don't know]
2	[No]	Intro5	98	[Refused]

Intro5. When is a good time I could call back to reach <Intro3>?

[RECORD DAY and TIME] Call back later

97	[Don't know]	98	[Refused]

[If <intro3> ≠ <name>, else skip to L1]

Intro6. What is your name?

[RECORD FIRST and LAST NAME] V1

97	[Don't know]	98	[Refused]

LED_ASK – Sample LED bulb

1 = 'LED 5 watt candelabra base'

2 = 'LED 40 watt Equivalent'

3 = 'LED 60 watt Equivalent'

4 = 'LED 75 watt Equivalent'

5 = 'LED 100 watt Equivalent'

6 = 'LED Exterior Fixture - 1 Lamp'

7 = 'LED Exterior Fixture - 2 Lamp'

8 = 'LED Globe'

9 = 'LED Indoor Downlights'

10 = 'LED Indoor Flood/PAR'

11 = 'LED Lamp less than 7 watts'

12 = 'LED Lamp 7 watts or greater'

13 = 'LED Outdoor Flood/PAR' ;

START LED BLOCK:

IF LED_QTY>0 then ask L1

IF LED = 0then skip to next section (LED Night Lights)

Verification –LED bulbs

[IF LED_QTY > 0, ask L1-L4, else END LED Block]

L1. To verify, did you receive one or more LED light bulbs from <UTILITY> this year?

1	Yes	L2	97	[Don't know]	L1a
2	No	L1a	98	[Refused]	

L1a. Just to confirm, you did NOT receive any LED bulbs from <UTILITY> this year?

1	We received LEDs	L1a.	97	[Don't know]	
2	We did NOT receive any LEDS	END LED Block	98	[Refused]	

L2. Our records show that you received <LED_QTY> LED light bulbs. Is this correct?

1	[Yes]	L3	97	[Don't know]	
2	[No]	L2a	98	[Refused]	

L2a. How many LED light bulbs did you receive?

#	[Enter quantity]	L3	97	[Don't know]	L3
0	[None]	END LED block	98	[Refused]	
3	[Did receive the quantity stated previously] L3				

L3. Are you using these LED light bulbs at <address>?

1	[Yes]	L4	97	[Don't know]	
2	[No]				

L4. How many of the LEDs provided by the program have been removed, burnt out, given away, or are not being used?

#	[Enter quantity]	L5	9997	[Don’t know]
9999	[All of them]		9998	[Refused]
0	[None of them]			

L5. How many of the LEDs provided by the program replaced another type of light bulb such as an incandescent, CFL or LED bulb? [IF NEEDED, “AS OPPOSED TO BEING INSTALLED IN A NEW LIGHT FIXTURE OR SOCKET”

#	[Enter quantity]	L6.	0	[None of them, all installed in new sockets] End LED block
9999	[All of them]		9997	[Don’t know]
			9998	[Refused]

L6. What type of light bulb(s) were you using before you installed the program provided LED(s)? [Prompt if needed: Was it the least efficient incandescent (or halogen) bulbs, the lesser efficient CFL bulbs or did you remove an LED?] Circle all that apply

1	[Incandescent or halogen]	L7.	50	[Other]
2	[CFL]		97	[Don’t know] End LED block
3	[LED]		98	[Refused]
4	[Mix of INC and CFL]			

L7. What was the approximate wattage of bulb(s) that you removed? (Prompt if needed: 100W, 75W, 60W or 40w or less?) Circle all that apply.

1	[100w or more]End LED Block	4	[20w or below]
2	[75w]	50	[Other]
3	[60w]	97	[Don’t know]
4	[40w]	98	[Refused]

Verification – LED NIGHT LIGHTS

[IF LED Night_QTY> 0, ask NL1-NL3, else END LED Night Lights Block]

[IF <LED> = Y, ask L1-L4, else END Lighting Block]

NL1. Our records show that you received <LED Night_QTY> LED nightlight(s). Is this correct?

1	[Yes]	NL2	97	[Don't know]	
2	[No]	NL1a	98	[Refused]	

NL1a. How many LED night lights did you receive?

#	[Enter quantity]	NL2	9997	[Don't know]	NL2
0	[None]	End LED Night Light Block	9998	[Refused]	
3	[Did receive the quantity stated previously] NL2				

NL2. Are you using these LED nightlights at your address?

1	Yes	NL3	97	[Don't know]	
2	No		98	[Refused]	

NL3. Have the <LED Night_QTY> nightlight(s), provided by the program, been removed, given away or is not in use? Circle all that apply.

1	[Yes removed, given away, not used] End NL block		97	[Don't know]	End NL block
			98	[Refused]	
2	[No still installed]	NL4			

NL4. How many of the LED nightlights replaced another type of nightlight bulb? [If needed, or did you install them in new sockets?]

#	[Enter quantity]	NL5	9997	[Don't know]
9999	[All of them]		9998	[Refused]
0	[None of them, all installed in new sockets] End NL block			

NL5. What type of nightlights were you using before you installed the LED nightlights? [Prompt if needed: Was it the least efficient incandescent (or halogen) bulbs, the lesser efficient CFL bulbs or did you remove an LED?] Circle all that apply.

1	[Incandescent or halogen]	4	[Mix of INC and CFL]
End NL block		50	[Other]
2	[CFL]	97	[Don't know]
3	[LED]	98	[Refused]

Verification –CFL bulbs

[IF CFL_QTY > 0, ask C1-C4, else END CFL Block]

C1. To verify, did you receive one or more CFL bulbs from <UTILITY> this year?

1	Yes	C2	97	[Don't know]	C1a
2	No	C1a	98	[Refused]	

C1a. Just to confirm, you did not receive any CFL bulbs from <UTILITY> this year?

1	We received CFLs	C2	97	[Don't know]
2	We did NOT receive any CFLS	END CFL Block	98	[Refused]

C2. Our records show that you received <CFL_QTY> CFL bulbs. Is this correct?

1	[Yes]	C3	97	[Don't know]
2	[No]	C2a	98	[Refused]

C2a. How many CFLs did you receive?

1	[Enter quantity]	C3	97	[Don't know]	L3
2	[None] END CFL block		98	[Refused]	
3	[Did receive the quantity stated previously] L3				

C3. Are you using these CFL light bulbs at <address>?

1 [Yes] C4 2 [No]

97 [Don't know]

C4. How many of the CFL bulbs provided by the program have been removed, burnt out, given away, or are not being used?

1 [Enter quantity] End CFL Block 97 [Don't know]

2 [All of them] 98 [Refused]

3 [None of them]

C5. How many of the LEDs installed replaced another type of light bulb such as an incandescent, CFL or LED bulb?

1 [Enter quantity] C6. block

2 [All of them] 97 [Don't know]

3 [None of them, all installed in new sockets] 98 [Refused]
End CFL

C6. What type of light bulbs were you using before you installed the LEDs? [Prompt if needed: Was it the least efficient incandescent (or halogen) bulbs, the lesser efficient CFL bulbs or did you remove an LED?] Circle all that apply

1 [Incandescent or halogen] C7. 50 [Other]

2 [CFL] 97 [Don't know] End CFL block

3 [LED] 98 [Refused]

4 [Mix of INC and CFL]

C7. What was the wattage of bulbs that you removed? (Prompt if needed: 100W, 75W, 60W or 40w or less?) Circle all that apply.

1 [100w or more]End CFL Block 3 [60w]

2 [75w] 4 [40w]

4	[20w or below]	97	[Don’t know]
50	[Other]	98	[Refused]

THANK & TERMINATE

END_1. Those are all the questions I have for you today. Thank you for your time.

APPENDIX Z. HIGH EFFICIENCY PRODUCTS TELEPHONE SURVEY

MPPA - Residential High Efficiency Products CATI Survey

30 November 2018

Survey house instructions

1. Text in bold should be read.

2. Text in brackets [ ] are instructions for interviewer, minor programming such as skips, or answer choices and should NOT be read.

3. Text in carrots < > are database variables that should be filled in on a case-by-case basis.

4. Text in gray boxes is major programming instruction.

5. Unless specifically noted, do NOT read answer choices. [Don't know] and [Refused] should NEVER be read.

Database variables

Variable	Definition
	(Unless otherwise noted, the database can contain more than one of each variable per respondent)
Name_1	Customer last name. Some implementer records include both first and last name in Name_1.
Name_2	Customer first name
Site_Address	Address where equipment was installed
City	City where equipment was installed
Utility	Customer Utility
MEAS_QTY1, MEAS_QTY2, etc.	Equipment type (non-lighting) and quantity of measure. These measures should be verified when QTY > 0. The individual measure names are included in the column header. Measures include efficient air-conditioners, AC tune-up, ceiling fans, clothes washers and dryers, computers, dehumidifiers, dishwashers, freezers, furnaces, heat pump water heaters, low-flow aerators and showerheads, monitors, pipe wrap, pool pumps, power strips, programmable thermostats, refrigerators and TVs.
Lighting	Y/N indicates whether the recipient received lighting measures (primarily LEDs, although a few CFLs).
LED_QTY	This is the sum of all LEDs (A-lamp and PAR) distributed to customers that need to be verified. If QTY is greater than 0, the LED battery should be delivered.
Program Name	"High Efficiency Products"

Introduction

Intro1. May I speak with < Name_2, Name_1>? Hello, my name is _____, and I'm calling on behalf of the High Efficiency Products Program run by your utility, <UTILITY>. The program provides rebates for efficient appliances and heating and cooling equipment. I'm calling to talk to you about your experience with the rebate program. Is now a good time to speak to you?

[IF NEEDED:] I'm not selling anything; I'd just like to ask your opinions. Your responses will be kept confidential and your individual responses will not be revealed to anyone.

[IF ASKED] You can verify the legitimacy of this research by calling Patrick Devon (517) 323-8919 Ext. 114

1	[AGREES TO PARTCIPATE]	Intro2
2	[DOES NOT AGREE TO PARTCIPATE]	END_1

Intro2. Our records show that you received rebates for a/an

<Equipment> you recently purchased. Are you familiar with the decision to purchase this equipment?

1	[Yes]	V1	97	[Don't know]
2	[No]	Intro3	98	[Refused]

Intro3. Who could I speak to that would be familiar with that process?

	[RECORD FIRST and LAST NAME] Intro4	97	[Don't know]
		98	[Refused]

Intro4. Could I speak with <Intro3> now?

1	[Yes]	Intro1	97	[Don't know]
2	[No]	Intro5	98	[Refused]

Intro5. When is a good time I could call back to reach <Intro3>?

	[RECORD DAY and TIME] Call back later		
97	[Don't know]	98	[Refused]

[If <intro3> ≠ <cont1>, else skip to V1]

Intro6. What is your name?

[RECORD FIRST and LAST NAME] V1 98 [Refused]

97 [Don't know]

Verification

START EQUIPMENT BLOCK: Repeat V1 to V3 for each measure that was installed (MEAS_TYPE1, MEAS_TYPE2….MEAS_TYPEx). Programmer note, max repeats = 4.

V1. Just to verify, did you purchase or receive and the following equipment: <MEAS_TYPE1, MEAS_TYPE2, MEAS_TYPE3,..7 etc.> this year?

[If Meas_TYPE X = Air Conditioner Tune-up ONLY then read: <UTILITY> records show you had a/an AC tune-up that was rebated by <UTILITY>. Just to verify, did you have your air conditioner tuned up?]

1	Yes	V2	97	[Don't know]	Intro3
2	No	V1a	98	[Refused]	

V1a. Just to confirm, you did not receive a rebate for < MEAS_TYPE1 to MEAS_TYPEx> from <UTILITY> this year?

1	We received equipment	V2	97	[Don't know]	Intro3
2	We did NOT receive any equipment END Equipment Block		98	[Refused]	

V2. Our records show that the equipment was installed at <site address, city>, is this correct?

1	Yes	V3	97	[Don't know]
2	No		98	[Refused]

V3. Is/are this/these <MEAS_TYPE1 to MEAS_TYPEx> still operational?

1	Yes	END Equipment Block	2	No

97 [Don't know] 98 [Refused]

START LED BLOCK

IF Lighting = Y and LED_QTY>0 then ask L1 Else IF LED="0", end survey.

Next I would like to ask you about the various types of light bulbs you received through the program.

Verification –LED bulbs

[IF LED_QTY > 0, ask L1-L4, else END LED Block]

L1. To verify, did you receive one or more LED light bulbs from <UTILITY> this year?

1 Yes L2 97 [Don't know] L1a

2 No L1a 98 [Refused]

L1a. Just to confirm, you did not receive any LED bulbs from <UTILITY> this year?

1 We received LEDs L1a. 97 [Don't know]

2 We did NOT receive any LEDS END LED Block 98 [Refused]

L2. Our records show that you received <LED_QTY> LED light bulbs. Is this correct?

1 [Yes] L3 97 [Don't know]

2 [No] L2a 98 [Refused]

L2a. How many LED light bulbs did you receive?

1 [Enter quantity] L3 97 [Don't know] L3

2 [None] END LED block 98 [Refused]

3 [Did receive the quantity stated previously] L3

L3. Are you using these LED light bulbs at <address>?

1 [Yes] L4 97 [Don't know]

2 [No]

L4. How many of the LED bulbs provided by the program have been removed, burnt out, given away, or are not being used?

1	[Enter quantity]	End LED Block	97	[Don't know]
2	[All of them]		98	[Refused]
3	[None of them]			

L5. How many of the LEDs installed replaced another type of light bulb such as an incandescent, CFL or LED bulb?

1	[Enter quantity]	L6.	97	[Don't know]
2	[All of them]		98	[Refused]
3	[None of them, all installed in new sockets] End LED block			

L6. What type of light bulb(s) were you using before you installed the LED(s)? [Prompt if needed: Was it the least efficient incandescent (or halogen) bulbs, the lesser efficient CFL bulbs or did you remove an LED?] Circle all that apply

1	[Incandescent or halogen]	L7.	50	[Other]	
2	[CFL]		97	[Don't know]	End LED block
3	[LED]		98	[Refused]	
4	[Mix of INC and CFL]				

L7. What was the wattage of bulb(s) that you removed? (Prompt if needed: 100W, 75W, 60W or 40w or less?) Circle all that apply.

1	[100w or more]End LED Block		4	[20w or below]
2	[75w]		50	[Other]
3	[60w]		97	[Don't know]
4	[40w]		98	[Refused]

Verification –Recycled Small Appliances

[IF MeasType1: "Dehumidifier Recycling or Room AC Recycling or Freezer Recycling" then ask otherwise skip this section (none exist in MeasType2 though 7)

VG0. I have some questions about the equipment you had recycled.

VG1. Our records show your household had <Total_Measure_Cnt > < Measure_Name1>, Measure_Name2, Measure_Name3> recycled. Is that correct number of recycled appliances?

1 [Yes] GOTO VG2c

2 [No] VG2a

97 [Don't know] GOTO Intro3 or T&T

98 [Refused]

VG2a. How many <MeasNameX> were recycled?

[RECORD VERBATIM] If ≠ <MeasNameCountX > the go to GOTO VG2b.

97 [Don't know] VG2c.

98 [Refused]

VG2b. Why were a different number of <MeasNameX> recycled?

[RECORD VERBATIM] VG2c

97 [Don't know]

98 [Refused]

VG2c. Before being recycled, was the <MeasNameX> being stored or used at < Address>?

1 [Address is incorrect – Record correct address] VG2d

2 [Address is correct] R0

97 [Don't know]

98 [Refused]

VG2d. Why were they recycled from a different address?

[RECORD VERBATIM]

RO

97 [Don't know]

98 [Refused]

[Repeat for each <MeasNameX>]

RO. Was/were the <MeasNameCountX or VG2a# > <MeasNameX> you recycled in working condition?

1 [Yes –All] R1

2 [No – none/or only some] R0a.

98 [Refused]

97 [Don't know] R1

R0a. How many <MeasNameX> were in working condition?

[RECORD VERBATIM] R1 98 [Refused]

97 [Don't know]

R1. If the program had not offered the recycling service when it did, would you have still gotten rid of the <MeasNameCountX > <MeasNameX>, or would you have kept it/them?

[PROMPT FOR RESPONSE – READ OPTIONS IF NEEDED]

1 [Gotten rid of it or both] R2 97 [Don't know]

2 [Kept one and got rid of one] 98 [Refused]

3 [Kept it or both] REPEAT VG0-R2 for each MeasNameX ELSE GO

R2. How would you have gotten rid of it/them? [PROMPT FOR RESPONSE – READ OPTIONS IF NEEDED, ACCEPT MULTIPLES IF <MeasNameCountX >=1]

1 [Thrown away / Taken to Landfill] REPEAT VG0-R2 for each MeasNameX ELSE GO TO RO

2 [Taken to recycling center]

3 [Donated to charity]

4 [Have removed by installer of new one]

5 [Sold to used appliance dealer]

6 [Sold to private individual]

7 [Given it to friend/relative/private individual]

8 [Kept it - plugged in]

9 [Kept it - not plugged in]

10 [Disassembled it myself]

11 [Abandon it]

77 [Other (specify)]

97 [Don't know]

98 [Refused]

END_1. Those are all the questions I have for you today.

THANK & TERMINATE

Thank you for your time.

APPENDIX AA. INCOME QUALIFIED TELEPHONE SURVEY

MPPA - Income Qualified Program CATI Survey

Feb 1, 2018

Final 09 Jan 2013

Survey house instructions

1. Text in bold should be read.

2. Text in brackets [ ] are instructions for interviewer, minor programming such as skips, or answer choices and should NOT be read.

3. Text in carrots < > are variables that should be filled in on a case-by-case basis.

4. Text in gray boxes is major programming instruction.

5. Unless specifically noted, do NOT read answer choices. [Don't know] and [Refused] should NEVER be read.

THIS TABLE MAY BE UPDATED ONCE THE SAMPLE DESIGN IS FINALIZED

Database variables

Variable	Definition
	(Unless otherwise noted, the database can contain more than one of each variable per respondent)
ID	DNVGL Unique Identifier
Utility	Customer Utility Name; often same name as the City where they live or presented as an acronym.
Name_1	Customer first name. Some implementer records include both first and last name in Name_1.
Name_2	Customer last name
Site_Address	Address where equipment was installed
City	City where equipment was installed
Phone	If Null – Okay to skip this record.
MeasCount	Sum of measure types given away per household
Other	Y/N indicates whether the recipient received non-lighting measure(s). These may include, Advanced/Smart Power Strip, aerators, pipe wrap. This field will drive the decision to ask the non-lighting battery of questions.

MEAS_QTY1, MEAS_QTY2, etc. Equipment type (non-lighting) and quantity of measure. These measures should be verified when "other" flag = Y and QTY > 0. The individual measure names are included in the column header.

LED_1; LED_2 This is the sum of all LEDs (A-lamp and PAR) distributed to customers that need to be verified. If QTY is greater than 0, the LED battery should be delivered.

NL This is the sum of all LED nightlights distributed to customers that need to be verified. If QTY is greater than 0, the LED nightlight battery should be delivered.

LED Holiday_QTY This is the sum of all LED holiday lights distributed to customers that need to be verified. If QTY is greater than 0, the LED holiday lights battery should be delivered.

Program Name "Income Qualified Program" is the program name. This is primarily a Giveaway (kit/box) that is given or mailed to customers. Some utilities do direct installation performed by the utility's contactor Michigan Energy Options.

NL ENERGY STAR LED Night Light

L1-L3 only

LED Bulb (60 W); (40); (75W); Globe LEDs

LED Holiday Light Strings

V1-V3

Advanced/Smart Power Strip

Bathroom Faucet -Aerator

Shower Head-Aerator

Kitchen-Aerator

Pipe Wrap Insulation

INTRODUCTION

Intro1. May I speak with < Name_1, Name_2>? Hello, my name is _____, and I'm calling on behalf of your electric utility company <Utility>. I would like to ask to you about some energy saving LED light bulbs that were either given to you, mailed to you or previously installed in your home last year.

[IF NEEDED] You may have received a box of energy saving light bulbs either by mail or they could have been given to you in person or installed directly in your home. These were distributed sometime in 2018.

[IF NEEDED] I'm not selling anything; I'd just like to ask your opinions. Your responses will be kept confidential and your individual responses will not be revealed to anyone.

[IF ASKED] You can verify the legitimacy of this research by calling Patrick Devon (517) 323-8919 Ext. 114

1	[AGREES TO PARTCIPATE]	Intro2
2	[DOES NOT AGREE TO PARTCIPATE]	TERMINATE

Intro2. <Utility> records show the program gave away or directly installed energy saving LED light bulbs and may have provided other energy savings improvements to your home. Are you familiar with having received the free light bulbs or other equipment?

[PROMPT IF NEEDED: You may have received LED light bulbs, night lights, low-flow faucet aerators or smart power strips.

1	[Yes]	Intro6	97	[Don't know]
2	[No]	Intro3	98	[Refused]

Intro3. Who could I speak to that would be familiar with the program's offering?

1	[RECORD FIRST and LAST NAME]	Intro4	97	[Don't know]
			98	[Refused]

Intro4. Could I speak with <Intro3> now?

1	[Yes]	Intro1	97	[Don't know]
2	[No]	Intro5	98	[Refused]

Intro5. When is a good time I could call back to reach <Intro3>?

1	[RECORD DAY and TIME] Call back later		97	[Don't know]
			98	[Refused]

[If <intro3> ≠ <name>, else skip to V1]

Intro6. What is your name?

	[RECORD FIRST and LAST NAME]	V1	98	[Refused]
97	[Don't know]			

START "OTHER" EQUIPMENT BLOCK:

IF Other="Y" then Repeat V1 to V4 for each measure that was installed (M1, M2, … Mx)

IF Other="N" then skip to LED Block (L1)

Verification –Other equipment (non-lighting)

V1. Just to verify, did representatives on behalf of <UTILITY> give you or directly install the following equipment <measX>? in 2018?

1	Yes	V2	97	[Don't know]	Intro3
2	No	V1a	98	[Refused]	

V1a. Just to confirm, you did not receive a/an <measX> on behalf of <UTILITY> in 2018?

1	We received equipment	V2	97	[Don't know]	Intro3
2	We did NOT receive any equipment END Equipment Block		98	[Refused]	

V2. Our records show that you received <measX qty>. Is this correct?

1	Yes	V3V4	97	[Don't know]
2	No	V3	98	[Refused]

V3. How many <measX> did you receive?

#	[Enter quantity]	L3VL4	-97	[Don't know]	L3VL4
0	[None] END LED block		-98	[Refused]	
-96	[Did receive the quantity stated previously] L3VL4				

V4. Are you using <measX> at this address?

1	[Yes]	V5	97	[Don't know]
2	[No]			

V5. How many of the <measX> provided by the program have been removed, given away, or are not being used?

Check all that apply.

#	[Enter quantity NOT USED]	V6	-97	[Don't know]	END Equipment Block
0	[All of them ARE NOT USED]	V6	-98	[Refused]	

V65. What did you do with the <measX> that are not being used? [IF NEEDED: Check all that apply.

1	Failed/ no longer work END Equipment Block	4	Thrown away	
2	Gave them away	[50[	Other	
3	Stored in house	[97]	[Don't know]	
		[98]	[Refused]	

END Other (non-lighting) measures Block

Repeat other block for all non-lighting measures installed (M1, M2, … Mx)

START LED BLOCK

IF LED_QTY>0 then ask L1

Else IF LED="0", skip to next section (LED Night Lights)

Next I would like to ask you about the various types of LED light bulbs you received through the program.

Verification –LED bulbs

[IF LED_QTY > 0, ask L1-L4, else END LED Block]

[IF MULTIPLE TYPE OF LEDS THEN REPEAT L2-L7

L1. To verify, did you receive one or more LED light bulbs from <UTILITY> in 2018?

1	Yes	L2	97	[Don't know]	L1a
2	No	L1a	98	[Refused]	

L1a. Just to confirm, you did not receive any LED bulbs from <UTILITY> in 2018?

1	We received LEDs	L2.	97	[Don't know]
2	We did NOT receive any LEDS	END LED Block	98	[Refused]

L2. Our records show that you received <LED_QTY/TYPE> light bulbs. Is this correct?

1	[Yes]	L3	97	[Don't know]
2	[No]	L2a	98	[Refused]

L2a. How many LED light bulbs did you receive?

#	[Enter quantity]	L3	-97	[Don't know]	L3
0	[None]	END LED block	-98	[Refused]	
-96	[Did receive the quantity stated previously] L3				

L3. Are you using these LED light bulbs at your address?

1	[Yes]	L4	97	[Don't know]
2	[No]			

L4. How many of the LED bulbs provided by the program have been removed, burnt out, given away, or are not being used?

[IF NEEDED: Those that are removed, burnt out, given away, or are not being used?] Check all that apply.

			0	[All of them ARE NOT USED]	L5
#	[Enter quantity NOT USED]	L5	-97	[Don't know]	END LED block

-98 [Refused]

L5. What did you do with the LEDs provided by the program that are not being used?

[IF NEEDED: Those that are removed, burnt out, given away, or are not being used?] Check all that apply.

1	[Removed]	L6	50	[Other]
2	[Burned out]		97	[Don't know]
3	[Gave away]		98	[Refused]
4	[Storage]			

L6. How many of the LEDs installed replaced another type of light bulb such as an incandescent, CFL or LED bulb?

#	[Enter quantity]	L7	97	[Don't know]
-90	[All of them]		98	[Refused]
0	[None of them, all installed in new sockets] End LED block			

L7 What type of light bulb(s) were you using before you installed the LED(s)? [Prompt if needed: Was it an incandescent (or halogen) bulb(s), CFL bulb(s) or did you remove an LED (LEDs) ?] Circle all that apply

1	[Incandescent or halogen]	End LED block	4	[Mix of INC and CFL]
2	[CFL]		50	[Other]
3	[LED]		97	[Don't know]
			98	[Refused]

Verification – LED NIGHT LIGHTS

[IF LED Night_QTY> 0, ask NL1-NL3, else END LED Night Lights Block]

[IF <LED> = Y, ask L1-L4, else END Lighting Block]

NL1. Our records show that you received <LED QTY/ NIGHTLIGHTS>. Is this correct?

1	[Yes]	NL2	97	[Don't know]
2	[No]	NL1a	98	[Refused]

NL1a. How many LED night lights did you receive?

#	[Enter quantity]	NL2	-97	[Don't know]	NL2
0	[None]	End LED Night Light Block	-98	[Refused]	
-960	[Did receive the quantity stated previously] NL2				

NL2. Are you using these LED nightlights at this address?

1	Yes	NL3	97	[Don't know]
2	No		98	[Refused]

NL3. How many of the <LED Night_QTY> night light(s), provided by the program, have been removed, given away or are not being used?

#	[Enter quantity NOT USED]	NL45
-960	[All of them ARE NOT USED][None of them]	End Block
-97	[Don't know]	

NL45. What did you do with the night light(s) provided by the program that are not being used?

[IF NEEDED: Those that are removed, burnt out, given away, or are not being used?] Check all that apply.

1	[Removed]	End LED Block	50	[Other]
2	[Burned out]		97	[Don't know]
3	[Gave away]		98	[Refused]
4	[Storage]			

Verification – LED HOLIDAY LIGHTS

[IF LED Holiday_QTY> 0, ask HL1-HL2, else END LED Holiday Lights Block]

HL1. Our records show that you received < QTY /LED Holiday_QTY> strands. Is this correct?

1	[Yes]	HL2	97	[Don't know]
2	[No]	HL1a	98	[Refused]

HL1a. How many strands of LED holiday lights did you receive?

#	[Enter quantity]	HL2	97	[Don't know]	HL2
0	[None]	End LED Holiday Block	98	[Refused]	
90	[Did receive the quantity stated previously] HL2				

HL2. During the holidays, did you use these at your <address>?

1	Yes	HL3	97	[Don't know]	HL3
2	No	HL3	98	[Refused]	

HL3. During the holidays, were the holiday light(s), provided by the program, removed, given away or not used?

1	[Yes all removed, given away, not used] HL4HL45		-97	[Don't know]	HL4END
2	[No, all were installed]	HL4end	-98	[Refused]	
3	[Some removed some installed] HL45				

HL45. What did you do with the holiday light(s) provided by the program that were not used?

1	[Removed]	End LED Block	50	[Other]
2	[Burned out]		97	[Don't know]
3	[Gave away]		98	[Refused]
4	[Storage]			

END SURVEY

THANK & TERMINATE

END_1. Those are all of the questions I have for you today. Thank you for your time.

APPENDIX BB. COMMERCIAL ONSITE SURVEY

Utility Name:	«Program_Name__Program_Name»
Project Name:	
Account_Name	
Site_Address	
Primary_Project_Contact__Full_Na	
Primary_Project_Contact__Phone	
Primary_Project_Contact__Email	

Scheduled Date/time	Scheduled Site Contact	Scheduling Notes
		«Site_Notes»

DNV GL Signature: Date Time

DNVqty	Measure Type: «RetroType1»/«RetroRetroType1»	Measure or Model Detail
«DNVQty1»	**«RetroName1»**	**«DNVDesc1»**
Qty Verified:		
Qty Operational:		
Measure Verified	YES NO	
(comment any notes if any discrepancy from tracking)		
Notes:		

DNVqty	Measure Type: **«RetroType2»/«RetroRetroType2»**	Measure or Model Detail
«DNVqty2»	**«RetroName2»**	**«DNVDesc2»**
Qty Verified:		
Qty Operational:		
Measure Verified	YES NO	
(comment any notes if any discrepancy from tracking)		
Notes:		

DNVqty	Measure Type: **«RetroType3»/«RetroRetroType3»**	Measure or Model Detail
«DNVqty3»	**«RetroName3»**	**«DNVDesc3»**
Qty Verified		
Qty Operational		
Measure Verified	YES NO	
(comment any notes if any discrepancy from tracking)		
Notes:		

APPENDIX CC. LOW INCOME VERIFICATION RATE

DNV GL completed the Low Income Program verification during the 1st quarter of 2018 with all surveys completed by February 14, 2018. The overall weighted verification rate is 48%. The unweighted survey results are presented in Table 21.The table illustrates the type of measures, number of measures and the average verification rate by measure as well as the average installation rate by measure. The results show the majority of customers acknowledge receiving the measures but only approximately half (depending on the measure type 45-57%) installed the measures. The survey asked respondents what they did with the measures provided by the program that are not being used the vast majority stated the measures were "in storage" which implies the measures will be installed eventually.

All respondents received at least three measures, some received four. Measure types included LEDs: 60W equivalent A-style bulbs, globe light bulbs, night lights, and in some cases holiday lights or smart power strips.

The starting sample was 27 customers, one customer was excluded due to an incomplete survey. Due the lower verification rate, DNV GL tested the results by added six additional sample points to identify if the trend of low installation rates persisted. The added sample showed no significantly difference from the primary sample.

Table 21. Low Income Average Verified and Installed by Measure Type

		Unweighted averages	
	n, measures	Average Verification Rate	Average Installation Rate
60W equivalent LEDS	96	97%	57%
Globe LEDS	106	82%	54%
Night Light LEDS	36	90%	45%
Holiday Lighting	28	82%	50%
Smart Power Strips	2	100%	100%

DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.