

**BEFORE THE  
PUBLIC UTILITIES COMMISSION OF OHIO**

In the Matter of the Application of Ohio )  
Edison Company, The Cleveland Electric )  
Illuminating Company, and The Toledo )  
Edison Company For Approval of Their ) Case No. 16-0743-EL-POR  
Energy Efficiency and Peak Demand )  
Reduction Program Portfolio Plans for 2017 )  
through 2019 )

**APPLICATION**

**Introduction**

1. Pursuant to Section 4928.66, Revised Code as amended by Substitute Senate Bill Number 310 (“S.B. 310”) and the Commission’s Rules,<sup>1</sup> Ohio Edison Company (“OE” or “Ohio Edison”), The Cleveland Electric Illuminating Company (“CEI”), and The Toledo Edison Company (“TE” or Toledo Edison”) (collectively, the “Companies”) request approval of their respective Energy Efficiency (“EE”) and Peak Demand Reduction (“PDR”) Plans (the “Proposed Plans”), which are attached hereto as Attachment A.

2. Prior to the development of the Proposed Plans, the Companies recognized that other interested parties have knowledge, experience and expertise with regard to EE and PDR programs and are a valuable part of the development of the Proposed Plans. Therefore, the Companies met with their Ohio Collaborative Group (established prior to the Companies submitting their first EE/PDR Plans in 2009) specifically to request input from and openly share the Companies’ thoughts on the programs and measures to be included in the Proposed Plans. These meetings also included draft projections and information on the development of the Companies’ 2016 Market Potential Study. The Companies actively solicited input and suggestions from the Collaborative Group on the Proposed Plans. Based on feedback received from the Collaborative Group, the Proposed Plans were designed to reflect many of the

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<sup>1</sup> Specifically, Rules 4901:1-39-04, 4901:1-39-05, 4901:1-39-06, and 4901:1-39-07, Ohio Administrative Code.

suggestions received. Some examples are: greater focus on LED lighting; inclusion of hot water circulating pumps in the residential and small enterprise sectors; small business direct install; and analytics-enabled energy efficiency recommendations. Further, as demonstrated in the proposed schedule below, the Companies commit to hosting a technical conference on the Proposed Plans where interested parties will have the opportunity to be briefed on plan details, ask questions and seek further information on the components in the Proposed Plans.

3. On March 31, 2016, the Commission approved the Companies' Stipulated Fourth Electric Security Plan ("Stipulated ESP IV") in Case No. 14-1297-EL-SSO entitled "Powering Ohio's Progress." Included in the comprehensive benefits of Stipulated ESP IV are mechanisms and programs to promote future resource diversity. One of those benefits is the Companies' robust energy efficiency offerings including: (i) reactivation of all programs suspended in the Companies' Amended EE/PDR Portfolio Plans;<sup>2</sup> (ii) expansion of offerings to include best practice ideas from utility peers in Ohio and nationally;<sup>3</sup> and (iii) robust EE/PDR portfolio plan offerings to strive to achieve over 800,000 MWh savings annually subject to customer opt-outs.<sup>4</sup> In addition to meeting the statutory benchmarks, the Proposed Plans meet the provisions of the Stipulated ESP IV.

4. As set forth herein, and in the supporting exhibits and testimony of Denise J. Mullins, George L. Fitzpatrick, Edward C. Miller and Eren G. Demiray, the Companies' Proposed Plans satisfy the Commission's rules and directives,<sup>5</sup> and represent a comprehensive set of cost-effective programs that are designed to meet or exceed the statutory requirements set forth in Section 4928.66, Revised Code, and the provisions included in the Companies'

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<sup>2</sup> Case No. 14-1297-EL-SSO, Third Supplemental Stipulation and Recommendation at Section E III (a) (December 1, 2015) ("Third Supplemental Stipulation").

<sup>3</sup> *Id.*

<sup>4</sup> *Id.* at Section E 3 (b).

<sup>5</sup> *See e.g.*, Rule 4901:1-39-04, Ohio Administrative Code.

Stipulated ESP IV while taking into account the suggestions made by the Collaborative Group. Thus, the Commission should approve this Application and the Proposed Plans.

### **Background and History**

5. Each of the Companies is an electric distribution utility (“EDU”) as that term is defined in Section 4928.01(A)(6), Revised Code.

6. Section 4928.66(A)(1)(a), Revised Code, required an EDU, starting in 2009, to “implement energy efficiency programs that achieve energy savings equivalent to at least three-tenths of one percent of the total annual average, and normalized kilowatt-hour sales of the [EDU] during the preceding three calendar years to customers in this state.” From 2009 to 2014, the Companies’ EE and PDR benchmarks increased annually. In Case Nos. 12-2190-EL-POR, *et seq.*, the Companies filed an application for approval of their EE/PDR portfolio plans for the years 2013-2015, which was approved by the Commission on March 20, 2013 (“Previous EE/PDR Portfolio Plans”).

7. On September 12, 2014, S.B. 310 went into effect. S.B. 310 amended Section 4928.66, Revised Code, which, among other things, amended the Companies’ EE and PDR cumulative benchmarks to 2014 levels for 2015 and 2016. S.B. 310 permitted EDUs in Ohio to amend their existing EE/PDR portfolio plans. On September 24, 2014, the Companies filed an application to amend their existing EE/PDR portfolio plans, which was approved on November 20, 2014 (“Amended EE/PDR Portfolio Plans”). The Companies have been and will continue operating under the Amended EE/PDR Portfolio Plans for 2015 and 2016. Hereinafter, the Companies’ Previous EE/PDR and Amended EE/PDR Portfolio Plans are collectively referred to as “Prior Plans.”

8. Rule 4901:1-39-04, Ohio Administrative Code, requires each EDU to file an “updated program portfolio plan...by the fifteenth of April every third year...unless otherwise directed by the commission.”<sup>6</sup>

### **Benchmark Reports**

9. The Companies have calculated their EE and PDR benchmarks in accordance with the requirements of Section 4928.66, Revised Code. They have appropriately adjusted the energy efficiency savings benchmarks for weather and, for both the EE and PDR benchmarks, the results of mercantile self-directed projects. Although, the Companies may adjust their benchmarks for customers who choose to opt-out pursuant to Section 4928.66(A)(2)(iii), Revised Code, as discussed in the testimony of Company Witness Mullins, the Companies have not done so for purposes of the benchmarks included in the Proposed Plans. However, the Companies will make adjustments to benchmarks going forward to reflect the impacts of customers opting-out of the Proposed Plans.

10. In her testimony, Company Witness Mullins describes the methodologies used by the Companies to produce their estimated benchmarks for 2017 through 2019. Each Company’s baseline and benchmarks are described in Exhibits DJM-1 and DJM-3 of Company Witness Mullins’s Testimony.

### **The Development of the Proposed Plans**

11. Sections 1 and 3 of the Proposed Plans describe the development process for the Proposed Plans, as does the testimony of Company Witness Miller.

### **The Companies’ Proposed Plans**

12. The Companies’ Proposed Plans provide detail as to the Companies’ proposed EE and PDR programs for which the Companies seek Commission approval. Collectively, the proposed programs provide significant opportunities for energy and cost savings for the

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<sup>6</sup> Rule 4901:1-39-04(A), Ohio Administrative Code.

Companies' customers and for the Companies to meet or exceed their statutory EE and PDR benchmarks and provisions of the Stipulated ESP IV in a cost effective manner.

13. Like the Prior Plans, the Proposed Plans include a portfolio of energy efficiency programs targeted to a variety of customer segments, including: (i) Residential-Low Income; (ii) Residential-Other; (iii) Small Enterprise; (iv) Mercantile-Utility; and (v) Governmental. Each of the Proposed Plans passes the Total Resource Cost ("TRC") test on a portfolio basis. Company Witness Miller provides more detail on both the proposed programs and the TRC calculations.

14. Each of the Proposed Plans includes components reflected in the Companies' Previous EE/PDR Portfolio Plans and comply with the EE and PDR provisions of the Stipulated ESP IV. The Companies have also expanded offerings and made changes in an effort to provide customers with more opportunities for energy and related cost savings and the Companies with more implementation flexibility to improve their ability to meet the EE and PDR benchmarks. For example, many of the programs include new measures and expanded end-uses, which enhance the program offerings to the Companies' customers. Similar to the Companies' Prior Plans, the Proposed Plans also are similar in design and format to FirstEnergy's other utilities outside of Ohio which allow the Companies to continue to: (i) capitalize on the economies of scale and synergies created through common plan administration and program implementation activities; (ii) simplify evaluation, measurement and verification ("EM&V") and program performance evaluations; and (iii) streamline program tracking and reporting, which collectively contributes to lower overall administrative costs.

### **Residential Programs**

15. The Companies' residential programs are described in Table 6 and Section 3.2 of the Proposed Plans. The Companies request approval of the following residential programs that the Companies have implemented and have not changed from the Amended EE/PDR Portfolio Plans:

- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to Section 4928.662, Revised Code.
- **Direct Load Control Program.** – a continuation of the existing program which controls residential customers’ air conditioning by cycling usage during peak demand periods.

16. The Companies request approval of the following residential programs that the Companies have changed from either the Previous or Amended EE/PDR Portfolio Plans as discussed below:

- **Appliance Turn-In Program** – a reactivation of the program from the Previous EE/PDR Portfolio Plans with the following change:
  - Added dehumidifiers.
- **Energy Efficient Homes Program** - a reactivation of the “Home Performance Program” from the Previous EE/PDR Portfolio Plans with the following changes:
  - Increased focus on LEDs for both EE Kits and School Education;
  - Added a Smart Thermostat sub-program that will deploy advanced smart thermostats to optimize operation of customer HVAC equipment;
  - Added manufactured homes to the New Homes sub-program; and
  - Expanded the Audits sub-program to target multi-family residences and manufactured homes.
- **Energy Efficient Products Program** - a reactivation of the program from the Previous EE/PDR Portfolio Plans with the following changes:

- Added efficient clothes dryers to the Appliances sub-program;
  - Added imaging equipment and emerging home technologies to the Consumer Electronics sub-program;
  - Increased focus on LEDs and added lighting controls to the Lighting sub-program; and
  - Added packaged terminal heat pumps (“PTHP”), air conditioners (“PTAC”), circulation pumps and programmable/smart thermostats to the HVAC sub-program.
- **Low Income Energy Efficiency Program** – an expansion of the “Low Income Program” from the Amended EE/PDR Portfolio Plans to include two sub-programs as follows:
    - Continuation and expansion of the Community Connections program as a sub-program that will be administered by the Ohio Partners for Affordable Energy (“OPAE”), as approved in the Companies’ Stipulated ESP IV; and
    - Added a Low-Income New Homes sub-program to encourage the construction of new energy efficient housing or major rehabilitation of existing housing in the low income sector through the application of building shell, installed measures, and other related building improvements.

### **Small Enterprise Programs**

17. The Companies’ small enterprise programs are described in Table 8 and Section 3.3 of the Proposed Plans. The Companies request approval of the following Small Enterprise

program that the Companies have implemented and have not changed from the Amended EE/PDR Portfolio Plans:

- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken outside of utility-administered programs pursuant to Section 4928.662, Revised Code.

18. The Companies further request approval of the following Small Enterprise programs that the Companies have changed from the Previous EE/PDR Portfolio Plans as discussed below:

- **C&I Energy Solutions for Business Program -Small** - a reactivation and consolidation of the C&I Energy Efficient Equipment Program – Small and the C&I Energy Efficient Buildings Program – Small. The following changes to the previous program have been made:
  - Added circulation pumps to the HVAC sub-program;
  - Expanded program offerings to include Smart Thermostats;
  - Increased focus on LED applications in the Lighting sub-program;
  - Added beverage machines to the Food Service sub-program;
  - Added dehumidifiers to the Appliance Turn-In sub-program;
  - Added efficient clothes dryers to the Appliances sub-program;
  - Added Consumer Electronics sub-program with new measures;
  - Added new sub-program and measures for Agricultural customers;
  - Added dedicated sub-program for the Data Center customer sector and for Retro – Commissioning;



- Expanded audit offerings to include audits with direct install measures and multifamily audits; and
- Expanded services provided under the Audits & Education sub-program to include energy manager, benchmarking, and behavioral offerings to increase energy education and awareness.

### **Mercantile-Utility (Large Enterprise) Programs**

19. The Companies' mercantile-utility (large enterprise) programs are outlined in Table 10 and Section 3.4 of the Companies' Proposed Plans. The Companies request approval of the following Large Enterprise programs that the Companies have implemented and have not changed from the Amended EE/PDR Portfolio Plans:

- **Demand Reduction Program** – a continuation of the existing program which captures demand reduction resulting from the Companies' Rider ELR as included in the Companies' Stipulated ESP IV; and from PJM participating demand resources or other contracted demand resources.<sup>7</sup>
- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to Section 4928.662, Revised Code.

20. The Companies further request approval of the following Large Enterprise program that the Companies have changed from the Previous EE/PDR Portfolio Plans:

- **C&I Energy Solutions for Business Program -Large** - a reactivation and consolidation of the C&I Energy Efficient Equipment Program – Large and the

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<sup>7</sup> Section 4928.662(A), Revised Code "...including resources associated with such savings or reduction that are recognized as capacity resources by the regional transmission organization operating in Ohio...shall count toward compliance with the energy efficiency and peak demand reduction requirements."

C&I Energy Efficient Buildings Program – Large. The following changes to the previous program have been made:

- Added packaged terminal heat pumps (“PTHP”) and air conditioners (“PTAC”) to the HVAC sub-program;
- Increased focus on LED applications in the Lighting sub-program;
- Added dedicated sub-program for the Data Center customer sector and for Retro – Commissioning; and
- Expanded services provided under the Audits & Education sub-program to include energy manager, benchmarking, and continuous improvement offerings to increase energy education and awareness.

### **Government Programs**

21. The Companies’ government programs are outlined in Table 12 and Section 3.5 of the Proposed Plans. The Companies request approval of the Government Tariff Lighting Program, which is a reactivation of the Government Tariff Lighting Program from the Previous EE/PDR Portfolio Plans, which includes LED Traffic Signals and Street & Area Lighting, and a continuation of the Experimental Company-Owned LED Lighting Program, currently pending approval from the Commission in Case No. 16-0470-EL-ATA, from the Amended EE/PDR Portfolio Plans.

### **New Program**

22. The Companies are seeking approval of a new program - the Energy Special Improvement District (“ESID”). The ESID is a program where Ohio townships and municipalities can create ESIDs to offer constituents Property Assessed Clean Energy (“PACE”) financing to install qualified energy improvements, pursuant to Section 1710.061, Revised Code. This new program captures the energy savings from these improvements. The Companies will seek approval for inclusion of the savings associated with these projects through separate

dockets. No costs associated with this program are included in the budgets set forth in the Proposed Plans.

### **Other Programs Addressed in Other Dockets**

23. As discussed above, the Proposed Plans include the Community Connections sub-program that was approved in the Companies' Stipulated ESP IV and the LED Street lighting Tariff pending in another docket as referenced above. The Proposed Plans also include the Mercantile Customer Program, the Transmission and Distribution ("T&D") Upgrades Program and the Smart Grid Modernization Initiative Program. These programs are included in the Proposed Plans as part of the Companies' strategy for compliance with statutory EE and PDR benchmarks. Because these programs are either permitted by statute, have already been approved by the Commission or will be included if approved by the Commission in separate dockets, with the exception of the administrative budget described below, no further approval is necessary in this docket.

24. The Mercantile Customer Program is a continuation of the existing Mercantile Self-Direct program, only with a different name and reactivation of the rebate option. This program targets mercantile customer energy efficiency projects implemented from January 1, 2014 through the end of the Plan Period, incenting customers to commit their projects implemented prior to the Plan Period, or otherwise incenting them to invest in energy efficient projects during the Plan Period. Applications for approval of mercantile customer-sited projects are separately filed with the Commission in individual dockets with incentives paid to customers (and recovered by the Companies through the Companies' Riders DSE) or exemptions, both of which are approved in those individual dockets. Accordingly, the budgets set forth in the Proposed Plans do not include any costs for these incentives, but do include costs associated with the administration of this program.

25. The Companies' existing T&D Program is continuing in the Proposed Plans, but under the new name – T&D Upgrades Program, which accumulates the savings achieved through various T&D projects. These projects involve various system improvements that, when made, reduce line losses, which result in a more efficient delivery system. The Companies seek approval for inclusion of the savings associated with these projects through separate dockets. The budgets set forth in the Proposed Plans do not include any costs for undertaking these projects, but do include costs associated with the administration of this program.

26. The Smart Grid Modernization Initiative Program was approved in Case No. 09-1820-EL-ATA *et al.* and was part of the Department of Energy Smart Grid Investment Grant Program. The pilot program is studying the impact of smart grid technologies on the distribution system and includes Distribution Automation (“DA”), Integrated Volt Var Controls (“IVVC”) and Advanced Metering Infrastructure (“AMI”) deployment in a 36-circuit area located in CEI's service territory. As part of the Stipulated ESP IV, the Companies committed to filing a Grid Modernization Business Plan that included various scenarios of additional AMI, DA and IVVC. Should the Companies receive approval for additional deployment of the smart grid technology, EE and PDR savings from that deployment would be included in this program. Information on the Grid Modernization Business Plan can be found in Case No 16-0481-EL-UNC. No costs associated with this program are included in the budget set forth in the Proposed Plans.

### **Waiver Requests**

27. The Commission's proposed EE and PDR template as set forth in Case No. 09-714-EL-UNC,<sup>8</sup> calls for the reporting of data using seven customer classifications. However, these seven classifications do not directly correlate to the organization of the Companies' tariffs and billing systems. If the final template mandates the use of classifications that are different

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<sup>8</sup> *In the Matter of the Adoption of a Portfolio Plan Template for Electric Utility Energy Efficiency and Peak-Demand Reduction Programs*, Case No. 09-714-EL-UNC.

from the customer sectors utilized in the Proposed Plans, the Companies could be required to make systematic and costly changes to their accounting and billing systems.

28. As shown in the Proposed Plans, and as described in the testimony of Company Witnesses Mullins and Miller, the Companies have allocated forecasted usage and program costs to customer sectors in a format intended to most closely resemble the draft template's classifications, without incurring the costs to modify their accounting and billing systems. Thus, the customer classifications utilized in the Companies' Proposed Plans are the most cost-effective presentation of the relevant information for consideration by the Commission and interested parties.

29. The Companies request a waiver of any informational requirements that are inconsistent with the presentation of such information as set forth in the Proposed Plans.

30. Rule 4901:1-39-05(C), Ohio Administrative Code, requires the Companies to submit their compliance filing by March 15 of each year. However, in an Entry in Case No. 16-0072-EL-WVR,<sup>9</sup> the Commission granted the Companies' request for a waiver of this rule and authorized the Companies (and all other EDUs) to file their Annual Status Reports by May 15<sup>th</sup> of each year. The Commission's Entry in that case only authorized the two-month extension of the filing deadline through the filing in 2018. Since the Plan Period for the Proposed Plans will end on December 31, 2019, the Companies are requesting that, absent a change to Rule 4901:1-39-05(C), Ohio Administrative Code, the waiver and two-month filing extension granted by the Commission be extended one more year through 2019. As the Companies have explained in the past, compliance with this deadline is difficult because the data necessary for the report must first be collected and studied and then collated into the necessary format. However, certain underlying participation data is not available from the program participants until February or

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<sup>9</sup> *In re the Joint Application of [the Companies] for Waiver with Regard to OAC 4901:1-39-05(C)*, Case No. 16-0072-EL-WVR, Entry (Feb. 24, 2016).

March of each year. Program data is often compiled by a contractor, a retailer, or a coupon processor, who must then relay the information to the Companies' implementation vendors who validate and summarize the data for use by the Companies and the Companies' Independent Evaluator for reporting purposes. The process imposes a natural delay and there is no alternative means by which to hasten this process. Further, the granting of the Companies' request for the extension of the waiver and the corresponding two month filing extension through 2019 would be consistent with Staff's recommendation to permanently change the filing deadline to May 15<sup>th</sup> as set forth in Case No. 13-651-EL-ORD.

### **Cost Recovery**

31. As provided for by Section 4928.66, Revised Code, the Companies are authorized to recover the costs of their Proposed Plans. The structure and function of the Companies' cost-recovery mechanism – the Demand Side Management and Energy Efficiency Riders (“Riders DSE”) – has already been approved by the Commission. The Companies are not seeking to modify their Riders DSE in this proceeding. Additionally, consistent with previous Commission orders, lost distribution revenue and any shared savings resulting from the Shared Savings Mechanism included in the Proposed Plans will also flow through this Rider. Further, any revenues received for participation in the PJM Reliability Pricing Model capacity auctions for the Companies' EE and PDR resources, net of the PJM revenue sharing, costs, and/or penalties, will be credited against program costs in the Rider. Section 7 of the Proposed Plans and Company Witness Demiray discuss the Shared Savings Mechanism and PJM Bidding Strategy included in the Proposed Plans.

### **Future Modifications of the Proposed Plans**

32. As the Commission recognized in its Entry in Case Nos. 16-574-EL-POR, 16-576-EL-POR and 16-649-EL-POR (waiver requests by various EDUs), modifications of

EE/PDR portfolio plans may be necessary as a result of future changes in law or rules.<sup>10</sup> Therefore, the Companies reserve the right to modify their Proposed Plans as a result of future changes in law or rules or events outside of the Companies' control.

33. In addition, given that the Proposed Plans are dependent on some of the provisions of Stipulated ESP IV, the Companies reserve the right to modify their Proposed Plans as a result of any changes to the Stipulated ESP IV or further orders.

### **Schedule for Commission Review**

34. The Companies have proposed a procedural schedule that will permit the Commission to issue an order prior to September 30, 2016 so as to avoid any potential delay in implementing the Proposed Plans on January 1, 2017. The procedural schedule proposed by the Companies is reasonable given the fact that: (i) the Proposed Plans are generally extensions of the Prior Plans, only with additional measures, many of which were requested by members of the Collaborative Group; (ii) the Companies have, on several occasions, already discussed with the Collaborative Group the program and measure mix that they intended to include in the Proposed Plans; (iii) the Companies have already provided an overview of the Proposed Plans; and (iv) the Companies are offering to host a technical workshop after all parties have had time to review the Proposed Plans after filing so as to provide interested parties with an opportunity to ask questions and gain a better understanding of how calculations were made, and how results were derived. In light of the foregoing, the Companies hereby propose the procedural schedule set forth below for the review of the Application and request a waiver of any Commission rule which would result in a contrary and lengthier procedural schedule. This proposed schedule is similar to the procedural schedule used for the Companies' Previous EE/PDR Portfolio Plans. Further, certain elements discussed as part of the Proposed Plans have already been approved in the Companies' Stipulated ESP IV case, which reduces the number of elements subject to review

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<sup>10</sup> Case Nos. 16-574-EL-POR, 16-576-EL-POR and 16-649-EL-POR, Entry at 4 (April 7, 2016).

in this proceeding. The Companies request the adoption by the Commission of the following procedural schedule for use in this proceeding:

Companies File Proposed Plans:	April 15, 2016
Company-Sponsored Technical Conference:	May 9, 2016
Objections and Motions to Intervene Due:	May 30, 2016
Intervenor Testimony Due:	June 13, 2016
Intervenor Discovery Deadline (Other than Depositions):	June 13, 2016
Company Discovery Deadline (Other than Depositions):	June 20, 2016
Evidentiary Hearings:	Week of July 11, 2016
Briefs and Reply Briefs Due:	As agreed at close of hearing
Commission Order Issued:	By September 30, 2016

### **Conclusion**

35. As discussed above, the Companies, as a part of the Stipulated ESP IV are striving to promote future resource diversity. The filing of the Proposed Plans is an important step toward that goal. The Companies have reflected valuable insights from many parties in the development of the Proposed Plans. The Companies look forward to working with all interested parties in moving the Proposed Plans forward.

36. Based upon this Application and the supporting materials and testimony filed herewith, the Companies respectfully request that the Commission adopt the procedural schedule proposed herein and approve this Application and issue an Opinion and Order no later than September 30, 2016 that: (i) approves the Companies' Proposed Plans, finding them to be just, reasonable, and consistent with statutory requirements and Commission directives; (ii) approves the requested waiver regarding customer classifications and presentation of information to the extent such information is presented in a format inconsistent with that which may be required upon approval of a final reporting template; (iii) approves the requested waiver of the



compliance filing deadline; and (iv) authorizes the Companies to recover all costs identified in the Proposed Plans through their respective Riders DSE, finding all such costs to be just and reasonable.

Respectfully submitted,

/s/ Carrie M. Dunn

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AND THE TOLEDO EDISON COMPANY



Ohio Edison Company  
The Cleveland Electric Illuminating Company  
The Toledo Edison Company

**Energy Efficiency & Peak Demand Reduction  
Program Portfolio Plans**

**(For the Period January 1, 2017 through December 31, 2019)**

Case No. 16-0743-EL-POR

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#### ***1.1. Summary describing the electric utility's Energy Efficiency and Peak Demand Reduction ("EE/PDR") Program Portfolio Plans ("Plans") to meet or exceed the statutory benchmarks for EE/PDR reductions.***

On September 12, 2014, Substitute S.B. 310 ("S.B. 310") became effective, revising, among other things, Chapter 4928 of the Ohio Revised Code ("R.C."). The amendment included the revision of the statutory percentage benchmark reductions in energy consumption and peak demand originally established in Am. Sub S.B. 221 ("S.B. 221"). These benchmarks are set forth in R.C. 4928.66(A)(1)(a) and (b). For the period January 1, 2017 through December 31, 2019 ("Plan Period"), electric distribution utilities ("EDUs") are required to achieve incremental annual savings of one percent of the baseline and are required to achieve peak demand reductions based on an additional seventy-five hundredths of one percent reduction from the 2016 requirements. Based on these requirements, the cumulative percentage EE/PDR Benchmarks are as follows:

**Table 1: S.B. 310 Percentage EE/PDR Benchmarks**

Year	Energy Consumption MWh	Peak Demand kW
2017	5.20%	5.50%
2018	6.20%	6.25%
2019	7.20%	7.00%

The Public Utilities Commission of Ohio ("Commission") adopted rules that address, among other things, an EDU's compliance with, and measurement and reporting of, a utility's energy efficiency ("EE") and peak demand reduction ("PDR") results ("Rules").<sup>1</sup> Pursuant to R.C. § 4928.66 and the related Rules, Ohio Edison Company ("Ohio Edison" or "OE"), The Cleveland Electric Illuminating Company ("CEI" or "CE") and The Toledo Edison Company ("Toledo Edison" or "TE") (collectively, the "Companies") developed an energy efficiency and peak demand reduction ("EE/PDR") strategy that is designed to exceed their respective benchmarks and to comply with the provisions in the in the Companies' Stipulated Fourth Electric Security Plan ("Stipulated ESP IV") as approved by the Commission on March 31, 2016.<sup>2</sup> The Companies strived to develop Plans that are consistent throughout the Companies' service territories.

Based on the above benchmarks, the aggregate MWh and MW reduction requirements for the Companies as a whole are as follows:

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<sup>1</sup> See generally, § 4901:1-39-01 et seq., Ohio Admin. Code.

<sup>2</sup> Case No. 14-1297-EL-SSO, Opinion and Order (March 31, 2016).



## 1.0 OVERVIEW OF PLANS

**Table 2: Total FirstEnergy Ohio S.B. 310 EE and PDR Reduction Requirements**

Year	Energy Efficiency Benchmarks Percentage	Required Energy Efficiency Savings MWh <sup>1</sup>	Peak Demand Reduction Benchmarks Percentage	Required Peak Demand Reductions MW <sup>1</sup>
2017	5.20%	2,763,149	5.50%	603.9
2018	6.20%	3,249,627	6.25%	688.4
2019	7.20%	3,772,229	7.00%	768.3

Note 1: Values shown represent cumulative requirements

Each company's individual requirements are:

**Table 3: S.B. 310 Baselines and Benchmarks for the Period 2017 - 2019**

Year	Energy Efficiency Baseline MWh <sup>2</sup>	Energy Efficiency Benchmarks Percentage	Required Energy Efficiency Savings MWh <sup>1</sup>	Peak Demand Reduction Baseline MW <sup>2</sup>	Peak Demand Reduction Benchmarks Percentage	Required Peak Demand Reductions MW <sup>1</sup>
<b>Ohio Edison</b>						
2017	23,897,849	5.20%	1,242,688	5,016	5.50%	275.9
2018	23,352,582	6.20%	1,447,860	5,072	6.25%	317.0
2019	23,310,890	7.20%	1,678,384	5,053	7.00%	353.7
<b>Cleveland Electric Illuminating</b>						
2017	18,754,732	5.20%	975,246	3,864	5.50%	212.5
2018	18,574,168	6.20%	1,151,598	3,859	6.25%	241.2
2019	18,537,490	7.20%	1,334,699	3,852	7.00%	269.6
<b>Toledo Edison</b>						
2017	10,484,896	5.20%	545,215	2,100	5.50%	115.5
2018	10,486,596	6.20%	650,169	2,083	6.25%	130.2
2019	10,543,694	7.20%	759,146	2,072	7.00%	145.0

Note 1: Values shown represent cumulative requirements

Note 2: Values shown do not include opt outs

The figures in Table 2 and 3 represent the Companies' planning benchmarks as required by Rule 4901:1-39-05. They have been calculated consistent with this Rule's requirements and the provisions of R.C. §4928.66(A)(2)(c). These benchmarks are based on information provided in the Companies' April 15, 2016 Long-Term Forecast Report in Case No. 16-582-EL-FOR ("LTFR") in PUCO Form FE-D1 and D3, adjusted for weather and the results of mercantile customer self-directed projects that have been filed with the Commission as of December 31, 2015. The three year rolling average energy efficiency baselines for years 2017, 2018, and 2019, upon which the energy efficiency benchmarks and peak demand reduction benchmarks are based, are also shown in Table 3. These benchmarks have been established for planning purposes and will be adjusted, as necessary, in the Companies' annual filings that are required by the Commission. Note that

these values do not include any assumptions for customers choosing to opt out of programs, and actual benchmarks will be impacted by such customers.<sup>3</sup>

The programs outlined in these Plans were designed based on the Companies' four primary goals: (i) comply with statutory requirements; (ii) comply with the energy efficiency and demand response related provisions from the Companies' Stipulated ESP IV (iii) provide programs for each of the major customer classes; and (iv) develop a portfolio that provides implementation flexibility. As indicated below, these Plans contemplate a suite of EE/PDR programs for all major customer segments. It is generally a continuation of programs as approved by the Commission on March 20, 2013 in Case No. 12-2190-EL-POR ("Previous EE/PDR Portfolio Plans") *et al*, and a reactivation of programs previously suspended in the Companies' Amended Plans ("Amended EE/PDR Portfolio Plans")<sup>4</sup> collectively referred to as "Prior Plans;" as well as an expansion of offerings to include stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally. The programs proposed in these Plans include the following:

### Residential Programs:

- Appliance Turn-In Program;
- Low-Income Program;
- Direct Load Control Program;
- Energy Efficient Products Program;
- Energy Efficient Homes Program; and
- Customer Action Program – Residential.

### Small Enterprise Programs:

- C&I Energy Solutions for Business Program – Small; and
- Customer Action Program – Small C&I.

### Mercantile-Utility (Large Enterprise) programs:

- C&I Energy Solutions for Business Program – Large;
- Customer Action Program – Large C&I; and
- Demand Reduction Program – Large C&I.

### Government Program:

- Government Tariff Lighting Program.

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<sup>3</sup> Consistent with R.C. 4928.66 (A) (2) (a) (ii)

<sup>4</sup> On September 24, 2014, the Companies filed an application to amend their existing EE/PDR portfolio plans, which was approved on November 20, 2014 ("Amended EE/PDR Portfolio Plans"). The Companies have been operating under the Amended EE/PDR Portfolio Plans for 2015 and 2016.

## 1.0 OVERVIEW OF PLANS

Other Programs:

- Mercantile Customer Program;
- Transmission & Distribution Upgrades;
- Smart Grid Modernization Initiative; and
- Energy Special Improvement District Program.

Below is a table that details how the Companies' programs included in Prior Plans align with the programs proposed in these Plans:

**Table 4: Prior & New Programs**

Prior and New Programs	
Prior Program	New Program
<b>Residential Programs</b>	
Appliance Turn-In Program	Appliance Turn In Program
Home Performance Program	Energy Efficient Homes Program
Energy Efficient Products Program	Energy Efficient Products Program
Direct Load Control Program	Residential Demand Response Program
Customer Action Program	Customer Action Program - Res
<b>Residential Low-Income Programs</b>	
Low Income Program	Low Income Energy Efficiency Program
<b>Small Enterprise Programs</b>	
C&I Energy Efficient Equipment Program - Small	C&I Energy Solutions for Business Program - Small
C&I Energy Efficient Buildings Program - Small	
Customer Action Program	Customer Action Program - SCI
<b>Large Enterprise (Mercantile Utility) Programs</b>	
C&I Energy Efficient Equipment Program - Large	C&I Energy Solutions for Business Program - Large
C&I Energy Efficient Buildings Program - Large	
Demand Reduction Program	C&I Demand Response Program - Large
Customer Action Program	Customer Action Program - LCI
<b>Government Programs</b>	
Government Tariff Lighting Program	Government Tariff Lighting Program
<b>Other Programs</b>	
Mercantile Customer Program	Mercantile Customer Program
T&D Improvements	Transmission & Distribution Upgrades
Smart Grid Modernization Initiative	Smart Grid Modernization Initiative
N/A	Energy Special Improvement District

The successful implementation of these Plans are projected to generate Total Discounted Lifetime Benefits of approximately \$472 million for OE, \$338 million for CEI, \$178 million for TE which result in scores of the Total Resource Cost ("TRC") test of 1.6 for OE, 1.7 for CEI, 1.7 for TE.<sup>5</sup>

The total proposed costs for these programs during the Plan Period are \$156 million for OE, \$110 million for CEI, \$57 million for TE for a total of \$323 million for the Companies as reported in PUCO Table 3 in Appendix C-4 and Appendix B-1. Actual costs incurred will be recovered through the Companies' Rider DSE, which has already been approved by the Commission

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<sup>5</sup> See Section 8.0 for a discussion on the TRC test.

## 1.0 OVERVIEW OF PLANS

The Companies have prepared an EE/PDR strategy as reflected in these Plans that balances near-term energy savings opportunities among all rate classes with longer-term programs that continue to create jobs and build capacity for delivering greater energy and demand reduction impacts in the future. The result of these efforts is a comprehensive set of programs that, if approved as filed, will enable the Companies to comply with R.C. § 4928.66 requirements and exceed the energy savings and peak demand reduction goals set forth in Table 3, and to meet the provisions in the Companies' Stipulated ESP IV.

Table 5 shows the number of customers and sales or revenues that make up each Company's major customer segments addressed in these Plans.

**Table 5: Customer Class Characteristics**

Sector	# of Customers	MWh	MW
<b><i>Ohio Edison</i></b>			
Residential (Excluding Low-Income)	843,666	8,115,049	1,974
Residential Low-Income	77,775	748,102	182
Small Enterprise	109,845	6,479,742	1,702
Mercantile-Utility (Large Enterprise)	1,471	8,301,536	1,347
Governmental	504	38,542	3
<b>Total</b>	<b>1,033,261</b>	<b>23,682,971</b>	<b>5,209</b>
<b><i>Cleveland Electric Illuminating</i></b>			
Residential (Excluding Low-Income)	610,128	4,872,886	1,167
Residential Low-Income	56,864	454,153	109
Small Enterprise	78,935	6,423,182	1,667
Mercantile-Utility (Large Enterprise)	616	6,524,816	1,007
Governmental	1,812	137,895	0
<b>Total</b>	<b>748,355</b>	<b>18,412,932</b>	<b>3,950</b>
<b><i>Toledo Edison</i></b>			
Residential (Excluding Low-Income)	247,683	2,169,610	607
Residential Low-Income	25,182	245,550	69
Small Enterprise	35,020	1,973,173	547
Mercantile-Utility (Large Enterprise)	472	6,180,856	862
Governmental	1,019	51,147	0
<b>Total</b>	<b>309,376</b>	<b>10,620,336</b>	<b>2,086</b>

Forecasted 2017 usage from the LTFR has been assigned to five categories: (i) Residential Other; (ii) Residential Low Income; (iii) Small Enterprise; (iv) Mercantile-Utility; and (v) Governmental.<sup>6</sup> Residential Customers taking service under the RS tariff were split between "Residential" and "Residential

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<sup>6</sup> Although the Commission has preliminarily indicated a preference for information to be provided for customer segments different from that set forth in Table 5, (*see* Docket No. 09-0714-EL-UNC), the Companies do not track data in a manner that would allow them to present the data in the format requested by the Commission. In light of this, the Companies have attempted to present the data in a format that most closely resembles that requested by the Commission. *See* the Companies' comments filed on September 11, 2009, September 14, 2009, and September 18, 2009 in the above-referenced docket for a more detailed explanation.

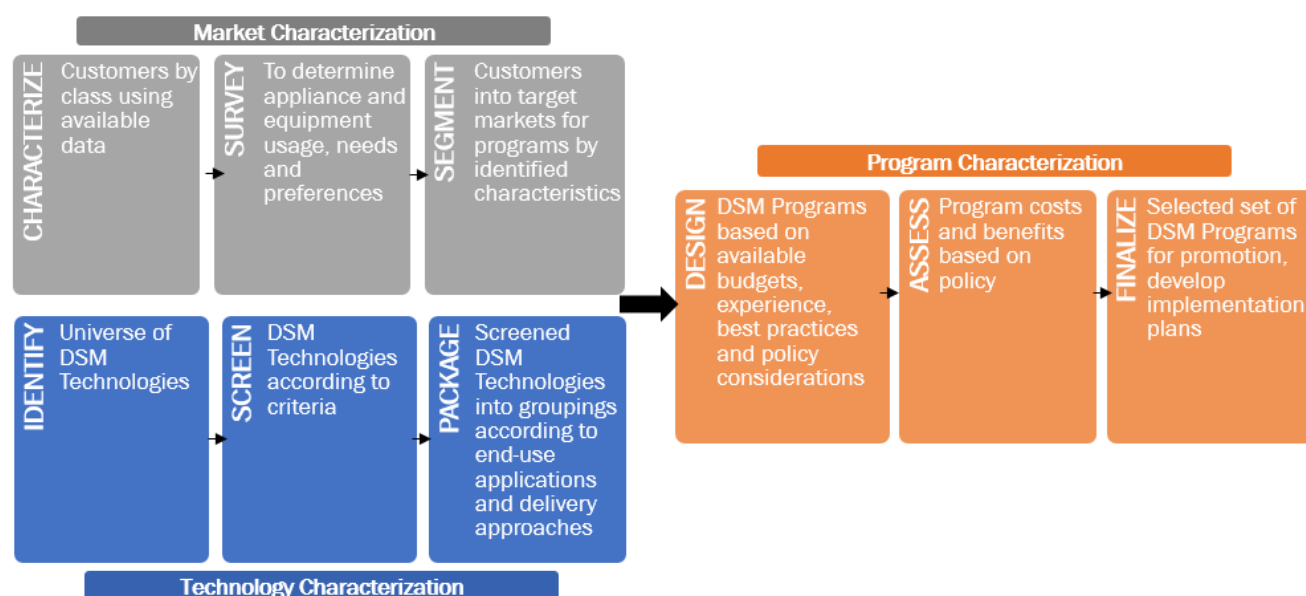
Low Income”. Because the Companies do not separately track (and therefore has no way to distinguish between) “Residential Low Income” customers and “Residential” customers, those customers who were enrolled in the Percentage of Income Payment Program (“PIPP”) as of January 2016 were used as a proxy for the low income category. For purposes of this plan, the Small Enterprise group consists of small commercial and industrial (“C&I”) customers who are taking service on the General Service Secondary Rate schedule (“GS”). The Mercantile-Utility group consists of large C&I customers taking service on the General Service Primary (“GP”), General Service Sub-transmission (“GSU”), and General Service Transmission (“GT”) rate schedules. The Governmental group consists of customers on the Street Lighting (“STL”) and Traffic Lighting (“TRF”) rate schedules. Customers were assigned to these categories based on available information in the Companies’ billing systems.

### 1.2. Summary of the process used and key assumptions made to develop the Plan

#### Process

Figure 1, below illustrates the process undertaken to develop these Plans. The Market Potential Study which was an integral tool in the development of the Plans is included in Appendix D.

**Figure 1: FirstEnergy EE/PDR Plan Development Process**



The Companies’ plan development approach balances key sources of information:

- Program experience and results, captured through implementation of the previous portfolio of programs, similar programs in other jurisdictions, and best practice ideas from utility peers in Ohio and nationally;
- Industry experience provided by the Companies’ Energy Efficiency consultants, contractors and program administrators;
- Customer attitudes and preferences obtained through mail, email and telephone surveys and interviews conducted as part of the 2016 Market Potential Study; and

- External stakeholder experience and opinions captured through a collaborative process<sup>7</sup>

Collaborative Group members' input was obtained through a series of meetings, followed by conference calls and e-mail communications with interested organizations.

To capture customer data, the Companies commissioned primary market research, with approximately 300 completed phone surveys of C&I customers, 600 completed phone surveys of residential customers, and an additional 3,180 on-line surveys of residential customers. Additionally, interviews were held with Managed Account and National Account representatives along with additional direct surveys to selected large managed accounts to capture needed energy related information on the Companies' largest customers. The resulting survey data was analyzed and informed the Market Potential Study.

The program portfolio design team considered numerous EE/PDR measures and practices, identified by the Companies' Plan development team, Collaborative Group, energy efficiency consultants, other stakeholders including the Companies' implementation team. This review also considered programs being offered by both Ohio utilities and utilities in other jurisdictions, as well as programs, measures and practices identified from industry reports and awards such as the American Council for an Energy Efficiency Economy ("ACEEE"), the Midwest Energy Efficiency Alliance ("MEEA"), and the Association of Energy Service Professionals ("AESP").

When developing the model, the program portfolio design team worked with its energy efficiency consultant to determine certain modeling assumptions, which are discussed in more detail below. The team also relied upon its experience in managing the previous or existing suite of EE/PDR programs as well as its experience in providing similar programs offered by the Companies' sister utilities in other jurisdictions to develop certain model inputs. Other model inputs were based on market survey results, and input from the EE/PDR implementation team.

The program portfolio development team used an iterative process to refine and complete the modeling that included reviewing the projected results for each program and measure and reviewing the results with its energy efficiency consultants and implementation team. This review included assessing the reasonableness of the projected results based on potential in the market, potential customer participation, estimated costs and potential savings. Values for market potential were based on the results set forth in the Market Potential Study. Estimated program participation values were informed by program implementation experience through the Prior Plans, the implementation of sister utility programs in other jurisdictions and the experiences of the Companies' energy efficiency consultants with other utility programs throughout the country. Program energy savings projections were predominantly based upon the protocols included in the Ohio Technical Reference Manual ("TRM") or Pennsylvania TRM. In certain cases, the protocols were

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<sup>7</sup> The Companies' utilized a collaborative process in which interested parties met with the Companies to discuss the development of the Programs included in the Companies' Plans ("Collaborative Group"). This Collaborative Group process is discussed in Section 3.1.5 of the Plan.

adjusted to incorporate recent or current industry information.<sup>8</sup> To a lesser degree, other industry sources or Companies' assumptions including historical program or evaluation results for similar programs were used as the basis of the savings projections.

### **Assumptions and Priorities**

There are both portfolio based and program/measure specific assumptions that must be made when modeling the programs included in this Plan. For overall compliance purposes, this Plan recognizes that if it exceeds its targets in any given year, the excess will be banked and will be applied towards future years' compliance either during or subsequent to the Plan Period<sup>9</sup>. For purposes of cost effectiveness testing throughout the Plans, the program portfolio development team used a discount rate of 8.48% based on the Companies' most recently authorized overall weighted average cost of capital ("WACC"). Avoided cost data is based on the Companies' forecasts of energy and capacity prices utilized in Stipulated ESP IV and on the results of the Avoided transmission and distribution ("T&D") Study.<sup>10</sup>

When designing the Plans, one of the design team's priorities was to reactivate and continue programs from the Prior Plans and to expand offerings to include stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally.

The above assumptions and priorities yield results that allowed the Companies to develop Plans that will comply with and/or exceed the statutory requirements and that will comply with the provisions in Stipulated ESP IV to offer robust comprehensive energy efficiency plans. However, there are certain conditions under which these programs will be implemented over the next three years that may have a material impact on actual results:

- The timing of the regulatory process and related uncertainty while the Plans are under consideration delays the Companies' ability to enter into contracts with implementation vendors and begin large scale execution of program support and implementation activities prior to approval of the Plans. The Plans and projections are based on an assumption that it will be approved no later than September 30, 2016;

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<sup>8</sup> With the exception of new construction whose savings are counted based on 2008 federal standards. R.C.4928.662 (B) *"Energy Efficiency savings and peak demand reduction achieved on and after the effective date of S.B. 310 of the 130<sup>th</sup> general assembly shall be measured on the higher of an as found or deemed basis, exceed that, solely at the option of the electric distribution utility, such savings and reduction achieved since 2006 may also be measured using this method. For new construction, the energy efficiency savings and peak demand reduction shall be counted based on 2008 federal standards, provided that when new construction replaces an existing facility, the difference in energy consumed, energy intensity, and peak demand between the new and replaced facility shall be counted toward meeting the energy efficiency and peak demand reduction requirements."*

<sup>9</sup> This is consistent with R.C. 4928.662 (G) *"Any energy efficiency savings or peak demand reduction amount achieved in excess of the requirements may, at the discretion of the electric distribution utility, be banked and applied toward achieving the energy efficiency or peak demand reduction requirements in future years."*

<sup>10</sup> The Avoided T&D Cost Study was completed to comply with the Commission Order in Case No. 12-2190-EL-POR, 12-2191-EL-POR and 12-2192-EL-POR, dated March 20, 2013, at 12: *"The Commission finds that for the next plan cycle, the Companies shall implement Staff's recommendation and shall perform an avoided T&D cost study from actual projects that are relatively certain to be implemented over the following five years and modify the avoided cost based upon these studies."*



- Changing economic conditions over the plan lives may alter the pace of investment estimated, and slow or accelerate the pace of mass market penetration;
- Newly introduced programs and measures included in the Plans will not have a historical basis for participation rates or experience. As a result, installation rates may be lower or higher than modeled, particularly in the early years;
- Targeted participants rates and energy/demand savings may not be achieved due to a variety of factors such as changing technology, market trends or incentives that are not high enough to encourage desired energy efficiency investment. The ability to make mid-stream adjustments on a timely basis to program measures or incentive levels is of paramount importance for the Companies to meet their targets and allows the Companies to proactively address rapidly evolving technology and market trends;
- Customers choosing to opt-out of the opportunity to participate in the Companies' portfolio plans may reduce the energy savings potential across all C&I customer classes.<sup>11</sup> As certain programs may be affected more than others, the Companies will closely monitor and track the opt-out customers' usage so that program potential may be assessed. Readjustment of resources may be required to address the shift in potential across programs;
- New or redesigned programs proposed herein will not have a historical basis for participation rates and other factors included in the model. This may cause installation rates to be lower or higher than modeled, particularly in the early years;
- Newly proposed programs may not provide adequate incentives to achieve targeted participants' penetration rates and energy/demand savings; and
- Future legislation, regulation or orders related to EE and PDR<sup>12</sup>.

Timely Commission approval of the Plans is critical to provide the Companies with the opportunity to comply with their statutory requirements and Stipulated ESP IV provisions during the Plan Period.

These and other risks have been factored into the Plan to the degree reasonably possible. Nevertheless, because of these and other potential uncertainties, the Commission must have in place a process that affords the Companies the ability to make mid-stream adjustments in a timely manner and provides the Companies with the opportunity to meet their statutory targets and other provisions. Such an approach will also allow the Companies to proactively address rapidly evolving technology and market trends. These Plans are based on the assumption that such a process is in place, that the Stipulated ESP IV remains in effect without change and that the Commission approves the Plans by September 30, 2016, allowing for a launch date of January 1, 2017.

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<sup>11</sup> R.C. 4928.6611 "*Beginning January 1, 2017, a customer of an electric distribution utility may opt out of the opportunity and ability to obtain direct benefits from the utility's portfolio plan. Such an opt out shall extend to all of the customer's accounts, irrespective of the size or service voltage level that are associated with the activities performed by the customer and that are located on or adjacent to the customer's premises.*"

<sup>12</sup> The Companies reserve the right to modify the Plans in the event of future changes in legislation, regulation or orders.



### ***1.3. Summary tables of portfolio savings goals, budget & cost-effectiveness (PUCO Tables 1, 2 and 3)***

PUCO Tables 1-3 in Appendix C-4 summarize the cost-effectiveness, portfolio savings goals and budgets of the Plans.

PUCO Table 1 sets forth lifetime costs and benefits of the programs being presented to the various customer segments. The Cost Benefit Ratio was calculated consistent with Commission directives. While certain programs within a segment may not pass the TRC, the portfolio as a whole does, as indicated in PUCO Table 1. PUCO Table 2 sets forth the projected MWh and MW savings by customer segment to be achieved as a result of the programs being proposed in this Plan. PUCO Table 3 sets forth the costs of programs for each of the customer segments.

### ***1.4. Summary of the utility implementation strategy to manage the portfolio, engage customers and trade allies, encourage innovation and market access, transform markets, and align or coordinate with other utilities.***

The Companies intend to provide market access to the majority of their program services through a mix of third party vendors and administrators selected by the Companies. Pursuant to a stipulation entered into in Case No. 08-0935-EL-SSO, the Companies committed to using specific organizations as “Administrators.” The administrator program is discussed in Section 5.1.1 of the Plans. The Companies use the Administrators primarily to educate their respective customer segments and to “market” various programs being offered by the Companies to achieve the program targets and objectives. The terms and conditions under which Administrators work are set forth in the Administrator agreements approved by the Commission on December 2, 2009 in Docket No. 09-553-EL-EEC. The amounts Administrators are paid were approved in the Commission's December 2, 2009 and March 16, 2011 Entries in Docket No. 09-553-EL-EEC and in Case No. 14-1297-EL-SSO. The various program descriptions included in Sections 3.2 through 3.6 of the Plans include a description of the anticipated delivery process.

The programs included in the Amended EE/PDR Portfolio Plans are currently being managed by various third party vendors. While these Plans are being considered for approval, the Companies will evaluate existing and past vendor performance and determine if certain aspects of the current process should be modified or eliminated. On an as needed basis, the Companies will solicit bids from potential implementation vendors, either in addition to, or in place of, current vendors. However contracts with selected vendors cannot be finalized prior to Commission approval, thus making it critical that the Commission approve the Plans within a reasonable time frame.

The Companies will continue providing general customer awareness that is designed to educate both customers and the media about energy efficiency and peak demand reduction programs and benefits. The Companies will review the market survey results and the results from the Market Potential Study as well as feedback received from their implementation vendors to assess whether new or modified messages should be incorporated into marketing campaigns. The Companies will also continue to rely on the Collaborative Group to provide valuable feedback and to assist in making their constituencies aware of potential EE/PDR opportunities.

Market access and market transformation are generally discussed in the specific program descriptions set forth in Sections 3.2 through 3.5 of the Plans. More specifically, the Plans are projected to cost \$323 million. These spending levels over relatively short periods of time should contribute to market transformation by providing an influx of funds that should increase the demand for Ohio-specific retail and wholesale stock of more efficient electric consuming appliances, HVAC equipment, lighting and other process equipment. The

programs included in the Plans and promoted by the Companies should also have the effect of making customers aware of efficient alternatives, thus creating an increased level of demand for such equipment. In light of this anticipated market transformation, the Companies will continue to evaluate new measures, including those that were not accepted for inclusion in the Plans, and will vet with the Collaborative Group potential new measures as circumstances arise during the Plan Period. To the extent that new measures show promise for inclusion in the Companies' portfolios, such measures will be discussed in the annual status report or in a separate filing with the Commission.

When designing these Plans, the Companies reviewed stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally. The Companies plan to continue these discussions and research to inform future program opportunities.

***1.5. Summary of the utility's data management, quality assurance and internal evaluation processes, including how the Plan and individual programs will be updated or refined based on evaluation results.***

The Companies are committed to designing and implementing robust processes, organizations and systems that achieve the energy savings and demand reduction targets established under S.B. 221 and revised in S.B. 310, as well as the provisions in the Stipulated ESP IV.

Section 6.0 of this report presents detailed plans regarding the data management quality assurance and evaluation processes for the Plans. Each program description in Section 3 provides a brief description of the planned evaluation, measurement and verification ("EM&V") steps intended for each program. Further, the Companies are committed to working with the Commission Staff and/or the selected statewide Independent Program Evaluator as appropriate to support their efforts in evaluating the programs. On an as needed basis, informal vendor-conducted customer satisfaction surveys will be performed to provide feedback to the Companies, as well as comments from the Companies' Administrators and Collaborative Group. In addition to making interim adjustments to programs as suggested by these feedback activities, the Companies will propose any major changes it believes are necessary in their annual reporting or in a separate filing with the Commission at other times as deemed necessary by the Companies.

***1.6. Summary of any cost recovery mechanisms.***

The Companies will continue to collect costs associated with the design, approval, administration and implementation of the programs included in the Plans through their current Demand Side Management and Energy Efficiency Rider (Rider DSE), which has already been approved by the Commission. The Companies are not seeking to modify their Riders DSE in this proceeding. Additionally, consistent with previous Commission Orders, lost distribution revenue and any shared savings resulting from the Shared Savings Mechanism included in the Plans will also flow through this Rider. Further, any revenues received for participation in the PJM Reliability Pricing Model capacity auctions for the Companies' EE and PDR resources, net of the PJM revenue sharing, costs, and/or penalties, will be credited against program costs in the Rider. For a more detailed explanation of these issues, see Section 7.0.

***1.7. Transition of existing or suspended programs to new programs.***

The Companies' goal is to reactivate the programs from the Previous EE/PDR Portfolio Plans that were suspended in the Amended EE/PDR Portfolio Plans, to continue the programs from the Amended EE/PDR Portfolio Plans and to leverage in these Plans the lessons learned through the implementation of those programs. Additionally, as the Plans will be introducing new offerings, the Companies are requesting Commission approval by September 30, 2016 in order to complete the necessary contracting and program

## 1.0 OVERVIEW OF PLANS

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start-up activities to support program implementation beginning January 1, 2017. The Plans assume approval in a time frame that allows the Companies to seamlessly transition from the Amended EE/PDR Portfolio Plans to these Plans. If such approval is delayed, the Companies will work with the Collaborative Group to develop a transition plan that will attempt to minimize the start-up time, customer confusion and dissatisfaction. However, because of the uncertainties surrounding the launch of unapproved plans, the Companies will not proceed beyond 2016 without Commission approval of either these Plans or a to-be-developed transition plan. Assuming timely approval, the Companies intend to generally run existing programs as they currently have while pursuing the start-up activities for the suspended and new programs supporting program implementation on January 1, 2017.

### 2.0 ENERGY EFFICIENCY PORTFOLIO – PROGRAM SUMMARIES

#### 2.1. *Residential program summaries – indicate which programs are new or continuing*

The Companies will reactivate programs from the Previous EE/PDR Portfolio Plans and continue programs from the Amended EE/PDR Portfolio Plans that are targeted for residential customers, with certain changes as outlined below. These programs are more fully described in Section 3.2:

- **Appliance Turn-In Program** – a reactivation of the program from the Previous EE/PDR Portfolio Plans with the following change:
  - Added dehumidifiers
- **Energy Efficient Homes Program** - a reactivation of the “Home Performance Program” from the Previous EE/PDR Portfolio Plans with the following changes:
  - Increased focus on LEDs for both EE Kits and School Education;
  - Added a smart thermostat sub-program that will deploy advanced smart thermostats to optimize operation of customer HVAC equipment;
  - Added manufactured homes to the New Homes sub-program; and
  - Expanded the Audits sub-program to target multi-family residences and manufactured homes.
- **Energy Efficient Products Program** - a reactivation of the program from the Previous EE/PDR Portfolio Plans with the following changes:
  - Added efficient clothes dryers to the Appliances sub-program;
  - Added imaging equipment and emerging home technologies to the Consumer Electronics sub-program;
  - Increased focus on LEDs and added lighting controls to the Lighting sub-program; and
  - Added packaged terminal heat pumps (PTHP), air conditioners (PTAC), circulation pumps and smart thermostats to the HVAC sub-program.
- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662.
- **Direct Load Control Program.** – a continuation of the existing program which controls residential customers’ air conditioning by cycling usage during peak demand periods.

### 2.2. *Residential Low-Income program summaries – indicate which programs are new or continuing.*

In addition to the Residential Programs described above in which all Residential Low-Income customers can participate, the Companies will offer through this Plan a continuation and expansion of the existing program that specifically targets and is available to qualified Residential Low Income customers. This program is more fully described in Section 3.2.1:

- **Low Income Energy Efficiency Program** - an expansion of the “Low Income Program” from the Amended EE/PDR Portfolio Plans to include two sub-programs as follows:
  - Continuation and expansion of the Community Connections program as a sub-program that will be administered by the Ohio Partners for Affordable Energy (OPAE), as included in the Stipulated ESP IV; and
  - Added a Low-Income New Homes sub-program to encourage the construction of new energy efficient housing or major rehabilitation of existing housing in the low income sector through the application of building shell, installed measures, and other related building improvement.

### 2.3. *Small Enterprise program summaries –indicate which programs are new or continuing.*

The Companies will reactivate and consolidate programs from the Previous EE/PDR Portfolio Plans and continue programs from the Amended EE/PDR Portfolio Plans, with certain changes outlined below. These programs specifically target the small business sector, which is comprised of customers taking service under rate schedule GS (Small Enterprise), and are more fully described in Section 3.3:

- **C&I Energy Solutions for Business Program -Small** - a reactivation and consolidation of the C&I Energy Efficient Equipment Program - Small and the C&I Energy Efficient Buildings Program – Small. The following changes to the previous programs have been made:
  - Added circulation pumps to the HVAC sub-program;
  - Expanded program offering to include Smart Thermostats;
  - Increased focus on LED applications in the Lighting sub-program;
  - Added beverage machines to the Food Service sub-program;
  - Added dehumidifiers to the Appliance Turn-In sub-program;
  - Added efficient clothes dryers to the Appliances sub-program;
  - Added Consumer Electronics sub-program with new measures;
  - Added new sub-program and measures for Agricultural customers;
  - Added dedicated sub-program for the Data Center customer sector and for Retro – Commissioning;

- Expanded audit offerings to include audits with direct install measures and multifamily audits; and
- Expanded services provided under the Audits & Education sub-program to include energy manager, benchmarking, and behavioral offerings to increase energy education and awareness.
- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662.

### 2.4. *Mercantile-Utility program summaries – indicate which programs are new or continuing.*

The Companies will reactivate and consolidate programs from the Previous EE/PDR Portfolio Plans and continue programs from the Amended EE/PDR Portfolio Plans, with certain changes outlined below. These programs specifically target the mercantile-utility sector, which is comprised of customers taking service under rate schedule GP, GSU and GT, and are more fully described in Section 3.4 of this Plan:

- **C&I Energy Solutions for Business Program -Large** - a reactivation and consolidation of the C&I Energy Efficient Equipment Program - Large and the C&I Energy Efficient Buildings Program – Large. The following changes to the previous programs have been made:
  - Added packaged terminal heat pumps (PTHP) and air conditioners (PTAC) to the HVAC sub-program;
  - Increased focus on LED applications in the Lighting sub-program;
  - Added dedicated sub-program for the Data Center customer sector and for Retro – Commissioning; and
  - Expanded services provided under the Audits & Education sub-program to include energy manager, benchmarking, and continuous improvement offerings to increase energy education and awareness.
- **Demand Reduction Program** – a continuation of the existing program which captures demand reduction resulting from the Companies’ Rider ELR as included in the Companies’ Stipulated ESP IV and from PJM participating demand resources.<sup>13</sup>

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<sup>13</sup> R.C. 4928.662 (A) “...including resources associated with such savings or reduction that are recognized as capacity resources by the regional transmission organization operating in Ohio...shall count toward compliance with the energy efficiency and peak demand reduction requirements.”

- **Customer Action Program (CAP)** – a continuation of the existing program. CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662.

### ***2.5. Governmental program summaries – indicate which programs are new or continuing.***

The Companies will reactivate the Government Tariff Lighting Program from the Previous EE/PDR Plans, which includes LED Traffic Signals and Street & Area Lighting, and a continuation from the Amended EE/PDR Portfolio Plans of the Companies' Experimental Company Owned LED Lighting Tariff, if the extension is approved by the Commission<sup>14</sup>. The Companies have specific rate codes that enable identification of municipal lighting accounts that qualify for this program. This program is more fully described in Section 3.5.

In addition to this program, which is specifically targeted to certain government entities, government customers qualify for measures and services of the other programs for non-residential customers (such as the C&I Energy Solutions for Business Programs – Small and Large, subject to each program's eligibility rules.

### ***2.6. Other program summaries – indicate which programs are new or continuing.***

The Companies have four other programs, three of which are addressed in separate dockets and are summarized in Section 3.6 of the Plan:

- **Mercantile Customer Program (Continuing)**

The Companies' existing Mercantile Customer Program is continuing in these Plans with reactivation of the rebate option. This program targets mercantile customer energy efficiency projects implemented from January 1, 2014 through the end of this Plan period, incenting customers to either commit projects that have already been completed, or incenting customers to invest in new energy efficiency projects. Applications for approval of mercantile sited programs are separately filed with the Commission in individual dockets, in accordance with the application and approval process determined in Case No. 10-834-EL-POR.<sup>15</sup> with any incentives paid to customers (and recovered by the Companies through Rider DSE2) approved in those individual dockets. Customers may also apply for Combined Heat and Power and Waste Energy Recovery projects under this program and will be provided incentives consistent with Commission directives. Although the budgets included in these Plans do not include any costs associated with the incentives paid to customers or administrator payments, the budgets do include costs associated with the administration and evaluation of this program.

- **Transmission & Distribution Upgrades (Continuing)**

The Companies' existing T&D Program is continuing in these Plans, but under the new name – Transmission & Distribution Upgrades Program, which accumulates the savings achieved through various T&D projects. These projects involve various system improvements that, when made, reduce line losses, which results in a more efficient delivery system. Examples of the types of efficiency

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<sup>14</sup> Case No. 16-0470-EL-ATA filed on February 29, 2016.

<sup>15</sup> Case No. 10-834-EL-POR In the matter of the Mercantile Customer Pilot Program for Integration of Customer Energy Efficiency or Peak-Demand Reduction Programs, Finding and Order, July 17, 2013.



projects in the T&D program may include, but are not limited to (i) reconductoring of lines; (ii) substation improvements; (iii) the addition of capacitor banks; and (iv) the replacement or installation of voltage regulators. These projects are selected through a comprehensive project evaluation process that includes among other things, assessment of capital requirements and constraints, projected results, and financial paybacks. The Companies seek approval for inclusion of the savings associated with these projects through separate dockets. The budgets set forth in the Plans do not include any costs for undertaking these projects, but do include costs associated with the administration of this program.

- **Smart Grid Modernization Initiative (Continuing)**

The Smart Grid Modernization Initiative Program was approved in Case No. 09-1820-EL-ATA et al and was part of the Department of Energy Smart Grid Investment Grant Program. The pilot program is studying the impact of smart grid technologies on the distribution system and includes Distribution Automation (DA), Integrated Volt Var Controls (IVVC) and an Advanced Metering Infrastructure (AMI) deployment in a 36-circuit area located in the Cleveland Electric Illuminating Company territory.

As part of the Stipulated ESP IV, the Companies committed to filing a Grid Modernization Business Plan that included various scenarios of additional AMI, DA and IVVC. Should the Companies receive approval for additional deployment of the smart grid technology, energy efficiency and peak demand reduction savings from that deployment would be included in this program. Information on the Grid Modernization Business Plan can be found in Case No 16-0481-EL-UNC. No costs associated with this program are included in the budget set forth in the Plans.

- **Energy Special Improvement District (New)**

This new program captures energy improvements made by Ohio township and municipality constituents. Energy Special Improvement Districts (ESID) offer constituents Property-Assessed Clean Energy (PACE) financing to install qualified energy improvements, pursuant to R.C. 1710.061. The Companies will seek approval for inclusion of the savings associated with these projects through separate dockets. No costs associated with this program are included in the budgets set forth in the Plans.



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### 3.0 PROGRAM DESCRIPTIONS

#### 3.1 *Discussion of criteria and process used for selection of programs:*

The program selection process included the following activities, with several activities encompassing the program development timeline and being performed coincidentally or iteratively:

1. The Companies performed a review of programs and measures, including stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally, based on feedback from: (i) the Collaborative Group; (ii) implementation experience; (iii) evaluation, measurement and verification (“EM&V”) experience; (iv) a review of the programs and measures currently being offered through the Previous EE/PDR Portfolio Plans; (v) a review of EE/PDR programs implemented by other utilities, including the Companies’ sister utilities in other jurisdictions, and (vi) various energy efficiency industry reports and awards including ACEEE, AESPMEEA, and E Source.
2. Technologies were grouped by sectors, such as: (i) residential and C&I; (ii) end uses, such as lighting, appliances and HVAC; and (iii) program types, such as efficient homes and efficient products.
3. The potential programs and measures underwent a screening process, which included among other things assessment of the anticipated participation, implementation requirements and savings impacts. Potential programs and measures were reviewed with the Collaborative Group.
4. Consumer research was conducted to identify the likelihood of customer participation/technology adoption, barriers to adoption and potential interest in specific services for overcoming those barriers. Research included gathering data on customers’ current conservation practices, appliance saturation and demographic information.
5. Program cost characteristics were developed at the sub-program or measure level, including, for example, incentive levels; marketing, administration and vendor costs; and incremental measure costs. The value of benefits was developed from savings estimates or formulas that were included in the Ohio TRM and from other industry sources, including TRMs from other states.
6. The economic modeling was completed on an iterative basis and TRC values were determined for each program. The TRC results for each of the programs included in these Plans can be found in PUCO Tables 7A through 7G in Appendix C-4.
7. Program designs were then finalized and evaluated based on whether each:
  - Promotes cost effective EE/PDR results;
  - Involves proven delivery strategies; as well as best practices based on peer and industry review and stakeholder input, with particular consideration given to hard-to-reach markets;
  - Includes programs that address prescriptive and custom measures as well as data analytics;
  - Leverages existing delivery channels that have proven to be successful and best practice approaches; and
  - Achieves positive customer satisfaction evaluations.
8. The results from the 2016 Market Potential Study, included as Appendix D, were used to finalize and to confirm that the final program designs and assumptions were consistent with market potential.

9. Once all programs were designed and modeled, the Plans were evaluated to balance results and costs to ensure plan reasonableness and compliance in a cost effective manner. These results were reviewed with the Collaborative Group, incorporating, when appropriate, suggestions for improvement from these groups.

The Companies have designed a suite of programs that move from the general to the specific, from providing customers with generic information about saving energy to customized information and services that will help them make energy efficiency changes in their own homes and facilities.

Through program implementation, customers will be encouraged to have an energy audit to help identify the opportunities that are available for increasing energy efficiency and lowering energy costs. These audits will serve a dual purpose of providing important “as-found” characteristics of homes and equipment before the installation of measures, and will offer the Companies and its implementation vendor’s important information about the age of equipment being replaced. Audits for the residential sector will be accessed either through the Comprehensive Home Audit, on line through the Companies’ Online Audit tool previously approved by the Commission<sup>16</sup>, or through OPAE who will implement the Companies’ Community Connections sub-program for low-income customers.<sup>17</sup> To help identify prescriptive measures for commercial and industrial customers, participants can receive incentives for a comprehensive audit.

To facilitate implementation of recommended measures, the Companies will offer a suite of fixed rebates and calculated incentives. Customers are also given incentives for removing refrigerators, freezers, old inefficient room air conditioners, and dehumidifiers from the system, and for replacing inefficient HVAC systems, appliances (such as central air conditioners and heat pumps) and equipment with newer qualifying energy efficient models.

### *3.1.1. Describe portfolio design criteria, overall program objectives and logistics and metrics that define program success.*

The portfolio design criteria and overall objectives are discussed in Sections 1.2 and 3.1 above. General metrics for each program are discussed below, with individual program metrics set forth in Appendices B and C.

Fundamental metrics for program performance are the number of participants, kWh savings, kW peak load reductions, dollars spent, dollars per kWh saved, and dollars per kW of peak load reduction. Individual program metrics follow the three main metric designations: Immediate (Near Term) Metrics which are generally numeric counts, Intermediate Metrics, which generally involve a calculation or data collection through surveys or other means, and Long-Term Metrics, which generally focus on accomplishment of broader range goals over longer periods of time.

### *3.1.2. Describe how programs were constructed for each portfolio to provide market coverage sufficient to reach overall energy and demand savings goals. Describe analyses and/or research that were performed (e.g., market, best-practices, market modeling).*

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<sup>16</sup> See PUCO Case No. 09-0580-EL-EEC *et seq.*

<sup>17</sup> See PUCO Case No. 14-1297-EL-SSO, Third Supplemental Stipulation and Recommendation at 17.

The EE/PDR Program Portfolio was finalized based on the market penetration and other market research results set forth in the Market Potential Study included in Appendix D. The following steps were taken to develop the program portfolio included in the Plans:

1. The first step was to select the potential programs and measures, with the programs included in the Prior Plans being considered first. Virtually all of the programs and measures included in the Prior Plans are included as the cornerstone of these Plans. Additional measures and programs, including stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally, were then reviewed to supplement and enhance this core group of programs.
2. Once selected, programs and measures were evaluated to ensure the portfolio of programs passed the TRC test and could meet the savings goals.
3. The final step was to ensure that the portfolio represented a robust and comprehensive range of programs and services that addressed the needs of each major customer group (e.g., low income, large C&I, Governmental) and incorporated all of the major customer end-uses (e.g., appliances, lighting, HVAC).
4. The results from the Market Potential Study was used to finalize and verify that the final modeling inputs used to create the portfolio of programs were reasonable.

*3.1.3. Describe available results for programs currently operated by the utility (continuing programs) and/or for similar programs operated by other program administrators in similar markets.*

The Companies currently provide eight EE or PDR programs through their Amended EE/PDR Plans<sup>18</sup>. These programs are ongoing and appear as part of these Plans, having been consolidated in these Plans. In the Previous EE/PDR Plans, comprehensive Results of the implemented programs through 2014 were reported in the Companies' Portfolio Status Reports filed with the Commission on May 15, 2015 in Case No. 15-0900-EL-EEC et al. For the convenience of the reader, certain summary tables are provided in Appendix A: Results of Prior Plans.

*3.1.4. Indicate number of customers and baseline kW and kWh consumption in each sector:*

- 3.1.4.1. Residential: See Table 5 in Section 1.1*
- 3.1.4.2. Residential Low-Income: See Table 5 in Section 1.1*
- 3.1.4.3. Small Enterprise: See Table 5 in Section 1.1*
- 3.1.4.4. Mercantile-Utility: See Table 5 in Section 1.1*
- 3.1.4.5. Governmental: See Table 5 in Section 1.1*
- 3.1.4.6. Other: See Table 5 in Section 1.1*

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<sup>18</sup> See Amended EE/PDR Portfolio Plans at 6, Paragraph 17 for more detail.

### *3.1.5. Describe Stakeholder processes used for program development*

In accordance with the Stipulation entered into in Case No. 08-0935-EL-SSO (“ESP I Stipulation”), the Companies created the Collaborative Group, which is comprised of interested stakeholders who represent various customer groups and industry interests, to consider the EE/PDR opportunities within the Companies’ service territories and to share knowledge and viewpoints on EE/PDR issues from their perspective.

The Collaborative Group was formed in May 2009, along with two subcommittees: (i) Residential/Low-Income; and, (ii) Commercial / Industrial & Demand Response. The Collaborative Group and the related subcommittees formally meet on an ongoing basis to discuss program performance and operations, best practices, and other energy efficiency and peak demand reduction matters.

When developing the Plans, the Companies solicited input from the Collaborative Group and related subcommittees on potential measures and programs to be included in these Plans on several occasions beginning in late 2015 and continuing through early 2016 up to the plan filing date. The Companies held Collaborative meetings during three phases of the plan development: 1) in December, at the onset of the plan development, 2) in early February, the Companies presented concept plan and programs and 3) in mid-March, as the plan was further developed, the Companies presented detail plan and program information. Company personnel also held multiple conference calls and exchanged communications with interested Collaborative Group member organizations throughout the plan development process. These Plans incorporate many of the Collaborative members’ suggestions.

### *3.1.6. Describe alignment with other utility and non-utility programs*

When practical, the Companies strive to coordinate their EE/PDR program designs with other utilities and in developing this plan included programs identified from utility peers in Ohio and nationally. The Companies have also designed the Plans so that there is commonality among program offerings, program participation requirements and EM&V protocols within the FirstEnergy Ohio footprint. Additionally, the Companies review the other Ohio utilities EE/PDR plans and programs to determine if adopting some of these utilities’ ideas may improve FirstEnergy programs. The Companies have very good working relationships with their counterparts at the other Ohio investor owned utilities and engage them to discuss program implementation, EM&V and design challenges, and do not hesitate to discuss specific concerns or problems with their counterparts in these organizations as needed. The Companies have actively participated in Commission-sponsored workshops in the past addressing alternative financing and comprehensive home energy audits and other whole home solutions, and expect to continue to participate in these and other workshops that address EE/PDR program issues that are state-wide or involve policies better resolved at the state level.

The Companies’ Community Connections sub-program partners with OP&E who uses the funds from this program to leverage other state funded programs through various agencies within the State of Ohio. The Companies’ proposed Energy Efficient Homes Program includes a school education program that is modeled to be consistent with school programs offered by other Ohio utilities. Additionally, the Companies’ implementation team works closely with industry groups, trade allies and program allies and considers opportunities to leverage funding sources where possible to support program operations. The Companies also participate in the OP&E-sponsored Weatherize Ohio Conference, also attended by other utilities and state program administrators and agencies.

### **Portfolio Overview**

A comprehensive portfolio of programs is listed in Tables 6 and 7 below. These programs provide customers with a full range of services – from customized information identifying energy saving opportunities for their

## 3.0 PROGRAM DESCRIPTIONS

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homes and facilities, to significant incentives for reducing the cost of implementing certain of these recommendations. Low income customers can obtain certain measures and services at no additional cost, and small enterprise customers similarly receive selected services at a significantly reduced cost. Comprehensive audits are also available to both residential and non-residential customers. Finally, in recognition of the substantial benefits of addressing energy efficiency at the time of building design, programs are offered that will work with builders and developers of residential and non-residential new construction to help move energy efficiency levels beyond current building codes. The programs are described in detail in Sections 3.2 through 3.6.

Many of the programs set forth below have their genesis in the programs implemented under Prior Plans, enhanced and streamlined by combining programs with similar operational characteristics or offerings and supplementing or expanding them with additional programs or measures including stakeholder suggestions as well as other program ideas and best practices from utility peers in Ohio and nationally.

Many of the programs being proposed in these Plans contemplate the use of rebates to incent the installation of efficient equipment by customers. Appendix C-3 lists all rebate schedules for each technology included in these Plans.

## 3.0 PROGRAM DESCRIPTIONS

EE/PDR Program Plans

### 3.2. Residential Programs

**Table 6**

Prior Program Name	New Program Name	Program Description
Appliance Turn-In Program	Appliance Turn In Program	This program provides rebates and removal and recycle services to consumers for turning in working appliances.
Home Performance Program	Energy Efficient Homes Program	This program provides customers with energy efficiency education and awareness along with measures and incentives to improve energy efficiency of homes.
Energy Efficient Products Program	Energy Efficient Products Program	This program promotes the purchase of energy efficient products, such as HVAC equipment, appliances, lighting, home electronics and other energy saving home products, through consumer rebates or incentives and support to retailers and manufacturers.
Direct Load Control Program	Residential Demand Response Program	The program consists of a customer having their central air conditioning compressor cycled during summer peak load periods.
Customer Action Program	Customer Action Program - Res	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662
Low Income Program	Low Income Energy Efficiency Program	The low-income program provides weatherization services, home audits and installation of energy efficiency measures for low-income customers under the Community Connections sub-program. The program also provides incentives for the construction of new energy efficient housing or major rehabilitation of existing housing for low-income customers.

### 3.0 PROGRAM DESCRIPTIONS

The table below details each measure that is offered in the programs listed in Table 6 and whether it is a previous or new measure:

**Table 7: Proposed Residential Portfolio**

Sector	Program	Sub-Program	Measure	Status
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	Prior
			Freezer Recycling	Prior
			Room Air Conditioner Recycling	Prior
			Dehumidifier Recycling	New
	Energy Efficient Homes Program	School Education	School Education	Prior
		EE Kits	Energy Efficiency Measures	Prior
		Audits & Education	Comprehensive Audit	Prior
			On-Line Audit	Prior
		Behavioral	Behavioral	Prior
		New Homes	New Construction - Townhouse and Duplexs	Prior
			New Construction - Two-on-Two Condos	Prior
			New Construction - Single Family Detached	Prior
			New Construction - Multi Family Low Rise	Prior
			New Manufactured Housing	New
		Smart Thermostat	Smart Thermostat	New
	Energy Efficient Products Program	Appliances	Clothes Washer	Prior
			Clothes Dryer - (Elec w Moisture Sensor)	New
			Freezers	Prior
			Refrigerators	Prior
			Dehumidifiers	Prior
			Water Heater - Heat Pump	Prior
		Consumer Electronics	Home Technology & Automation	New
			Monitors	Prior
			Computers	Prior
			Imaging	New
			TVs	Prior
		Lighting	CFL Lamps	Prior
			CFL Fixtures	Prior
			LED Fixtures	Prior
			LED Lamps	Prior
			Residential Lighting Controls	New
		HVAC	Heat Pump	Prior
			Central Air Conditioner	Prior
			Room Air Conditioner	Prior
			Ductless Mini-Split Heat Pump	Prior
			PTAC - Multi Family	New
			PTHP - Multi Family	New
			Heat Pump - Water & GeoT	Prior
			HVAC - Maintenance	Prior
			Furnace Fans	Prior
			Circulation Pumps	New
			Programmable / SMART Thermostat	New
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	Prior
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	Prior
	Low Income Energy Efficiency Program	Community Connections	Community Connections	Prior
		LI - New Homes	LI New Construction	New

Below is a summary of all of this sector's programs being proposed in these Plans:



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<b>Program Title and Program years during which program will be implemented</b>	<b>1. Direct Load Control 2017 – 2019</b>
<b>Objective(s) and program metrics</b>	<p>This program will leverage the installed base of programmable thermostats with one-way radio communications capability at participating residential customer homes to cycle the compressors in the central air conditioners using an algorithmic cycling strategy through control signals initiated by the Companies. This program provides the Companies with the capability to reduce loads during the peak demand periods in the summer operating season. Participating customers can also program the thermostat for their preferred day, night, and seasonal settings in order to achieve electric and gas energy savings throughout the year.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	The target market for this program is residential homeowners who reside in a location that supports the communication strategy and has a working central air conditioner or heat pump.
<b>Program approach, rationale and description</b>	This existing program began in the summer of 2007 has been continued in the Prior Plans and these Plans.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	<p>Total administration of the program, including installation of thermostat, marketing, call center, and general administration is provided by a third party vendor.</p> <p>During summer peak periods, the Companies can curtail air conditioning usage during a critical peak day. Customers have the ability to override (i.e., opt out of) a curtailment event.</p>
<b>Program issues and risks and risk management strategy</b>	Technology is rapidly developing in this market, and the Companies will remain flexible about testing and revising the type of equipment used for this program over time.
<b>Ramp-Up strategy</b>	This is a continuation of the Companies' existing program. The Companies anticipate a seamless transition and implementation upon Commission approval of the program.
<b>Marketing strategy</b>	This program will be launched with existing participants and expanded on an as needed basis.
<b>Market Transformation Strategy (if applicable)</b>	This program affords customers the opportunity to gain experience with energy management technology, which can also be used if advanced metering infrastructure becomes available.

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<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>The program leverages programmable thermostat installed at participating customers that can be used to achieve year-round electric savings for those with electric heat and/or central air cooling.</p> <p>See Appendix C-3 for rebate/incentive amounts.</p>
<b>Non-Energy Benefits</b>	<p>Increased consumer control over household energy consumption. Experience with technology that lends itself to advanced metering infrastructure. In addition, energy savings may result in reduced greenhouse gas emissions.</p>
<b>Other information deemed appropriate</b>	<p>None.</p>

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<b>Program Title and Program years during which program will be implemented</b>	<b>2. Appliance Turn-In Program 2017 – 2019</b>
<b>Objective(s) and program metrics</b>	<p>The program is a reactivation of the previous Appliance Turn-In program with the objective to remove older inefficient operating appliances from residences by offering customers an incentive and pick-up and recycle services at no additional cost.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	<p>The target market for this program is existing multi-family and single family households, renters and home owners. Customers must have working eligible appliance(s) at the time of pick up.</p>
<b>Program approach, rationale and description</b>	<p>This program provides customers an incentive, pick-up, and recycle services for turning in qualifying, inefficient, operating appliances. Qualifying appliances will be picked up at the customer's residence. In order to qualify for appliance turn in, equipment must be working at the time of pick up. In addition, periodic events may be offered at centralized drop-off locations where customers can drop off smaller inefficient operating appliances.</p>
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	<p>The Companies will outsource implementation of this program to a Program Implementation Vendor ("Vendor") who will be responsible for marketing, scheduling appointments, picking up / recycling of qualified working appliances, processing rebates and handling customer inquiries.</p> <p>The Companies plan to select the vendor in a timeframe that supports program reactivation beginning in January 2017 based on receiving Commission approval by September 30, 2016.</p>
<b>Program issues and risks and risk management strategy</b>	<p>The risks associated with this program primarily involve obtaining sufficient customers to participate in the program. Well established marketing techniques will be used to promote the participation in this program. The Companies will monitor the program performance and adjust marketing, outreach and/or incentives where applicable to mitigate this risk.</p> <p>Another risk is that appliances will be turned in that were not being used. Customers will be asked to verify that the appliance is in working order when they register for pick up.</p>

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<b>Ramp-Up strategy</b>	This is a reactivation of the Companies' prior program. The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval.
<b>Marketing strategy</b>	Customers will be alerted to this service through various media and marketing channels to facilitate targeted roll-out of the program, and efficient collection in targeted areas. Marketing will target customer awareness including introduction of the program and the need for consumers to take energy efficiency actions. Marketing channels may include bill inserts, newspaper, television and radio spots, search engine optimization and e-mail. The program is also cross-marketed through retailers and other residential programs, such as energy usage reports or audits.
<b>Market Transformation Strategy (if applicable)</b>	Appliance removal programs help to accelerate market transformation by encouraging customers to remove older inefficient appliances, thereby making them aware of the higher consumption of these older units.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	The customer receives an incentive following pick up or turn in of qualifying appliances. Eligible program measures and incentive strategy are included in Appendix C-3. Smaller appliances (room air-conditioners and dehumidifiers) will only qualify for the program if they are picked up in conjunction with a major appliance (refrigerator or freezer).
<b>Non-Energy Benefits</b>	The removal of the appliances may result in avoided carbon emissions. Customer bills may also be lower as a result of lower energy consumption. The program also promotes responsible disposal of hazardous materials.
<b>Other information deemed appropriate</b>	None.

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<b>Program Title and Program years during which program will be implemented</b>	<b>3. Energy Efficient Products Program 2017 – 2019</b>
<b>Objective(s) and program metrics</b>	<p>The Energy Efficient Products Program is a reactivation of the previous program. The objective of the program is to promote the installation of energy efficient appliances, lighting, consumer electronics and HVAC equipment. The program provides rebates to consumers and/or “upstream” financial incentives and support to manufacturers, distributors, and retailers that sell energy efficient products, such as ENERGY STAR® qualified appliances, high efficiency lighting, and other energy saving products. The program includes promotional support, point-of-sale materials, training, promotional events and rebates for select measures.</p> <p>This program includes the following sub-programs:</p> <ul style="list-style-type: none"> <li>➤ HVAC</li> <li>➤ Appliances</li> <li>➤ Consumer Electronics</li> <li>➤ Lighting</li> </ul> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	Residential customers of the Companies that purchase high-efficiency appliances or other qualifying products.
<b>Program approach, rationale and description</b>	<p>The approach to this program is to provide an avenue for customers to take advantage of the information gained from energy efficiency messages and energy audits and make the changes recommended. A key barrier to implementation of energy efficiency measures remains their higher first cost over less efficient models. . This program involves consumer education and incentives for selling ENERGY STAR® qualified appliances and other qualifying energy efficient equipment and measures.</p> <p>The program will use strategies including, but not limited to, giveaways, and/or special promotional events to encourage sales of high efficiency products.</p>
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	The Companies will outsource the implementation of this program to a Program Implementation Vendor (“Vendor”) who will be responsible for marketing, application processing and process documentation regarding purchased products and mail-in rebates. A separate activity will involve implementation of the retailer program. The Companies will offer mail in rebates, work with manufacturers and retailers for point of purchase

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	<p>rebates, up-stream buy-downs and consider other methods for providing rebates and other rebate application processes. Additionally, the program implementation vendor will provide support and assistance to retailers to support identification and promotion of qualifying energy efficient products. For contractor-installed products such as HVAC, the Companies will work with contractors supporting their marketing and installation of energy efficient products and participation in the program.</p> <p>The Companies plan to select the vendor in a timeframe that supports program implementation beginning in January 2017 based on receiving Commission approval by September 30, 2016.</p>
<b>Program issues and risks and risk management strategy</b>	<p>The risks associated with this program primarily involve obtaining sufficient customers to participate in the program. Well established marketing techniques will be used to promote the participation in this program. A key barrier of energy efficiency measures remains their higher purchase price as compared to less efficient models. Educational materials will need to highlight the lower operating costs of high efficiency equipment and the quick payback customers will enjoy from making the higher efficiency choice. Evaluations will monitor the extent of uptake on each product and determine whether rebate levels need to be adjusted. The Companies will monitor the program performance and adjust marketing, outreach and/or incentives where applicable to mitigate this risk.</p>
<b>Ramp-Up strategy</b>	<p>This is a reactivation of the Companies' prior program. The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval.</p>
<b>Marketing strategy</b>	<p>The program will use strategies including, but not limited to, giveaways, and/or special promotional events to encourage sales of high efficiency products. The program will be marketed, where practical, in conjunction with the audits and education program as the "next step" toward achievement of the identified energy savings. Mass marketing will target this program as a cornerstone of the various other programs and services available to residential customers under the overall portfolio.</p>
<b>Market Transformation Strategy (if applicable)</b>	<p>The objective of the program is to promote the installation of energy efficient equipment which will increase market demand for those measures, thereby increasing availability and lowering prices.</p>

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<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>For the proposed program measures, the minimum qualifying efficiency ratings are based on meeting either ENERGYSTAR® requirements or other requirements that exceed the current Federal Standard. New measures or eligibility requirements have been added to support emerging technologies including Home Controls (e.g. Home Energy Management Systems and other in home devices) and connected appliances.</p> <p>This program has been designed based on applying established efficient conditions for certain applicable measures. Given the potential of changing standards and specifications for the eligible products under the program during the term of this Plan, to maintain program continuity and implement timely on-going energy efficiency improvements, the Companies may implement tier level or incentive changes for certain applicable measures in conjunction with future specification changes.</p> <p>Eligible program measures and incentive strategy are included in Appendix C-3.</p>
<b>Non-Energy Benefits</b>	<p>The installation of high efficiency measures may result in lower carbon emissions. The impact evaluation will quantify the avoided emissions. In addition, program energy savings may result in reduced greenhouse gas emissions.</p>
<b>Other information deemed appropriate</b>	<p>This program focuses on electric energy using equipment within a residence. Weatherization and building shell type measures are covered under the Energy Efficient Homes Program.</p>

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<b>Program Title and Program years during which program will be implemented</b>	<b>4. Energy Efficient Homes Program</b> <b>2017 – 2019</b>
<b>Objective(s) and program metrics</b>	<p>The program is a reactivation of the previous Home Performance Program with the addition of a Smart Thermostat sub-program. The primary objective of this program is to educate customers on energy efficiency and energy usage, and to encourage customers to retrofit existing or implement new end use technologies and to adopt energy efficiency behaviors to conserve energy in their homes. The program is broken into the following sub-programs:</p> <ul style="list-style-type: none"> <li>➤ Audits and Education</li> <li>➤ Energy Efficiency Kits</li> <li>➤ School Education</li> <li>➤ New Homes</li> <li>➤ Behavioral</li> <li>➤ Smart Thermostat (new)</li> </ul> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	The target market for this program is residential customers and builders of new residential home construction.
<b>Program approach, rationale and description</b>	<p><u>Audits and Education</u></p> <p>Audit - this sub-program measure offers residential customers, including multi-family residences and manufactured homes, an in-home energy audit for improving the overall energy efficiency of the home. It also examines appliance efficiency, lighting and HVAC systems. The cost of the audit is subsidized by the Companies, with the customer paying a discounted fee. After completing a home energy audit, customers are provided with a list of energy savings projects and measures applicable to their home and the associated energy savings impacts. Customers who implement eligible energy savings measures are entitled to additional rebates from the Companies. The Companies will also pursue opportunities to coordinate providing these services to qualified customers with Natural Gas Distribution Companies (NGDC) including providing program referrals and/or leveraging common contractors.</p> <p><u>On-Line Audit</u></p>



The On-line Audit measure is a Home Energy Audit software program that provides customers with information and education to lower their energy usage and costs through energy efficiency program participation and other actions. Customers without internet access can verbally record via telephone their responses to the computerized questions through one of the Companies' customer services representatives. This tool provides an approach that increases the efficiency and effectiveness of the Companies' customer service by helping residential customers better understand and manage their bills. The tool converts the customers' input of their energy usage characteristics into information customers can understand and act upon, including such things as the cost of heating and cooling their homes, a usage comparison graph, tips on how to save energy and other energy efficiency program opportunities available to them.

### Energy Efficiency Kits

This sub-program will include a variety of items meant to introduce customer segments to energy efficient technologies that can be easily installed in the home, and serve as a gateway for broader home energy efficiency education. Provided items may include, but not be limited to: Educational Materials, CFLs/LEDs, Faucet Aerators, Low Flow Shower Heads, Furnace Whistles, etc. EE Kit contents may also be customized to target specific customer end-uses (e.g. electric water heating).

### School Education

This sub-program provides a customized education program that is delivered by contracted performers and/or educators to elementary school children and teachers. The education materials may include: handout materials, homework assignments, contests and/or presentations that are designed to educate students on energy efficiency and conservation. A "take home" or "opt-in" kits will be utilized to introduce simple retrofit measures that the student can work with at home with their parent's involvement.

### New Homes

This sub-program provides incentives to local builders for achieving energy efficiency targets through a combination of building shell and installed measures, including appliance upgrades. To qualify for this program, the contractor must construct the home to the

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	<p>applicable ENERGY STAR® standard or build at a higher efficiency level than the current adopted building code.</p> <p><u>Behavioral</u></p> <p>This sub-program provides energy usage reports and specific information about each customer's energy usage as well as analysis regarding their usage over time, with specific tips for conserving energy and other energy efficiency program opportunities that are available to them.</p> <p><u>Smart Thermostat</u></p> <p>This new sub-program will deploy Smart Thermostat technology to control and optimize a customer's HVAC equipment and result in lower electric energy usage. The program will incorporate direct install and customer installed options. Once deployed and operational, the program will also investigate the capability of the system to perform as a demand response resource.</p>
<p><b>Implementation strategy (including expected changes that may occur in different program years)</b></p>	<p>The Companies will outsource the implementation of this program to Program Implementation Vendors ("Vendors") who will be responsible for marketing, outreach, enrollment, fulfillment of the program services and rebate processing, where applicable.</p> <p>The Companies plan to select the vendors in a timeframe that supports program implementation beginning in January 2017 based on receiving Commission approval by September 30, 2016.</p>
<p><b>Program issues and risks and risk management strategy</b></p>	<p>The risks associated with this program primarily involve obtaining sufficient customers to participate in the program. Well established marketing techniques will be used to promote the participation in this program. The Companies will monitor the program performance and adjust marketing, outreach and/or incentives where applicable to mitigate this risk.</p>
<p><b>Ramp-Up strategy</b></p>	<p>The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval.</p>
<p><b>Marketing strategy</b></p>	<p>Marketing and outreach activities will target eligible customers to inform them of the program. Mass marketing will target this program as a cornerstone for the other programs and services available to residential customers under the overall portfolio. Marketing channels may include but are not limited to: bill</p>

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	inserts, newspaper, television and radio spots, search engine optimization, and e-mail. The online audit, EE Kits and energy usage reports will also serve as a portal to other program opportunities available to the customer.
<b>Market Transformation Strategy (if applicable)</b>	This program's objective of the transformation of markets toward higher market share of efficient electric appliances, products, and homes will be achieved by educating customers about energy efficiency and offering them incentives to purchase energy efficient products.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>The program includes the following sub-programs:</p> <ul style="list-style-type: none"><li>➤ Audits and Education</li><li>➤ Energy Efficiency Kits</li><li>➤ School Education</li><li>➤ New Homes</li><li>➤ Behavioral</li><li>➤ Smart Thermostat (new)</li></ul> <p>Please see Appendix C-3 for a list of measures available within each sub-program listed above along with their eligibility and rebate/incentive amounts.</p>
<b>Non-Energy Benefits</b>	Lower operating costs, improved condition of housing stock, improved homeowner comfort, improved capacity of the local contractor base to deliver comprehensive services, improved customer service and reduced greenhouse gas emissions.
<b>Other information deemed appropriate</b>	None.

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<b>Program Title and Program years during which program will be implemented</b>	<b>5. Low Income Energy Efficiency Program</b> <b>2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>The primary objectives of this program are to provide energy efficiency and whole building measures; educate low-income customers about energy efficiency and conservation, about their home's energy use and ways to save energy and to target the construction of new energy efficient low-income housing. The program is a continuation of the existing Community Connections Program as a sub-program, with the addition of a Low Income New Homes sub-program.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	<p>Community Connections: The target beneficiaries of this program are residential customers and landlords of residents eligible for one of the following: (i) the Ohio Home Weatherization Assistance Program (HWAP); (ii) Percent of Income Payment Plan (PIPP); or (iii) Home Energy Assistance Program (HEAP).</p> <p>Low Income New Homes: The target market for this program are builders and developers of housing for customers who are income-qualified up to 200% of the Federal Poverty Income Guideline (FPIG).</p>
<b>Program approach, rationale and description</b>	<p>This program provides various levels of energy efficiency and whole building measures, energy efficiency and conservation education and targets the construction of new energy efficient low-income housing. This program includes the following sub-programs:</p> <p><u>Community Connections:</u></p> <p>This sub-program is administered by OPAE who works with community-based agencies and subcontractors. Under this sub-program, OPAE subcontracts to community-based agencies to provide electric energy conservation measures and energy education to the Companies' low-income residential customers. All work is completed pursuant to appropriate government permits and inspected as required. Due care is used to assure that all services, materials and supplies are of good quality, reasonably priced, and installed in a professional manner and all contractors are duly qualified to complete the work they have been assigned. Energy conservation services are to be performed throughout the Companies' service territories.</p> <p><u>Low-Income New Homes:</u></p>

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	<p>This new sub-program encourages the construction of new energy efficient housing or major rehabilitation of existing housing in the low income sector through the application of building shell, installed measures, and other related building improvements. Under this sub-program homes must be constructed to exceed the current adopted building code or meet the requirements for the applicable ENERGY STAR® standard.</p>
<p><b>Implementation strategy (including expected changes that may occur in different program years)</b></p>	<p>For the Community Connections sub-program, the services will be delivered by OPAE and subcontracted to community-based agencies. Participation by low-income customers in other programs will be tracked or estimated to support reporting and evaluation.</p> <p>For the Low Income New Homes sub-program, implementation will be outsourced to a Program Implementation Vendor (“Vendor”) who will be responsible for the marketing, outreach, enrollment and program services.</p> <p>The Companies plan to select the vendor in a timeframe that supports program implementation beginning in January 2017 based on receiving Commission approval by September 30, 2016.</p>
<p><b>Program issues and risks and risk management strategy</b></p>	<p>The Companies expect minimal risks for the Community Connections sub-program as the sub-program is already operational. OPAE will monitor program performance to mitigate emerging risks.</p> <p>For the Low Income New Home sub-program, the Companies expect some challenges with identifying income-qualified customers and recruiting and training contractors that construct low-income housing.</p>
<p><b>Ramp-Up strategy</b></p>	<p>For the Community Connections sub-program, the Companies anticipate a seamless transition and implementation upon Commission approval of the program. For the New Homes sub-program, it is anticipated that it will take at least three months to start up the program to launch after program approval.</p>
<p><b>Marketing strategy</b></p>	<p>Information regarding the Community Connections sub-program will be communicated both through OPAE and its related community-based agencies and the Companies’ call center and website.</p> <p>Marketing and outreach activities will target income-eligible customers and developers of low income housing to inform them of the Low Income New Homes program. Marketing activities</p>

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	will be coordinated with the Companies' other programs and other state low-income programs.
<b>Market Transformation Strategy (if applicable)</b>	This program's strategy to transform the market toward higher market share of efficient electric appliances, products, and homes will be achieved through direct installation of efficient products and materials, efficient home construction and by educating customers about energy efficiency.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Electric energy conservation measures and client education include but are not limited to: Home energy audits, installation of CFLs, blower door tests, air sealing (such as weather stripping, caulking, foam), appliance replacement, insulation, cooling load reducing measures, electric hot water heat reducing measures, such as energy-saving shower heads and faucet aerators and limited health and safety measures. Qualified customers will receive, at no additional cost, electric energy conservation measures and customer energy education. Landlords of qualified low-income residential customers will receive similar measures at 50 percent of the cost. These improvements will result in more efficient electricity usage which will result in less electric consumption.</p> <p>For the New Homes sub-program, please see Appendix C-3 for the available rebate/incentive amount.</p>
<b>Non-Energy Benefits</b>	The installation of high efficiency measures may result in lower carbon and other greenhouse gas emissions, and lower societal costs through reduced energy bills.
<b>Other information deemed appropriate</b>	Energy efficiency measures must meet the State of Ohio Weatherization Program standards, must satisfy the TRC test or its equivalent as well as necessary EM&V requirements and/or be included in the Ohio TRM.

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<b>Program Title and Program years during which program will be implemented</b>	<b>6. Customer Action Program (CAP) - Residential 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662. This will be accomplished by employing a variety of approaches to capture customer and market information, which may include, but are not limited to, surveying efforts; market research; reports from retailers and trade allies; site verification visits; and other evaluation, measurement and verification activities.
<b>Target market (including participation requirements)</b>	The target market for this program is residential customers who take actions outside of utility incentives to reduce energy usage.
<b>Program approach, rationale and description</b>	The Companies will work with the Evaluation, Measurement and Verification (EM&V) Consultant to employ a variety of EM&V approaches that will be used depending on the specific measure to support claimed savings. CAP savings may be supported by independent evaluator surveys to obtain data supporting verified energy savings. The survey would collect information such as customer demographics, customer building characteristics including, heating and cooling systems, lighting, home appliances and equipment, miscellaneous end uses, customer energy use practices and behavior, conservation efforts, and the characteristics of any new and replaced equipment as well as other information as required. On-site visits may also be conducted for a sample of customers to collect information regarding the characteristics of the building structure (e.g., insulation levels) and of space conditioning equipment, and for installed conservation measures. Market data on the distribution of energy efficient products may be acquired through organizations such as the Air-Conditioning, Heating & Refrigeration Institute and the Association of Home Appliance Manufacturers to support the total number of units of each measure type in the Companies' service territories.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	A qualified EM&V Consultant will conduct market research to a statistical confidence level in order to extrapolate findings to the population of residential customers in the Companies' service territories.
<b>Program issues and risks and risk management strategy</b>	Risks associated with this program primarily relate to the availability of market data.
<b>Ramp-Up strategy</b>	The Companies intend to direct their EM&V Consultant to begin collecting market data from customers, and other applicable resources during the first quarter of 2017.

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<b>Marketing strategy</b>	Not applicable.
<b>Market Transformation Strategy (if applicable)</b>	Not applicable.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Measures that produce energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662 are eligible for CAP.</p> <p>Incentives will not be paid for this program, however commitment payments may be made to customers, and other applicable entities for the procurement of market data.</p>
<b>Non-Energy Benefits</b>	Reduced possible future expenses for customers with the ability to count savings towards benchmarks that are occurring in the future.
<b>Other information deemed appropriate</b>	None.



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### 3.3. *Small Enterprise Programs*

**Table 8**

Prior Program Name	New Program Name	Program Description
C&I Energy Efficient Equipment Program - Small	C&I Energy Solutions for Business Program - Small	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized processes, applications or end uses to higher efficiency processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.
C&I Energy Efficient Buildings Program - Small		
N/A	Customer Action Program - SCI	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662

The table below details each measure that is offered in the programs listed in Table 9 and whether it is a previous or new measure:

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**Table 9: Proposed C/I Small Enterprise Portfolio**

Sector	Program Name	Sub-Program	Measure Name	Status
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	Prior
			Air Conditioning - <=5.4 Tn - SCI	Prior
			Air Conditioning - >5.4 < 20 Tn - SCI	Prior
			Air Conditioning - >=20 Tn - SCI	Prior
			Chiller - Water Cld w Full Load - SCI	Prior
			Heat Pump - <=5.4 Tn - SCI	Prior
			Heat Pumps - >5.4 Tn - SCI	Prior
			Heat Pumps - Water & GeoT - SCI	Prior
			HVAC - Maintenance - SCI	Prior
			Circulation Pumps - SCI	New
			Ductless Mini-Split HP - SCI	Prior
			PTAC - SCI	Prior
			PTHP - SCI	Prior
		Lighting - SCI	CFL Fixtures - SCI	Prior
			CFL Lamps - SCI	Prior
			Lighting Controls (Daylight & Occupancy) - SCI	Prior
			Linear Fluorescent T8 / T5 - SCI	Prior
			LED Linear - SCI	Prior
			LED Channel Signage - SCI	Prior
			Exit Signs - SCI	Prior
			LED Fixtures External - SCI	Prior
			LED Fixtures Internal - SCI	Prior
			LED Lamps - SCI	Prior
			LED Reach in Refrigerator / Freezer Lights - SCI	Prior
			Street & Area Lighting (Customer Owned) - SCI	Prior
		Food Service	Refrigerators - Reach In - SCI	Prior
			Freezers - Reach In - SCI	Prior
			Ice Machines - SCI	Prior
			Refrigerated Case Cover - SCI	Prior
			Strip Curtains - SCI	Prior
			Anti Sweat Heater Controls - SCI	Prior
			Beverage Vending Machine - Controls - SCI	Prior
			Beverage Vending Machine - New EE- SCI	New
			Combination Oven - SCI	Prior
			Convection Oven - SCI	Prior
			Steam Cookers - SCI	Prior
			Fryers - SCI	Prior
			Griddles - SCI	Prior
			Hot Food Holding Cabinet - SCI	Prior
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	Prior
			Freezer Recycling - SCI	Prior
			Room Air Conditioner Recycling - SCI	Prior
			Dehumidifiers Recycling - SCI	New
		Appliances - SCI	Clothes Washer - SCI	Prior
			Clothes Dryer (Elec w Moisture Sensor) - SCI	New
			Refrigerators - SCI	Prior
			Water Heater - Heat Pump - SCI	Prior
			Freezers - SCI	Prior
			Pre-Rinse Sprayers - SCI	Prior

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Sector	Program Name	Sub-Program	Measure Name	Status
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	New
			Monitors - SCI	New
			Computers - SCI	New
			Imaging - SCI	New
			Small Network - SCI	New
		Agricultural	Efficient Dairy Equipment - SCI	New
			High Efficiency Fans - SCI	New
		Data Centers - SCI	DC - Custom Servers- SCI	Prior
			DC - Custom HVAC - SCI	Prior
			DC - Audit - SCI	Prior
		Custom - SCI	Custom - Process Improvement - SCI	Prior
			Custom - HVAC & Chillers - SCI	Prior
			Custom - Compressed Air - SCI	Prior
			Custom - VFDs < 10HP - SCI	Prior
			Custom - VFDs > 10 HP - SCI	Prior
			Custom-Motors - Three Phase - SCI	Prior
			Custom - Refrigeration - SCI	Prior
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	Prior
		Custom Buildings - SCI	Custom - Building Improvements - SCI	Prior
			Custom - Energy Management - SCI	Prior
		Audits & Education - SCI	Energy Manager - SCI	New
			Energy Efficiency Measures - SCI	Prior
			Multi Family Audit - SCI	New
			Benchmarking - SCI	New
			Audit - SCI	Prior
			Audits w Direct Install - SCI	New
			Behavioral - SCI	New
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	Prior

Below is a summary of all of this sector's programs being proposed in these Plans:

### 3.0 PROGRAM DESCRIPTIONS

EE/PDR Program Plans

<b>Program Title and Program years during which program will be implemented</b>	<b>7. C&amp;I Energy Solutions for Business Program - Small 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>The program is a reactivation and consolidation of the previous C&amp;I Energy Efficient Equipment Program – Small and the Energy Efficient Building Program – Small. In addition, the program contains new sub-programs for the Agricultural and Data Center customer sectors and end uses, and for Consumer Electronics and Retro-Commissioning.</p> <p>The primary objective of the program is to accelerate the adoption and increase the market share of high efficiency equipment and to increase the efficiency of buildings among commercial and industrial customers by reducing the first cost of high efficiency equipment or building improvements. This program includes the following sub-programs:</p> <ul style="list-style-type: none"> <li>➤ HVAC</li> <li>➤ Lighting</li> <li>➤ Food Service</li> <li>➤ Appliance Turn-In</li> <li>➤ Appliances</li> <li>➤ Consumer Electronics (New)</li> <li>➤ Agriculture (New)</li> <li>➤ Data Centers (New)</li> <li>➤ Custom</li> <li>➤ Retro-Commissioning (New)</li> <li>➤ Custom Buildings</li> <li>➤ Audits and Education</li> </ul> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	Commercial, industrial, and municipal customers in the Companies' service territories.
<b>Program approach, rationale and description</b>	This program will provide incentives to the small commercial and industrial customer who implements qualifying high efficiency measures, recycles inefficient appliances or retrofits specialized processes and applications to higher efficiency process and applications, implements qualifying high efficiency building shell or systems improvements, completes an energy efficiency audit or

utilizes energy management services. Prescriptive and performance incentives are intended to reduce the customer's investment for qualifying high efficiency measures thereby encouraging the adoption of higher efficiency equipment and buildings.

This program includes the following sub-programs:

### HVAC

HVAC measures are intended to encourage customers to maintain or install more efficient HVAC equipment in an effort to reduce both energy consumption and demand in the HVAC end use category. The Plan proposes traditional and newer efficiency measures within this grouping as listed in the table above. Prescriptive or performance based incentives will be provided to encourage customers to perform maintenance on existing units to ensure baseline performance levels are being met, to upgrade less efficient HVAC equipment to higher efficiency units, and to install HVAC system controls, in order to improve system operation and decrease system run hours. These program measures are selected and designed to encourage the customer to retrofit existing systems, implement controls and install newer energy efficiency measures.

### Lighting

Lighting measures are intended to encourage customers to install more efficient lighting equipment in an effort to reduce both energy consumption and demand in the lighting end use category. The Plan proposes measures within this grouping as listed in the table above. Prescriptive and performance based incentives will be provided to customers for upgrading less efficient lighting systems to higher efficiency lighting and controls. Prescriptive incentives may be offered for individual lighting applications and smaller retrofit projects employing standard efficient lighting technologies. Performance based incentives will be offered for higher efficient technologies as well as larger projects and retrofits, based on kWh savings. These program measures are designed to encourage customer renovation of existing lighting systems and to install newer energy efficiency measures by not limiting the reward to standard efficient lighting technologies. This offering will allow for future market development that can bring even greater energy savings without modification of the program design.

### Food Service

Food service / commercial kitchens measures within the C&I Energy Solutions for Business Program - Small are intended to encourage customers to install more efficient food service

equipment in an effort to reduce both energy consumption and demand in the food service sector. The Plans propose traditional, ENERGYSTAR® rated or other efficient equipment, and newer efficiency measures within this grouping as listed in the table above. Prescriptive incentives will be offered for retrofits of existing, and for the installation of new, energy efficient systems and equipment. These program measures are designed to encourage customers to retrofit existing food service equipment implement equipment controllers or to install newer energy efficiency measures.

### Appliance Turn-In

Appliance recycling measures within the C&I Energy Solutions for Business Program - Small are intended to encourage customers to recycle inefficient refrigerators, freezers, room air conditioners and dehumidifiers.

### Appliances

Prescriptive-based incentives will be provided to consumers and financial incentives and support to retailers that sell energy efficient products, such as ENERGY STAR® qualified appliances. Water Heating measures within the Appliance sub-program are intended to encourage customers to install more efficient water heating equipment in an effort to reduce both energy consumption and demand in the water heating end use. Prescriptive based incentives will be provided to customers for upgrading less efficient Domestic Hot Water (DHW) equipment.

### Consumer Electronics (New)

Prescriptive based incentives will be provided to consumers and financial incentives and support to retailers that sell energy efficient consumer electronics, such as ENERGY STAR® qualified electronics.

### Agriculture (New)

The new agriculture sub-program consists of end-use measures that are intended to encourage agriculture customers to install energy efficient equipment in an effort to reduce both energy consumption and demand in the agricultural customer sector. Prescriptive based incentives will be provided to end users and support will be provided to retailers that sell energy efficient equipment related to the milking, cooling, ventilation and water systems on farms.

### Data Centers (New)

This is a new targeted sub-program that will increase focus on customers with data center facilities and related equipment, including assessments or audits to identify opportunities for energy efficiency improvements. Prescriptive and performance based incentives will be provided to customers for upgrading less efficient specialized processes and applications (e.g. servers, UPS systems, HVAC equipment, etc.) to high efficiency specialized processes and applications.

### Custom

Custom measures within the C&I Energy Efficient Equipment Program - Small are intended to encourage customers to retrofit to or install more efficient specialized processes and applications in an effort to reduce both energy consumption and demand. Calculated or performance based incentives will be provided to customers for upgrading less efficient specialized processes and applications (e.g. variable frequency drives, motors, compressed air leakage reduction, equipment replacement, process change, etc.) to high efficiency specialized processes and applications.

### Retro-Commissioning (New)

The Retro-Commissioning sub-program within the Energy Efficient Buildings Program - Small is intended to encourage customers to gain and utilize certified building system operation training and energy management systems to reduce energy consumption by improving building energy performance. A systematic process will be used to identify less-than-optimal performance in the facility's equipment, lighting and control systems and make the necessary adjustments to restore the equipment to optimal performance.

### Custom Buildings

The Custom Buildings sub-program is intended to encourage customers to install specialized building shell improvements to reduce energy consumption and demand by improved building energy performance.

This program provides financial support through incentives for the implementation of cost effective, high efficiency measures to improve building energy performance by commercial and industrial customers. Performance incentives will be provided to customers for installing highly specialized custom building shell improvements.

### Audits and Education

The measures within this sub-program consists of multiple paths for a participating customer to receive an energy audit

and analytics that focuses on the energy usage of the building and the end use equipment, with the overall goal of installing more efficient end-use equipment and providing customers with energy usage analytics that will help implement energy management type strategies.

The measures included in the sub-program are:

Audits: The audit measure is intended to encourage customers to complete a detailed third party energy efficiency audit for commercial and industrial operational or manufacturing processes, building shell/envelope or building systems. This program will provide financial support through incentives toward the customer's cost of the audit and implementation of qualifying audit recommended energy efficiency improvements.

Audits with Direct Install (DI) Measures: The audit with DI measures is intended to provide an energy audit/assessment with technical assistance provided to document the building's existing equipment and efficiency opportunities prior to installation of efficiency measures. The direct installation of qualified energy efficiency measures will be provided with additional incentive for comprehensive retrofits.

Energy Manager Services: This service consists of providing an Energy Management professional that will work directly with small commercial and industrial customers to assess energy usage and identify low cost or no cost solutions. This is commonly referred to "Track and Tune" because it will focus on implementing improvements with little capital expenditures.

Benchmarking Services: This service will provide building owners and property managers with a quantitative analysis for their building's energy performance. Benchmarking is normally done to peer buildings to compare performance metrics. The program will utilize EnergyStar® or similar benchmarking tools for the analysis. Remote audits may also be utilized to provide benchmarking type analyses.

Behavioral: The Behavioral measure is designed to engage and provide customers with specific information about their energy usage as well as analysis regarding their usage over time and benchmarking, including development of specific recommendations for conserving energy, energy efficiency and other energy efficiency program opportunities that are available to them.



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	<p><u>Energy Efficiency Kits:</u> The Energy Efficiency Kits sub-program is intended to educate customers on the benefits of simple energy efficiency measures and other opportunities to accelerate the adoption and increase the market share of high efficiency equipment in the small business sector, including non-residential metered multifamily buildings, to improve building energy performance in an effort to reduce both energy consumption and demand. Provided items may include, but not be limited to: Educational Materials, CFLs/LEDs, and Faucet Aerators. EE Kit contents may also be customized to target specific customer end-uses (e.g. electric water heating, refrigeration). This sub-program provides cost effective measures and promotes customer participation and adoption of more comprehensive measures.</p> <p>Potential enhancements to this program include working with customers, manufacturers, allies, wholesalers and retailers including mid/up-stream incentives on select measures, other methods for providing incentives and other rebate application processes based on market considerations and opportunities that are identified during program implementation.</p>
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	<p>The Companies will outsource implementation of this program and sub-programs to one or more qualified Program Implementation Vendors (“Vendors”) who will be responsible for providing program services, marketing, outreach, application processing and documentation regarding purchased products and rebate fulfillment.</p> <p>The Companies will encourage Vendors who target specific customer segments or end uses (e.g. agriculture, food service) to respond to request-for-proposals, where applicable. The Companies intend to contract on a performance basis to insure creativity and motivation toward obtaining participation and meeting the program goals.</p> <p>The Companies plan to select the Vendors in a timeframe that supports program implementation beginning in January 2017, based on receiving Commission approval by September 30, 2016.</p>
<b>Program issues and risks and risk management strategy</b>	<p>The risks associated with this program primarily involve obtaining sufficient customers to participate in the program. Well established and innovative marketing and outreach techniques will be used to promote the participation in the program. The Companies will monitor the program performance and adjust marketing, outreach and/or incentive levels or approaches where applicable to mitigate this risk. Business climate may require customer fees or contributions to be reduced or waived in order to encourage participation.</p>

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<b>Ramp-Up strategy</b>	<p>The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval. The Companies intend to direct their Vendors to begin communicating the program and measure offering soon after Plan approval so that Commercial and Industrial customers can plan and budget for projects beginning in 2017.</p>
<b>Marketing strategy</b>	<p>The objective of the program is to promote the installation of energy efficient equipment and to improve the energy efficiency of buildings which will increase the market demand for those measures, thereby increasing customer awareness, measure availability and lower prices for energy efficiency measures. Marketing activities will target eligible customers to inform them of the program changes and the new measure, its components, and the associated benefits through bill inserts, direct mail, website, trade shows, the business customer newsletter, and key account managers. The Companies will work with distributors and contractors to market eligible higher efficiency equipment.</p> <p>Additionally, company resources will be utilized to conduct outreach to their constituents regarding program availability. Company personnel (e.g. Area Managers and Customer Support Representatives) will be charged with providing first line contacts to eligible customers within target market segments. The Program Implementation Providers and/or Program Managers will be responsible for ultimate program marketing. The Companies will contract with experienced Program Implementation Providers and/or Program Managers on a performance basis to insure creativity and motivation in marketing strategies toward obtaining the program's participation and energy saving goals.</p>
<b>Market Transformation Strategy (if applicable)</b>	<p>The objective of the program is to promote the installation of energy efficient equipment which will increase market demand for those measures, thereby increasing customer awareness, EE product availability and lowering EE product prices.</p>
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>This program has been designed based on applying established efficient conditions for certain applicable measures. Given the potential of changing standards and specifications for the eligible products under the program during the term of this Plan, to maintain program continuity and implement timely on-going energy efficiency improvements, the Companies may implement tier level or incentive changes for certain applicable measures in conjunction with future specification changes.</p> <p>Proposed measures with their eligibility and rebate strategy can be found in Appendix C-3.</p> <p>In addition to providing incentives after customers have installed qualified energy efficient measures, the Companies may provide</p>

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	mid-stream or up-stream incentive strategies to enhance program delivery for select measures, with such rebates and program costs within the approved incentive ranges and program budgets.
<b>Non-Energy Benefits</b>	Due to the longer life of some high efficiency equipment, customers do not need to maintain or replace consumables as often thus reducing the customers operation and maintenance costs.
<b>Other information deemed appropriate</b>	None.

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<b>Program Title and Program years during which program will be implemented</b>	<b>8. Customer Action Program (CAP) – Small C/I 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662. This will be accomplished by employing a variety of approaches to capture customer and market information, which may include, but are not limited to, surveying efforts; market research; reports from administrators and trade allies; site verification visits; and other evaluation, measurement and verification activities.
<b>Target market (including participation requirements)</b>	The target market for this program is C&I customers who take actions outside of utility incentives to reduce energy usage.
<b>Program approach, rationale and description</b>	The Companies will work with the Evaluation, Measurement and Verification (EM&V) Consultant to employ a variety of EM&V approaches that will be used depending on the specific measure to support claimed savings. Customer Action Program savings may be supported by independent evaluator surveys to obtain data supporting verified energy savings. The survey would collect information such as customer demographics, customer building characteristics including, heating and cooling systems, lighting and controls, appliances and equipment, miscellaneous end uses, customer energy use practices and behavior, conservation efforts, and the characteristics of any new and replaced equipment as well as other information as required. The Companies and independent evaluators may also work with retailers, administrators and trade allies to obtain project specific information. On-site visits may also be conducted for a sample of customers to collect information regarding the characteristics of the building structure (e.g., insulation levels) and of space conditioning equipment, and for installed conservation measures.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	A qualified EM&V Consultant will conduct market research to a statistical confidence level in order to extrapolate findings to the population of C&I customers in the Companies' service territories.
<b>Program issues and risks and risk management strategy</b>	Risks associated with this program primarily relate to the availability of market data.
<b>Ramp-Up strategy</b>	The Companies intend to direct their EM&V Consultant to begin collecting market data from customers, trade allies, administrators and other applicable resources during the first quarter of 2017.
<b>Marketing strategy</b>	Not applicable.

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<b>Market Transformation Strategy (if applicable)</b>	Not applicable.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Measures that produce energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662 are eligible for CAP.</p> <p>Incentives will not be paid for this program, however commitment payments may be made to customers, trade allies, administrators and other applicable entities for the procurement of market data.</p>
<b>Non-Energy Benefits</b>	Reduced possible future expenses for customers with the ability to count savings towards benchmarks that are occurring in the future.
<b>Other information deemed appropriate</b>	None.

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**3.4. *Mercantile-Utility Programs (Large Enterprise) program summaries – indicate which programs are new or continuing.***

**Table 10**

Prior Program Name	New Program Name	Program Description
C&I Energy Efficient Equipment Program - Large	C&I Energy Solutions for Business Program - Large	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized equipment, processes, applications or end uses to higher efficiency equipment, processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.
C&I Energy Efficient Buildings Program - Large		
Demand Reduction Program	C&I Demand Response Program - Large	The program captures load curtailment and curtailable capacity from the Companies' Interruptible Load Program (Economic Load Response Rider) and from additional demand resources including resources participating in the PJM market or through contracts for demand response attributes with customers or PJM CSPs.
Customer Action Program	Customer Action Program - LCI	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662

The table below details each measure that is offered in the programs listed in Table 11 and whether it is a previous or new measure:

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**Table 11: C/I Large Enterprise Portfolio**

Sector	Program Name	Sub-Program	Measure Name	Status	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	Prior	
			Chiller - Water Cld w Full Load - LCI	Prior	
			Air Conditioning - >5.4 < 20 Tn - LCI	Prior	
			Air Conditioning - >=20 Tn - LCI	Prior	
			Heat Pump - <=5.4 Tn - LCI	Prior	
			Heat Pumps - >5.4 Tn - LCI	Prior	
			Heat Pumps - Water & GeoT - LCI	Prior	
			Ductless Mini-Split HP - LCI	Prior	
			PTAC - LCI	New	
		PTHP - LCI	New		
		Lighting - LCI	CFL Fixtures - LCI	Prior	
			CFL Lamps - LCI	Prior	
			Lighting Controls (Daylight & Occupancy) - LCI	Prior	
			Linear Fluorscent T8 / T5 - LCI	Prior	
			LED Linear - LCI	Prior	
			LED Channel Signage - LCI	Prior	
			Exit Signs - LCI	Prior	
			LED Fixtures External - LCI	Prior	
			LED Fixtures Internal - LCI	Prior	
			LED Lamps - LCI	Prior	
			Street & Area Lighting (Customer Owned) - LCI	Prior	
		Data Centers - LCI	DC - Custom HVAC - LCI	Prior	
			DC - Custom Servers - LCI	Prior	
			DC - Audit - LCI	Prior	
		Custom - LCI	Custom - Process Improvement - LCI	Prior	
			Custom - HVAC & Chillers - LCI	Prior	
			Custom - Compressed Air - LCI	Prior	
			Custom - VFDs < 10HP - LCI	Prior	
			Custom - VFDs > 10 HP - LCI	Prior	
			Custom-Motors - Three Phase - LCI	Prior	
			Custom - Refrigeration - LCI	Prior	
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	Prior	
		Custom Buildings - LCI	Custom - Building Improvements - LCI	Prior	
			Custom - Energy Management - LCI	Prior	
		Audits & Education - LCI	Audit - LCI	Prior	
			Continuous Improvement - LCI	New	
			Energy Manager - LCI	New	
			Benchmarking - LCI	New	
		C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	Prior
		ELR Interruptible Tariff		Prior	
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	Prior	

Below is a summary of all of this sector's program summaries being proposed in these Plans:

### 3.0 PROGRAM DESCRIPTIONS

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<b>Program Title and Program years during which program will be implemented</b>	<b>9. C&amp;I Energy Solutions for Business Program - Large 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>The program is a reactivation and consolidation of the previous Energy Efficient Equipment Program – Large and the Energy Efficient Buildings Program – Large. In addition, the program contains a new targeted sub-program for the Data Center customer sector.</p> <p>The primary objective of the program is to accelerate the adoption and increase the market share of high efficiency equipment and to increase the efficiency of industrial processes and buildings among commercial and industrial customers by reducing the first cost of high efficiency equipment, processes and systems, or building improvements. This program includes the following sub-programs:</p> <ul style="list-style-type: none"> <li>➤ HVAC</li> <li>➤ Lighting</li> <li>➤ Data Centers (New)</li> <li>➤ Custom</li> <li>➤ Retro-Commissioning</li> <li>➤ Custom Buildings</li> <li>➤ Audits and Education</li> </ul> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	Commercial, industrial, and municipal customers in the Companies' service territories.
<b>Program approach, rationale and description</b>	<p>This program will provide financial support through incentives to the commercial and industrial customer who implements qualifying high efficiency measures, retrofits specialized processes and applications to higher efficiency processes and applications, implements qualifying high efficiency building shell or systems improvements, completes an energy efficiency audit or utilizes energy management services. Prescriptive and performance incentives are intended to reduce customer's investment for qualifying high efficiency measures thereby encouraging the adoption of higher efficiency equipment, processes, systems and buildings.</p> <p>This Program includes the following sub-programs:</p>



### HVAC

HVAC measures within the C&I Energy Efficient Solutions for Business Program – Large are intended to encourage customers to install more efficient HVAC equipment in an effort to reduce both energy consumption and demand in the HVAC end use category. The Plans propose traditional and newer efficiency measures within this grouping as listed in the table above. Prescriptive or performance based incentives will be provided to encourage customers to perform maintenance on existing units to ensure baseline performance levels are being met, to upgrade less efficient HVAC equipment to higher efficiency units, and to install HVAC system controls, in order to improve system operation and decrease system run hours. These program measures are selected and designed to encourage the customer to retrofit existing systems, implement controls and install newer energy efficiency measures.

### Lighting

Lighting measures within the C&I Energy Solutions for Business Program - Large are intended to encourage customers to install more efficient lighting equipment in an effort to reduce both energy consumption and demand in the lighting end use category. The Plan proposes measures within this grouping as listed in the table above. Prescriptive and performance based incentives will be provided to customers for upgrading less efficient lighting systems to higher efficiency lighting and controls. Prescriptive incentives may be offered for individual lighting applications and smaller retrofit projects employing standard efficient lighting technologies. Performance based incentives will be offered for higher efficient technologies as well as larger projects and retrofits, based on kWh savings. These program measures are designed to encourage customer renovation of existing lighting systems and to install newer energy efficiency measures by not limiting the reward to standard efficient lighting technologies. This offering will allow for future market development that can bring even greater energy savings without modification of the program design.

### Data Centers (New)

This is a new targeted sub-program within the C&I Energy Solutions for Business Program - Large that will increase focus on customers that have data center facilities and related equipment, including assessments or audits to identify opportunities. Prescriptive and performance based incentives will be provided to customers for upgrading less efficient specialized processes and applications (e.g. servers, UPS

systems, HVAC equipment, etc.) to high efficiency specialized processes and applications.

### Custom

Custom measures are intended to encourage customers to retrofit to or install more efficient specialized processes and applications (e.g. variable frequency drives, motors, compressed air leakage reduction, equipment replacement, process change, etc.) in an effort to reduce both energy consumption and demand. Performance based incentives will be provided to customers for upgrading less efficient specialized processes and applications to high efficiency specialized processes and applications.

### Retro-Commissioning

This sub-program is intended to encourage customers to gain and utilize certified building system operation training and energy management systems to reduce energy consumption by improving building energy performance. A systematic process will be used to identify less-than-optimal performance in the facility's equipment, lighting and control systems and make the necessary adjustments to restore the equipment to optimal performance.

### Custom Buildings

The Custom Buildings sub-program is intended to encourage customers to install specialized building shell improvements to reduce energy consumption and demand by improved building energy performance.

This program provides financial support through incentives for the implementation of cost effective, high efficiency measures to improve building energy performance by commercial and industrial customers. Performance incentives will be provided to customers for installing highly specialized custom building shell improvements.

### Audits and Education

The audit measures within this sub-program consists of multiple paths for a participating customer to receive an energy audit and analytics that focuses on the energy usage of the building and the end use equipment, with the overall goal of installing more efficient end-use equipment and providing customers with energy usage analytics that will help implement energy management type strategies.

The measures included in the sub-program are:

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	<p><u>Audits:</u> The audit measure is intended to encourage customers to complete a detailed third party energy efficiency audit for commercial and industrial operational or manufacturing processes, building shell/envelope or building systems. This program will provide financial support through incentives toward the customer's cost of the audit and implementation of qualifying audit recommended energy efficiency improvements.</p> <p><u>Energy Manager Services:</u> This service consists of providing an Energy Management professional that will work directly with commercial and industrial customers to assess energy usage and identify low cost or no cost solutions. This is commonly referred to "Track and Tune" type analysis because it will focus on implementing improvements with little capital expenditures.</p> <p><u>Benchmarking Services:</u> This service will provide building owners and property managers with a quantitative analysis of their building's energy performance. Benchmarking is normally applied to buildings with similar customer sectors (e.g. Hospitals, lodging, etc.) to compare energy usage performance metrics. The program will utilize EnergyStar® or similar benchmarking tools for the analysis. Remote audits may also be utilized to provide benchmarking type analyses.</p> <p><u>Continuous Improvement:</u> This service consists of providing customers with an energy management professional that will engage the Companies' largest customers to integrate energy efficiency design and planning as a core business practice. The program will help the customer create a long-term vision with short-term actions to improve the customer's overall energy efficiency.</p> <p>Potential enhancements to this program include working with customers, manufacturers, allies, wholesalers and retailers including mid/up-stream incentives on select measures, other methods for providing incentives and other rebate application processes based on market considerations and opportunities that are identified during program implementation.</p>
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	<p>The Companies will outsource implementation of this program and sub-programs to one or more qualified Program Implementation Vendors ("Vendors") who will be responsible for providing program services, marketing, outreach, application processing and documenting details regard purchased products and fulfilling rebate requests.</p>

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	<p>The Companies will encourage Vendors who target specific customer segments or end uses (e.g. Data Centers, Retro-Commissioning) to respond to request-for-proposals, where applicable. The Companies intend to contract on a performance basis to insure creativity and motivation toward obtaining participation and meeting the program goals.</p> <p>The Companies plan to select the Vendors in a timeframe that supports program implementation beginning in January 2017, based on receiving Commission approval by September 30, 2016.</p>
<b>Program issues and risks and risk management strategy</b>	<p>The risks associated with this program primarily involve obtaining sufficient customers to participate in the program. Well established and innovative marketing and outreach techniques will be used to promote the participation in the program. The Companies will monitor the program performance and adjust marketing, outreach and/or incentive levels or approaches where applicable to mitigate this risk. Business climate may require customer fees or contributions to be reduced or waived in order to encourage participation.</p>
<b>Ramp-Up strategy</b>	<p>The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval. The Companies intend to direct their Vendors to begin communicating the program and measure offering soon after plan approval so that Commercial and Industrial customers can plan and budget for projects beginning in 2017.</p>
<b>Marketing strategy</b>	<p>The objective of the program is to promote the installation of energy efficient equipment and to improve the energy efficiency of buildings and industrial processes which will increase the market demand for those measures, thereby increasing customer awareness, measure availability and lower prices for energy efficiency measures. Marketing activities will target eligible customers to inform them of the program changes and the new measure, its components, and the associated benefits through bill inserts, direct mail, website, trade shows, the business customer newsletter, and key account managers. The Companies will work with distributors and contractors to market eligible higher efficiency equipment.</p> <p>Additionally, company resources will be utilized to conduct outreach to their constituents regarding program availability. Company personnel (e.g. Area Managers and Customer Support Representatives) will be charged with providing first line contacts to eligible customers within target market segments. The Program Implementation Providers and/or Program Managers will be responsible for ultimate program marketing. The Companies will contract with experienced Program Implementation Providers and/or Program Managers on a performance basis to insure</p>

### 3.0 PROGRAM DESCRIPTIONS

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	creativity and innovation in marketing strategies toward obtaining the program's participation and energy saving goals.
<b>Market Transformation Strategy (if applicable)</b>	The objective of the program is to promote the installation of energy efficient equipment which will increase market demand for those measures, thereby increasing customer awareness, EE product availability and lowering EE product prices.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>This program has been designed based on applying established efficient conditions for certain applicable measures. Given the potential of changing standards and specifications for the eligible products under the program during the term of this Plan, to maintain program continuity and implement timely on-going energy efficiency improvements, the Companies may implement tier level or incentive changes for certain applicable measures in conjunction with future specification changes.</p> <p>Proposed measures with their eligibility and rebate strategy can be found in Appendix C-3.</p> <p>In addition to providing incentives after customers have installed qualified energy efficient measures, the Companies may provide mid-stream or up-stream incentive strategies to enhance program delivery for select measures, with such rebates and program costs within the approved incentive ranges and program budgets.</p>
<b>Non-Energy Benefits</b>	Due to the longer life of some high efficiency equipment, customers do not need to maintain or replace consumables as often thus reducing the customers operation and maintenance costs.
<b>Other information deemed appropriate</b>	None.

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<b>Program Title and Program years during which program will be implemented</b>	<b>10. Demand Reduction Program</b> <b>2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>This is a continuation of the Companies' existing program including the demand response resources participating in the PJM market for the applicable delivery year. The program includes the existing Economic Load Response Program Rider (ELR) and Contracted Demand Resources measures.</p> <p>The primary objective of this program is obtaining demand response resources including load curtailment, resources participating in the PJM market or contracts for demand response attributes with customers or PJM Curtailment Service Providers (CSPs). This program provides financial support through the Companies' Tariffs and incentives to Commercial and Industrial customers who contract for the ability to curtail with the Companies or their Vendor.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	<p><u>Interruptible Tariff</u></p> <p>Customers taking service under the Companies' Economic Load Response Program Rider (ELR).</p> <p><u>Contracted Demand Resources</u></p> <p>Customers taking service under Companies Rate Schedules GS, GP, GSU, or GT.</p>
<b>Program approach, rationale and description</b>	<p><u>Interruptible Tariff</u></p> <p>Please refer to the Companies' Riders ELR in their Electric Service Tariff for program description and rationale.</p> <p><u>Contracted Demand Resources</u></p> <p>The Companies will count demand response resources participating in the PJM market for the applicable delivery year through PJM CSPs. The Companies also has the ability to contract with customers or PJM CSPs for demand response attributes to supplement the resources participating in the PJM market when required. PJM CSPs will provide services to register customer curtailable load resources in the PJM markets and Company programs. The PJM CSPs will structure individual contracts with customers to participate in the PJM markets. Customer participation in the program and incentives will be according to the</p>

### 3.0 PROGRAM DESCRIPTIONS

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	contracts established between the Companies or PJM CSP and the customer.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	This program is a continuation of the Companies' existing C&I Interruptible Load Program. The Companies' Economic Load Response Program Rider (ELR) is currently approved through May 31, 2024.
<b>Program issues and risks and risk management strategy</b>	To the extent that this program relies on individual contracted resources, the Companies are exposed to performance risk associated with an individual contracted resource's ability to curtail should an event or test event be called. If applicable, the Companies plan to mitigate this risk through targeting customers of sufficient size and technical knowledge to fully understand program commitments, as well as incorporating the demand response resources that are participating in the PJM markets.
<b>Ramp-Up strategy</b>	Not applicable.
<b>Marketing strategy</b>	<u>Interruptible Tariff</u> – N/A  <u>Contracted Demand Resources</u>  This program will utilize the marketing efforts of PJM CSPs, and Company Account Managers to provide customers with information on the Contracted Demand Resources measure and PJM programs that are available to them.
<b>Market Transformation Strategy (if applicable)</b>	Not applicable.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	Proposed measures with their eligibility and rebate strategy can be found in Appendix C-3.
<b>Non-Energy Benefits</b>	Reduces the need to build additional generating capacity which, in turn, may benefit the environment.
<b>Other information deemed appropriate</b>	None.



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<b>Program Title and Program years during which program will be implemented</b>	<b>11. Customer Action Program (CAP) – Large C/I 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	CAP captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662. This will be accomplished by employing a variety of approaches to capture customer and market information, which may include, but are not limited to, surveying efforts; market research; administrators and trade allies; site verification visits; and other evaluation, measurement and verification activities.
<b>Target market (including participation requirements)</b>	The target market for this program is non-residential customers who take actions outside of utility incentives to reduce energy usage.
<b>Program approach, rationale and description</b>	The Companies will work with the Evaluation, Measurement and Verification (EM&V) Consultant to employ a variety of EM&V approaches that will be used depending on the specific measure to support claimed savings. Customer Action Program savings may be supported by independent evaluator surveys to obtain data supporting verified energy savings. The survey would collect information such as customer demographics, customer building characteristics including, heating and cooling systems, lighting and controls, miscellaneous end uses, customer energy use practices and behavior, conservation efforts, and the characteristics of any new and replaced equipment as well as other information as required. The Companies and independent evaluators may also work with administrators and trade allies to obtain project specific information. On-site visits may also be conducted for a sample of customers to collect information regarding the characteristics of the building structure (e.g., insulation levels) and of space conditioning equipment, and for installed conservation measures.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	A qualified EM&V Consultant will conduct market research to a statistical confidence level in order to extrapolate findings to the population of customers in the Companies' service territories.
<b>Program issues and risks and risk management strategy</b>	Risks associated with this program primarily relate to the availability of market data.
<b>Ramp-Up strategy</b>	The Companies intend to direct their EM&V Consultant to begin collecting market data from customers, trade allies, administrators and other applicable resources during the first quarter of 2017.



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<b>Marketing strategy</b>	Not applicable.
<b>Market Transformation Strategy (if applicable)</b>	Not applicable.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Measures that produce energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662 are eligible for CAP.</p> <p>Incentives will not be paid for this program, however commitment payments may be made to customers, trade allies, administrators and other applicable entities for the procurement of market data.</p>
<b>Non-Energy Benefits</b>	Reduced possible future expenses for customers with the ability to count savings towards benchmarks that are occurring in the future.
<b>Other information deemed appropriate</b>	None.

## 3.0 PROGRAM DESCRIPTIONS

### 3.5. *Governmental program summaries – indicate which programs are new or continuing.*

For purposes of these Plans, the Companies included as their Government sectors all customers taking service under the rate schedules Street Lighting (“STL”) and Traffic Lighting (“TRF”) rate schedules STL and TRF.

**Table 12**

Prior Program Name	New Program Name	Program Description
Government Tariff Lighting Program	Government Tariff Lighting Program	The program provides financial incentives and support to customers for implementing energy efficient street lighting or traffic lighting technologies on customer owned and maintained installations.

The table below details each measure that is offered in the programs listed in Table 13 and whether it is a previous or new measure:

**Table 13: Government Portfolio**

Sector	Program Name	Sub-Program	Measure Name	Status
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	Prior
			Street & Area Lighting (Tariff / Utility Owned) - Gov	Prior
			Street & Area Lighting (Tariff / Customer Owned) - Gov	Prior

The Companies’ program for government sector customers focuses on customer owned Street Lighting and Traffic/Pedestrian Lighting technology. The opportunities are focused on retrofitting of older standard technology to new, more efficient lighting fixtures.

The Companies’ existing Government Lighting Program is being renamed the Government Tariff Lighting Program. While this program is specifically targeted to the government entities served on the Companies’ street and traffic lighting rate schedules, government facilities qualify for measures and services of other programs for non-residential customers, subject to each program’s eligibility rules.

Below is a summary of the Government program being proposed in these Plans:

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<b>Program Title and Program years during which program will be implemented</b>	<b>12. Government Tariff Lighting Program</b> <b>2017 – 2019</b>
<b>Objective(s) and program metrics</b>	<p>The primary objective of this program is to accelerate the adoption and increase the energy efficiency of traffic or pedestrian signals and street or area lighting systems.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Target market (including participation requirements)</b>	Government customers with traffic and public safety signals served under rate schedule TRF, and/or customers with street and area lighting systems served under the Customer Owned provision of rate schedule STL.
<b>Program approach, rationale and description</b>	<p>This program provides financial support through incentives for the implementation of customer owned and maintained, high efficiency measures to improve traffic and public safety, and/or street and area lighting by Government / Municipal customers. Incentives are intended to reduce customer's capital investment for selected high efficiency equipment and operations.</p> <p>The LED Traffic Signal Measure is targeted at local governments. This component of the program will seek to convert traffic control or public safety signals to LED technology.</p> <p>The Street and Area Lighting (tariff/customer owned) Measure is offered to municipalities who convert or replace the lights with a higher efficient technology.</p> <p>Prescriptive incentives will be provided to customers for installing customer owned and maintained higher efficient lighting technologies.</p> <p>The Program also includes the Experimental Company owned LED Lighting Tariff offering municipalities an option to upgrade to more efficient LED street and area lighting. On February 29, 2016, the Companies filed an application in Case No. 16-0470-EL-ATA requesting approval to extend the Experimental Company Owned LED Lighting Tariff through December 31, 2019. If approved, this program will continue to be offered on an experimental basis, to municipalities and governmental authorities that elect to take service from Company Owned LED lights for the lighting of streets, sidewalks, parks, and other public grounds. Program costs are not included in this Plan and will be recovered through Rate STL.</p>

### 3.0 PROGRAM DESCRIPTIONS

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<b>Implementation strategy (including expected changes that may occur in different program years)</b>	<p>The Companies will contract with a qualified Program Implementation Vendor (“Vendor”) who will conduct the marketing and rebate fulfillment aspects of this program. Company resources will also be utilized to conduct outreach to their constituents regarding program availability. All existing measures will continue as implemented from the Previous EE/EDR Portfolio Plans into the 2017-2019 Plan.</p> <p>The Companies plan to select the vendor in a timeframe that supports program implementation beginning in January 2017, based on receiving Commission approval by September 30, 2016.</p>
<b>Program issues and risks and risk management strategy</b>	<p>Ramp-up may be slower than otherwise expected, due to, the long lead-in time needed for governmental budgeting processes. A customer education campaign that informs customers about the benefits of energy efficiency in general, as well as the specific benefits regarding energy efficiency will be utilized to accelerate ramp-up.</p>
<b>Ramp-Up strategy</b>	<p>The Companies anticipate a timely implementation upon Commission approval of the program. It is anticipated that it will take at least three months to start up the program to launch after program approval. The Companies intend to direct their Vendors to begin communicating the program and measure offering soon after plan approval so that Government and municipal customers can plan and budget for projects in 2017.</p>
<b>Marketing strategy</b>	<p>Marketing activities will target eligible customers to inform them of the program and measures, its components, and the associated benefits. Additionally, company resources will be utilized to conduct outreach to their constituents regarding program availability. Company personnel (e.g. Area Managers and Customer Support Representatives) will be charged with providing first line contacts to eligible customers within target market segments.</p>
<b>Market Transformation Strategy (if applicable)</b>	<p>The objective of the program is to promote the installation of energy efficient equipment which will increase market demand for those measures, thereby increasing customer awareness, EE product availability and lowering EE product prices.</p>
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Proposed measures with their eligibility and rebate strategy can be found in Appendix C-3.</p>
<b>Non-Energy Benefits</b>	<p>Reduced operations and maintenance costs associated with traffic, street, and area lighting systems for local governments.</p>

### 3.0 PROGRAM DESCRIPTIONS

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Other information deemed appropriate	None.
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## 3.0 PROGRAM DESCRIPTIONS

### 3.6. *Other program summaries – indicate which programs are new or continuing.*

For purposes of this Plan the Companies included all customers taking service under all rate schedules.

**Table 14**

Prior Program Name	New Program Name	Program Description
Mercantile Customer Program	Mercantile Customer Program	Captures energy efficiency and peak demand reduction projects committed to the Company by Mercantile customers as provided for by O.R.C. 4928.01 and 4928.66
T&D Improvements	Transmission & Distribution Upgrades	Capture savings achieved through various T&D projects that reduce line losses, which in turn results in a more efficient delivery system.
Smart Grid Modernization Initiative	Smart Grid Modernization Initiative	Captures energy savings from the project to produce an integrated system of protection, performance, efficiency and economy that extends across the energy delivery system.
N/A	Energy Special Improvement District	Incorporation of State Legislation that permits Ohio townships and municipalities to create Energy Special Improvement Districts offering constituents Property Assessed Clean Energy (PACE) financing for qualifying energy efficiency projects.

The table below details each measure that is offered in the programs listed in Table 15 and whether it is a previous or new measure:

**Table 15: Other Portfolio**

Sector	Program Name	Sub-Program	Measure Name	Status
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	Prior
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	Prior
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	Prior
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	New

Below is a summary of the Other programs proposed in these Plans:

### 3.0 PROGRAM DESCRIPTIONS

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<b>Program Title and Program years during which program will be implemented</b>	<b>13. Mercantile Customer Program</b> <b>2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>To obtain a commitment from mercantile customers that will allow the Companies to include EE/PDR savings from the customer's EE/PDR projects.</p> <p>Relevant metrics are provided in Appendices B and C.</p> <p><b>Project Description</b></p> <p>Eligible customers who have achieved EE/PDR savings independent of utility programs or incentives may file joint applications with the Companies to the Commission for commitment of these savings to the Companies and a request to exempt the customer from paying certain charges included in the Companies' Rider DSE or opt for a cash rebate.</p> <p><b>Project justification as an allowable efficiency activity</b></p> <p>R.C. § 4928.66, Section (A) (2) (c) allows for "including the effects of all demand-response programs for mercantile customers of the subject electric distribution utility, all waste energy recovery systems and all combined heat and power systems, and all such mercantile customer-sited energy efficiency and peak demand reduction programs, adjusted upward by the appropriate loss factors."</p>
<b>Target market (including participation requirements)</b>	All customers that meet the definition of "mercantile customer", as defined in R.C. § 4928.01 (A) (19) are eligible for this program.
<b>Program approach, rationale and description</b>	Customers must comply with the rules as dictated by the Commission's Mercantile Program, Case No. 10-834-EL-POR.
<b>Marketing and Implementation Strategy</b>	<p>The Companies use Administrators, who are trained periodically on the latest interpretation of Commission orders and rules, process changes, and general updates. The list of Administrators at the time of this filing includes: Association of Independent Colleges &amp; Universities, Council of Small Enterprises, County Commissioners' Association of Ohio (CCAO), Industrial Energy Users of Ohio, Ohio Hospitals Association, Ohio Manufacturer's Association, and Ohio Schools Council. The role of Administrators includes, but is not limited to, the following:</p> <ol style="list-style-type: none"> <li>1. Educating customers about the program. This step includes providing customers with background on S.B. 310 EE &amp; PDR requirements for utilities, explaining the two incentive options available.</li> </ol>

### 3.0 PROGRAM DESCRIPTIONS

	<ol style="list-style-type: none"> <li>Identifying for the Companies' customers who qualify as a mercantile customer, who are interested in the program, who have projects that may qualify and who otherwise qualify under the Companies' applicable rate schedules.</li> <li>Providing estimates of potential EE and PDR savings.</li> <li>Screening potential customer project(s) to determine if the project(s) appear to qualify under Commission Rules and Company rate schedules.</li> <li>For those projects that qualify, complete all necessary forms provided by the Companies and gather all supporting documentation required by the Companies and/or the Commission.</li> </ol> <p>The Companies also engage the regional customer service representatives, who are trained and educated on the details of the various program offerings. These representatives meet with a select group of customers to communicate program details. Alternatively, customers can access similar information on the Companies' energy efficiency website, <a href="http://energysaveohio.com">energysaveohio.com</a>, where program literature and application forms can be downloaded.</p>
<b>Program issues and risks and risk management strategy</b>	Risks associated with this program primarily relate to verification documentation. The Companies review the documentation to make sure that it meets all requirements in order to minimize this risk.
<b>Ramp-Up Strategy</b>	This is a continuation of the existing program.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	<p>Incentives will be consistent with Commission directive under either the Mercantile Pilot Program, Docket 10-834-EL-POR, or other relevant proceeding and may include Rider DSE2 exemptions, or cash rebates. Customers will have a choice between two options for program incentives. The Mercantile Customer program and associated incentives are subject to change at the discretion of the Companies and/or the Commission.</p> <p>➤ <b>Option 1 - Cash Rebate:</b> The cash rebate under the Mercantile Customer Program is 75% of what the project would qualify for under the new FirstEnergy Utilities Incentive Programs. These rebates are capped at the lowest of 50% of the total project cost, \$250,000 per project or \$500,000 per customer per year. Note that this option was suspended for the Amended Plan period, it will be again available as part of this Plan.</p>



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	<ul style="list-style-type: none"><li>➤ <b>Option 2 -DSE2 Rider Exemption:</b> To receive the exemption from the rider, a customer's project savings as compared to its baseline energy usage must meet or exceed the utility's statutory benchmark. The customer is eligible to receive the exemption for as long as the project meets those standards. Customers are required to submit annual reports documenting updated energy and demand savings, which are reviewed by the Companies and by the Commission Staff.</li><li>➤ Specific to Combined Heat and Power or Waste Energy Recovery Projects, customers may file applications under the Mercantile Customer Program. These projects will be rebated per the Commission's direction.</li></ul>
<b>Non-Energy Benefits</b>	Rewards customers that took a proactive approach to energy efficiency, thus encouraging more such actions in the future.
<b>Other Information deemed appropriate</b>	This program includes costs for marketing assistance through outside third parties. Costs associated with the rebates paid under Option 1 above are not included in the program budgets set forth in Appendices B. Rather, these costs are separately submitted as part of the individual filings that are submitted to the Commission for approval. Upon approval the costs are recovered through the Companies' Rider DSE.

### 3.0 PROGRAM DESCRIPTIONS

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<b>Program Title and Program years during which program will be implemented</b>	<b>14. Transmission &amp; Distribution Upgrades Program</b> <b>2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>The Companies' existing Transmission &amp; Distribution Program has been renamed to the Transmission &amp; Distribution (T&amp;D) Upgrades Program and is included as part of these Plans. The Companies have developed the T&amp;D Upgrades program that accumulates the savings achieved through various energy efficiency T&amp;D projects completed by the Companies. These projects involve various system improvements that, when made, reduce the amount of line losses, which in turn results in a more efficient delivery system.</p> <p>Relevant metrics are provided in Appendices B and C.</p>
<b>Program approach, rationale and description</b>	<p>This program will contain projects such as, but not limited to, the following that will serve to reduce system line losses, or improve system operation efficiency:</p> <ul style="list-style-type: none"> <li>a. Projects involving the replacement of existing transmission or distribution lines.</li> <li>b. Substation projects including tying together previously unconnected transmission or distribution lines, and/or the addition or upgrade of transformers and circuits in new or existing locations.</li> <li>c. Transmission capacitor bank projects include the addition or expansion of large capacitor banks at a substation location. Distribution capacitor bank projects include the addition of capacitor banks, or a series of banks, in parallel at a substation location or on distribution poles along the circuit.</li> <li>d. Distribution voltage regulation projects involve the replacement of existing equipment with larger and/or more efficient equipment.</li> </ul> <p>These projects are selected through a comprehensive project evaluation process that includes among other things, capital requirements and constraints, projected results, and financial paybacks.</p> <p><b>Project justification as an allowable efficiency activity</b></p> <p>R.C. 4928.66(A)(2)(d) permits a utility to include, for purposes of compliance with statutory EE/PDR benchmarks, "transmission and distribution infrastructure improvements that reduce line losses".</p>

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<b>Market Transformation Strategy (if applicable)</b>	None.
<b>Eligible measures and incentive strategy, include tables for each year of program, as appropriate showing financial incentives &amp; rebate levels (e.g., \$ per measure, \$ per kWh or MW saved)</b>	None.
<b>Non-Energy Benefits</b>	None.
<b>Other information deemed appropriate</b>	<b>Economic benefit from energy savings</b>  Less generation will be required to be purchased, thus reducing total generation costs that would be passed on to customers.

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<b>Program Title and Program years during which program will be implemented</b>	<b>15. Energy Special Improvement District 2017 - 2019</b>
<b>Objective(s) and program metrics</b>	Pursuant to R.C. 1710.061, townships and municipalities may create Energy Special Improvement Districts that offer Property-Assessed Clean Energy (PACE) financing to their constituents to install energy improvements. Energy Special Improvement District allows any efficiency savings or reduction in demand produced by a special energy improvement project located in its certified territory pursuant to R.C. 4928.66 This program is a new program that captures energy savings from such improvements.
<b>Target market (including participation requirements)</b>	Ohio Townships and Municipalities.
<b>Program approach, rationale and description</b>	Ohio Townships and Municipalities that have created Energy Special Improvement Districts, and achieved EE/PDR savings independent of utility programs shall submit a quarterly report to the electric distribution utility.
<b>Implementation strategy (including expected changes that may occur in different program years)</b>	As part of this program, the Companies will be developing a process with the Commission for constituents to submit their energy improvement projects.

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<b>Program Title and Program years during which program will be implemented</b>	<b>16. Smart Grid Modernization Initiative</b> <b>2017 - 2019</b>
<b>Objective(s) and program metrics</b>	<p>The intent of the Smart Grid Modernization Initiative (SGMI) is to study the impact of an integrated system of Distribution Automation (“DA”), Integrated Volt VAR controls (“IVVC”) and Automated Meters (“AMI”) on the energy delivery system. Through this program, the Companies seek to analyze and capture any savings achieved by the installation of the smart grid technologies. As part of this project, the Companies are studying the impact of IVVC on the circuits within the pilot footprint to determine the potential savings that can be achieved using this technology. The installation of smart devices such as capacitors can be used to flatten and fine tune voltage on these circuits and provides an opportunity to reduce KWh and KW on the distribution lines. The Companies are also offering residential customers a simple time of use rate with up to 15 critical peak price events to up to 250 non-shopping customers in the pilot footprint. Full project objectives and relevant metrics can be found in the Companies’ filings in Case No 09-1820-EL-ATA et al.</p>
<b>Target market (including participation requirements)</b>	<p>The Ohio site deployment is within a Cleveland suburban area serving residential &amp; commercial customers on distribution circuits, representing a demand of over 200 MVA.</p>
<b>Program Approach Rationale and Description</b>	<p>As part of the economic stimulus package known as the American Recovery and Reinvestment Act of 2009 (“ARRA”), the Department of Energy (“DOE”) solicited applications for approximately \$3.4 billion of investment grants for the deployment of smart grid technologies. FirstEnergy proposed investing \$114 million to evaluate “smart grid” technologies in three states. The costs associated with the Ohio portion of this experimental program are being recovered through Rider AMI. Although the DOE grant period has expired, the Companies continue to collect information in support of a five year study period ending in May 2019.</p> <p>AMI supports the offering of Rider RCP within the pilot footprint. The rate is designed to provide incentive for customers to use less during on-peak and critical peak periods by shifting their usage to off-peak.</p> <p>The Companies are studying IVVC within the pilot footprint. Adding equipment such as capacitors to the distribution circuit allows the Companies to levelize and get finer control of voltage</p>

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	<p>along the circuit providing opportunities to reduce both KWh and KW usage along the lines.</p> <p>Other information associated with the Companies' SGMI program can be found in Docket No 09-1820-EL-ATA et al.</p>
<b>Other information deemed appropriate</b>	<p>As part of Stipulated ESP IV, the Companies committed to filing a Grid Modernization Business Plan that included various scenarios of additional AMI, DA and IVVC. Should the Companies receive approval for additional deployment of the smart grid technology, energy efficiency and peak demand reduction savings from that deployment would be included in this program. Information on the Grid Modernization Business Plan can be found in Case No.16-0481-EL-UNC.</p>

### 3.7. *Program Budgets and Data Tables*

The Companies have included program budgets and additional data tables (by Company) as Appendices to these Plans as follows:

- Number of participants are shown in Appendix C-2;
- The measures included in this Plan are shown in Appendix C-1;
- Dollar incentives are shown in Appendices B1 and B3;
- kWh savings are shown in PUCO Tables 2 and 7A-7G in Appendix C-4;
- kW peak-demand reduced are shown in PUCO Tables 2 and 7A-7G in Appendix C-4;
- Estimated program budgets (total) by year are shown in Appendices B-1;
- Savings targets, including tables with MWh and MW goals per year and cumulative tables that document key assumptions of savings per measure or projects are shown in Appendix A;
- Cost-effectiveness, including TRC test results for each program with values for each benefit and cost component of TRC calculation are shown in PUCO Tables 7A-7G in Appendix C-4; and
- Anticipated costs to participating customers are shown in Appendix C-1.

### 4.0 PLANNING, REPORTING AND TRACKING SYSTEMS

#### 4.1. *Program Planning:*

As previously discussed, the cornerstone of the Plans is to reactivate and continue the programs from the Prior Plans and to expand the program offerings to include best practice and other ideas identified through benchmarking and stakeholder input as described in Section 3.1.

##### 4.1.1. *Define schedule for updating plans and for reporting such updates to Commission*

Each year, the Companies, as required by the Commission's Rules, file a portfolio status report, which addresses the performance of all approved EE/PDR programs included in the then current approved plan.<sup>19</sup> Included in the filing will be a recommendation on whether each program should be continued, modified, or eliminated. The Companies may propose alternative programs to replace eliminated programs, taking into account the overall balance of programming in their three year plans.<sup>20</sup>

Implemented programs are regularly monitored with results reported to Company personnel by program managers as more fully discussed in Section 4.2.1 below. Throughout the Plan Period, the Companies will track program results and the progress being made towards achieving the Companies' targets, sharing this information with the Collaborative Group as appropriate. Notification to the Commission of any changes to the Plans as approved by the Commission will be provided as required by the Commission's Rules.<sup>21</sup>

#### 4.2. *Project Management Tracking Systems:*

##### 4.2.1. *Provide brief overview of the utility data tracking system for managing and reporting measures, project program and portfolio activities, status and performance as well as utility performance and expenditures*

The Companies utilize a comprehensive system to track and report activities and results associated with the EE/PDR programs across the FirstEnergy system. The tracking and reporting system has the ability to track a customer through program-specific stages as well as provide standard status reports for individual participants and overall programs. Expenditures are tracked and verified on a monthly basis using the Companies' enterprise-wide financial system. Budget vs. actual reports are monitored to ensure program budgets stay within those approved in the Plans.

The Companies regularly work with third-party program managers and the Companies' EM&V consultant to verify the accuracy of data transferred from implementation contractor databases to the tracking and reporting system.

##### 4.2.2. *Describe how the Utility will coordinate with the Commission on data tracking and transfer. Provide examples of data fields captured*

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<sup>19</sup> See generally § 4901:1-39-05(C)(2)(c), Ohio Admin. Code.

<sup>20</sup> See generally § 4901:1-39-05(C)(2)(c), Ohio Admin. Code.

<sup>21</sup> Id.



The tracking and reporting system is a web-based application, allowing for access from any internet connection with the proper security authorizations. The system is capable of interfacing with both internal and external source systems to gather detail data and then summarize it for reporting purposes. The system receives program information from third-party program managers on a routine (daily, weekly or monthly) basis. Data integrity is ensured through a routine reconciliation process. This not only reduces paperwork, but helps maintain quality control over data entry as well as allowing for quick evaluation of program performance, and progress towards goal attainment. In addition to standard and customer reports the system has the ability to perform ad-hoc reporting.

The following are examples of data fields captured across various programs:

- Customer name;
- Customer contact information (address, e-mail, phone);
- Customer type;
- Account number;
- Project/Program name;
- Contractor/Retailer;
- Measure;
- Service address;
- Job status;
- Completion date;
- Heating system type;
- kWh/kW savings;
- Incentive; and
- Measures implemented

### **4.3. Annual report to be posted on PUCO website:**

As discussed in Section 4.2, the Companies' tracking and reporting system will be used to monitor progress of the programs included in these Plans. Reports will be provided as required by the Commission.

#### **4.3.1. List reports that would be provided to the Commission, the schedule for their delivery, and the intended contents. The focus should be on metrics identified in Section 3.1.1**

- An annual portfolio status report is required to be filed with the Commission each year.<sup>22</sup> The Companies' report will be filed consistent with the deadlines established by the Commission; the format and content of the report will be consistent with that defined by the Commission.

#### **4.3.2. Describe data that would be available (including format and timeframe of availability) for Commission review and audit**

As indicated in Section 4.2.2, the system will have the ability to provide reports as reasonably required by the Commission. Any data included within the system would be made available to Commission Staff through normal data request procedures. This information would also be available for Commission review and audit.

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<sup>22</sup> See generally § 4901:1-39-05, Ohio Admin. Code.

### 5.0 PORTFOLIO MANAGEMENT AND IMPLEMENTATION STRATEGIES

#### 5.1. Overview of Utility Management and Implementation Strategies:

5.1.1. *Describe the types of services to be provided by the utility as well as by any third-party providers, such as consultants and trade allies. Indicate which organizations will provide which services and the basis for such allocation*

Generally the Companies will continue overall administration and oversight of the Plans, and utilize third party vendors to perform various program implementation and support duties. Specific activities that the Companies will oversee include the execution of marketing campaigns; Quality Assurance/Quality Control activities and tracking and reporting activities. The Companies will use contractors to provide many program implementation services, including assistance with program implementation, EM&V and the installation of the tracking and reporting tool.

The Companies may also use the following Administrators that have been approved by the Commission<sup>23</sup>, for specific programs, class of customers or to accomplish the goals of a given program. Each of these Administrators is expected to commit to a reasonable level of efficiency and peak demand reductions on behalf of their members; to agree to a reasonable administration fee; and to agree to track and provide documentation evidencing the incremental energy reduction and actual kWh savings achieved from certain programs:

1. Ohio Schools Council
2. Ohio Hospital Association
3. Council of Smaller Enterprises (“COSE”)
4. Ohio Manufacturer’s Association
5. Industrial Energy Users
6. Association of Independent Colleges and Universities of Ohio
7. County Commissioners Association of Ohio Service Corporation (CCAOSC)

Unless otherwise expressly stated in these Plans, the compensation paid to these Administrators is as approved by the Commission in Case No. 09-0553-EL-EEC and/or the Companies’ Stipulated ESP IV.

5.1.2. *Describe risks to program performance and any risk management strategies that will be employed to mitigate those risks. Examples of risks that can cause a program to not deliver expected savings including program design flaws, technologies targeted by a program failing to deliver the savings expected (or failing to prove that they have delivered the savings), and customers or other key market players (e.g. contractors) choosing not to participate in a program*

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<sup>23</sup> While the Companies entered into contracts with The Ohio Energy Group, Roth Bros Inc., and FirstEnergy Solutions Corp. dba The E Group (“The E Group”), each of whom had also been approved by the Commission, these groups notified the Companies of their intent to terminate their Administrator agreements and pursuant to those notifications the agreements have been terminated.

There are various risks associated with the implementation of these Plans, the more significant of which are described below:

1. Performance Risk is the risk that the program does not deliver expected savings.

While modeling assumptions yielded results that support program success within budget, the Companies note the conditions under which these programs will be implemented during the Plan Period. Below is a list of some of the more material risks the Companies will face:

- The timing of the regulatory process and related uncertainty while the Plans are under consideration delays the Companies' ability to enter into contracts with implementation vendors and begin large scale execution of program support and implementation activities prior to approval of this Plan. These Plans and projections are based on an assumption that it will be approved no later than September 30, 2016;
- Changing economic conditions over the plan lives could result in customers not supporting the pace of investment estimated, and slow the pace of mass market penetration;
- Newly introduced programs and measures included in this Plan will not have a historical basis for participation rates or experience. As a result, installation rates may be higher or lower than modeled, particularly in the early years;
- Targeted participants rates and energy/demand savings may not be achieved due to a variety of factors such as changing technology, market trends or incentives that are not high enough to encourage desired energy efficiency investment. The ability to make mid-stream adjustments on a timely basis to program measures or incentive levels is of paramount importance for the Companies to meet their targets and allows the Companies to proactively address rapidly evolving technology and market trends.
- Customers choosing to opt out of the opportunity to participate in the Companies' portfolio plans may reduce the energy savings potential across all C&I customer classes.<sup>24</sup> As certain programs may be affected more than others, the Companies will closely monitor and track the opt-out customers' usage so that program potential may be assessed. Readjustment of resources may be required to address the reduction in potential across programs.

The Companies have taken steps to identify and manage risks as well as to prepare for contingencies that may be necessary during the Plans' implementation period. Those steps are as follows:

- The Companies will continue throughout the Plan Period open discussions with stakeholders, seeking input from the Collaborative Group and their Administrator Group.
- The Companies will continue to consult with their program implementation vendors to modify program implementation strategies and suggest program designs changes as indicated by participation and savings results.
- The Companies will continue to perform EM&V of their EE/PDR programs in order to ensure that all programs are reasonable in terms of dollars spent, participation rates achieved and kWh and kW savings realized.

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<sup>24</sup> R.C. 4928.6611

- The Companies have developed their incentive strategy in a way that allows timely response to market trends. By employing incentive ranges as opposed to fixed points, the Companies have the ability to quickly adjust incentive levels within the approved range to maximize program participation with appropriate incentive levels.
- The Companies will continue to address issues and remain committed to resolve: (i) important programmatic change requirements; (ii) potential additions that are found to be necessary and/or desirable as the Companies, the Collaborative Group and the Administrator Group collect and assesses key program performance metrics over the course of each program's deployment and operation; and (iii) unforeseen events that may arise over the next several years.

Given the investment required to meet the EE/PDR targets, the Companies believe that it is both prudent and necessary to have a robust evaluation process in place from the date of each program's inception, as well as the financial capability to make those changes that are either indicated by the program process evaluations and/or general economic conditions as they change over time.

The Companies believe that their Plans contain the right mixture of incentives and measure offerings to meet the prescribed targets. Further, the Companies' risk management strategies, as designed, should provide the flexibility necessary to maximize the potential for success.

2. Technology Risk is the risk that program technologies fail to deliver the savings expected.

These Plans incorporate virtually all of the programs included in the Prior Plans. Therefore this risk is minimized because of the known historic results for majority of the technologies. However, this risk is heightened for those new measures or existing measures that have been modified since incorporated through the Prior Plans. The Companies have attempted to manage this risk by relying on their expert consultants, their experience with similar measures used by their sister utilities in other jurisdictions and industry research. Further, these Plans incorporate a comprehensive suite of programs that will have an immediate impact on energy use and, in the long run, should help transform the market into one where customers seek energy efficient options on a regular basis.

3. Marketing Risk is the risk that customers, or other key market players, such as contractors, are not aware of available programs, or choose to not participate in a program.

The Companies will continue to carefully evaluate various approaches to building and enhancing awareness through communications in order to minimize market risk. They plan to further raise customers' awareness of the benefits of energy efficiency and conservation, as well as the existence of their programs offered through the Plans through a wide-reaching educational campaign, and community level outreach. In addition to a Company developed media campaign, the Companies intend to utilize the relationships that their Administrator Group has with various target markets, providing them with educational tools as well. Further, each program implementation vendor will also support and supplement such efforts with program specific marketing activities.

Marketing risk will be assessed through program tracking and periodic surveys to gauge awareness of the programs and, for those not participating, barriers to participation. Marketing risk will also be assessed through periodic process evaluations. This will enable the Companies to identify issues related to market risk and implement mid-course corrections to enable the programs to stay on track.

4. Evaluation Risk is the risk that independent EM&V will, based on different measurement methodologies and assumptions, support different levels of savings than those estimated in these Plans. The Companies

minimize this risk through their ongoing work with their EM&V consultant, an expert in EE/PDR program design and evaluation, insights gained through the Companies' experiences in other jurisdictions, and by utilizing the Ohio TRM and other industry TRMs and guidelines to estimate program savings. The Companies and their EM&V consultant will also work with the Commission Staff and/or the Commission's statewide Independent Program Evaluator, as appropriate, in an effort to perform EM&V activities consistent with Commission directives and the laws of the State of Ohio in a sufficiently robust manner so as to reliably capture all applicable program-related savings.

*5.1.2.1. Describe the utility's approach and process for shifting goals and funds, as needed between programs and adding new measures/and or programs*

If it is found that one or more programs are not meeting expectations, the Companies will take one or more of the following actions:

1. Shift the focus of underperforming programs to measures that have a higher adoption rate. The Companies' Plans utilize over 170 measures that are rolled up into programs. This large number of measures incorporated into the programs allows flexibility to shift emphasis to incorporate successful measures as are required to achieve program energy savings goals.
2. Expand program measures to include emerging technology that shows the potential to produce costs effective savings and may not have been well known, tested, accepted by the market, or produced in sufficient quantities at the time these Plans were designed. The Companies will continue to monitor technologies reviewed but not incorporated into these Plans throughout the Plan Period, discussing potential for such technologies with the Collaborative Group as appropriate. To the extent that new measures show promise for inclusion in the Companies' Portfolios, such measures will be discussed in the annual status report that is filed with the Commission.
3. Alter the program delivery processes utilized in order to enhance market penetration. Options here may include having Vendors add field staff to handle more inquiries or shorten response times, eliminating or adjusting project requirements if bottlenecks appear to be stalling progress, or other adjustments such as those identified through process evaluations. Any changes made will take care not to compromise data tracking for evaluation purposes.
4. Investigate issues that customers have with problem programs and modify delivery based upon the results of these surveys.
5. Shift program delivery to more aggressively promoted and perhaps rebated versions.
6. In extreme cases, abandon non-performing programs or measures and replace them with other programs or measures that show the potential for greater success.
7. Shift resources to higher performing programs. The Plans assume customer participation based on current experience of the Companies and their consultants. These are based, among other things, on customer participation in existing programs, and market survey results. To the extent actual customer participation significantly differs from these assumptions, the Plans' resources may need to be rebalanced among programs or Sectors to ensure the overall objectives of the Plan are met.
8. Add delivery or incentive channels.

9. Shift resources among sectors as needed to address demand.
10. Alter rebate levels on a temporary or long term basis to affect market response.

The Companies expect to have the ability to shift resources among programs and/or among customer sectors within the portfolios as needed to meet the goals, consistent with Commission rules.

***What mid-course corrections could be implemented?*** In addition to the steps previously identified, the Companies believe that certain programs may be ramped up through enhanced marketing efforts to achieve kWh and kW impacts greater than anticipated under the Companies' Plans. This may require a re-balancing of program goals and budgets. Notwithstanding, the EE/PDR program tracking system will provide guidance for making such mid-course decisions and adjustments with enough time for such corrections to take effect. The Companies have infrastructure in place for analysis of such information and the development and resolution of recommendations arising from such analysis.

***What would be communicated to regulators and others?*** In addition to the regular annual status reports submitted each year, the Companies will make available to the Commission any pertinent information related to these Plans upon request. Additionally, the Companies intend to apprise the Collaborative Group of progress towards achieving the goals throughout the Plan Period during their regularly scheduled or, if need be, *ad hoc* meetings and subcommittee meetings.

***How will the appropriate mid-course corrections be identified?*** The Companies anticipate using process evaluations to determine progress and identify any necessary corrective actions. Process evaluations will be performed using a combination of participant satisfaction and key customer perception surveys -- all performed using statistically significant samples along with a kWh/kW impact/cost analysis in which each program's performance are compared with Plan expectations. On a monthly basis, the Companies conduct an internal evaluation that reviews the progress of each program from both an energy savings and budget perspective. The Companies will also meet periodically with the Collaborative Group and their Administrator Group, gathering intelligence learned from either of them.

**5.1.2.2.      *Describe the process for collecting and addressing participating customers, contractor and trade ally feedback (e.g. suggestions and complaints)***

During the design phase of the programs, the Companies sought and obtained feedback on potential improvements to the programs included in the Prior Plans and on new programs and measures being contemplated from stakeholders through a variety of methods. Viewpoints of all customer segments were incorporated into the EE/PDR program design. Collaborative Group meetings on different aspects of the EE/PDR program design were also held. To the extent practical, responses from these Collaborative Group members have been factored into the various program designs.

While implementing the approved Plans, the Companies will gain additional direct input from various sources, including (i) Vendors that perform program management and implementation services; (ii) Collaborative Group members; (iii) results from other utilities; (iv) the Commission or its statewide Independent Program Evaluator for insights into the evolution of the EM&V process; and (v) any continuation of the rulemaking process, where the Companies intend to actively participate in the development of solutions to issues as they arise. Customers will be surveyed to



measure satisfaction with the programs and related services, and the efficiency of the EE/PDR measures being implemented. Further, the Companies will investigate program and measure complaints and suggestions from customers, and intend to continue to participate in industry working groups. The Companies' EM&V consultant will assist with program assessments and make recommendations for improvement. Program results and changes will be shared with the Collaborative Group and/or the Administrator Group as appropriate.

*5.1.2.3. Describe the procedures for measurement and project installation verification, quality assurance and control, and savings documentation*

The Companies will pursue evaluations of each of the programs that will include features such as:

- Verification of equipment installation and operation;
- Verification and review of documentation supporting energy savings and demand; reductions claimed along with the methodologies, data and assumptions used in their development;
- Performance of logging and metering studies as appropriate;
- Process reviews supporting quality assurance and informing vendor performance of program services; and
- Coordination and communications related to EM&V activities with Commission Staff or the statewide Independent Program Evaluator as appropriate.

As more fully discussed in Section 5.2, FirstEnergy has a dedicated department focused on energy efficiency. Among other things, this group oversees activities of an independent EM&V consultant who assists the Companies in their EM&V efforts related to each program.

The Companies have included evaluation plans in Section 6.4, which address each program as outlined in the program summaries included in Sections 3.2 through 3.6 of the Plan. The Companies recognize that such evaluations will also be influenced by the Commission Staff or the statewide Independent Program Evaluator who may articulate the Commission's EM&V expectations. The Companies' EM&V team will address questions about their evaluation approach and findings, and assist the Commission Staff in their role as advisors to the Commission.

The Companies will continue to rely on TRM values, as updated in Case No. 09-512-GE-UNC, July 31, 2013 Order, as they apply to counting provisions in S.B. 310<sup>25</sup>.

*5.1.2.4. Describe any "early warning systems" that will be utilized to indicate a lack of progress towards the benchmarks and whether they are likely to be met*

The Companies leverage tracking and reporting processes to monitor progress of each program toward its goals and for the portfolios toward benchmarks on a monthly basis, identifying performance issues, gaps and opportunities for improvement. Review meetings are performed at least monthly. Evaluation activities will also inform how well the programs are moving toward the achievement of goals, and will form the basis upon which any recommendations for adjustments to programs are made. The vast majority of this evaluation work will be done by the EM&V consultant hired by the Companies.

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<sup>25</sup> R.C. § 4928.662 (A) and (B)

- 5.1.2.5. *Provide individual program implementation schedules with milestones in the form of Gantt charts or similar format. Chart should differentiate activities and include dates for the launch, close, and major milestones for the three following years for all seven programs*

Section 1.4 describes the Companies' current roll out plans for the various programs proposed in this Plan.

The Gantt chart below details the Plans' anticipated implementation schedule, based on Commission approval by September 30, 2016.



## 5.0 PORTFOLIO MANAGEMENT & IMPLEMENTATION STRATEGIES

EE/PDR Program Plans

**Figure 2: Sub-program Implementation Schedule**

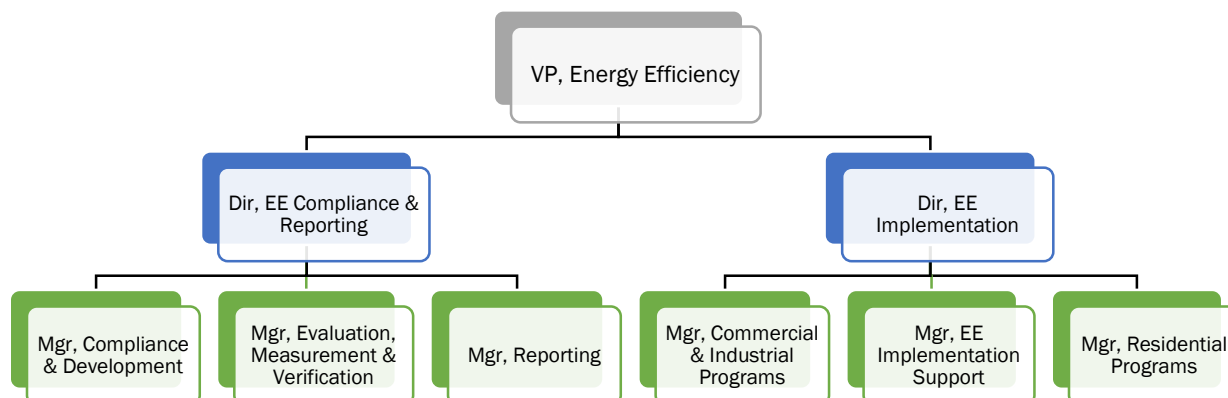
Figure 2: Gas Program Implementation Schedule														
Program Name	Sub-Program Name	June	July	August	September	October	November	December	Plan Year 2017				Plan Year 2018	Plan Year 2019
									1	2	3	4		
Residential Programs														
Appliance Turn In Program	Appliance Turn In													
Energy Efficient Homes Program	School Education													
	EE Kits													
	Audits & Education													
	Behavioral													
	Smart Thermostat													
	New Homes													
Energy Efficient Products Program	Appliances													
	Consumer Electronics													
	Lighting													
	HVAC													
Customer Action Program - Res	Customer Action Program - Res													
Residential Demand Response Program	Direct Load Control													
Residential Low-Income Programs														
Low Income Energy Efficiency Program	Community Connections													
	LI - New Homes													
Small Commercial & Industrial Programs														
C&I Energy Solutions for Business Program - Small	HVAC - SCI													
	Lighting - SCI													
	Food Service													
	Appliance Turn In - SCI													
	Appliances - SCI													
	Consumer Electronics - SCI													
	Agricultural													
	Data Centers - SCI													
	Custom - SCI													
	Retro - Commissioning - SCI													
	Custom Buildings - SCI													
	Audits & Education - SCI													
	Customer Action Program - SCI	Customer Action Program - SCI												
Large Commercial & Industrial Programs														
C&I Energy Solutions for Business Program - Large	HVAC - LCI													
	Lighting - LCI													
	Data Centers - LCI													
	Custom - LCI													
	Retro - Commissioning - LCI													
	Custom Buildings - LCI													
	Audits & Education - LCI													
C&I Demand Response Program - Large	Smart Thermostat - SCI													
	Demand Response - LCI													
Customer Action Program - LCI	Customer Action Program - LCI													
Governmental/Educational/Non-Profit Programs														
Government Tariff Lighting Program	Government Tariff Lighting													
Other														
Mercantile Customer Program	Mercantile													
Transmission & Distribution Upgrades	T&D Upgrades													
Smart Grid Modernization Initiative	Smart Grid													
Energy Special Improvement District	Energy Special Improvement District													
Key														
Develop and Issue RFP														
Select Program Implementation Provider														
Award Program Contract														
Program Set-Up Activities														
Program Launch and Implementation per PUCO Approval														

### 5.2. Executive Management Structure:

#### 5.2.1. Describe Utility management structure for efficiency programs and include Utility organization chart for management team responsible for implementing this plan

The Energy Efficiency Group is entrusted with ensuring that the Companies comply with all statutory EE/PDR requirements and that the approved programs are successfully implemented. The group reports to the Vice President, Energy Efficiency. This group also has responsibility for similar activities for FirstEnergy's other Ohio utilities, as well as its Maryland, New Jersey, Pennsylvania, and West Virginia utility subsidiaries. The organization chart set forth below depicts the management team and their primary areas of responsibility as they currently exist.

**Figure 3: Organization Chart**



The Companies believe that it is particularly important for senior management to be visible in its oversight role and corporate-wide support for the EE/PDR initiatives. As a result, FirstEnergy has created a steering committee that is comprised of senior management members from across the organization, including FE Utilities, Customer Service, Legal, Rates and Regulatory Affairs, Information Technology (IT), Marketing and Branding, External Affairs, Strategy, Supply Chain and Corporate Risk. The steering committee's primary purpose is to:

- Define strategies and provide governance over initiatives relating to EE/PDR; and
- Assure initiatives support corporate objectives integrating customer solutions with operational efficiencies.

The Energy Efficiency Implementation group is organized based on program management responsibilities across customer classes. Key activities include planning and executing marketing campaigns and acquiring and managing the program implementation vendors to ensure quality control and assurance over program implementation. The Energy Efficiency Compliance and Reporting group is organized based on support functions that are common to all programs such as plan development; program evaluation, measurement and verification; and compliance tracking and reporting. Members from this group also coordinate Collaborative

Group activities and manage the Administrator Group, both of which provide input and recommendations on program design and implementation, including customer communication/education.

5.2.2. *Describe administrative budget (i.e. those costs other than incentive payments to customers)*

**Explanation of Program Cost Elements:** The model used for developing the EE/PD programs involves a build-up of direct costs based on program or sub-program fixed costs and variable costs based on participation at the measure level, both of which are then aggregated to the program level. Common costs are estimated at the State or Company level and allocated to each program. The following terms are used in the Budget Tables located throughout the plan.

**Operations** includes all program operating expenses, including dedicated Utility Labor, Marketing, EM&V, Program Administration, Tracking and Reporting and All Other Costs.

**Incentives** include costs for rebates paid to customers as well as costs associated with providing services or measures directly to customers or midstream or upstream payments to program allies where applicable (other than those paid through the Mercantile Customer Program).

See PUCO Table 6A, in Appendix C- 4 for further description and detail on these cost elements, their make-up and development of the Plan budgets.

**6.0 UTILITY EVALUATION, MEASUREMENT AND VERIFICATION ACTIVITIES****6.1 *Describe market evaluations and how results will be used to improve programs and update expected progress toward meeting the electric utility's benchmarks.***

The Companies engaged Harbourfront Group, Inc. to perform market evaluations informing program plans and projections for each of the Companies' five customer sectors. That market evaluation assesses existing and future practices supporting identification of program savings opportunities. The general objective of market evaluation processes is to estimate program impacts based on the behavior of customers and others, including contractors, developers, equipment distributors and retailers. The results of this study are included in the Market Potential Study which is included in Appendix D.

To update expected progress toward meeting benchmarks, the Companies will continue to engage their EM&V Consultant, who will review existing studies, and develop specific evaluation plans that document existing practices and support program impacts. In addition, the EM&V Consultant will continue to utilize established measurement and verification processes to support program improvements, verify program reports, and ascertain whether the programs included in this Plan have achieved the desired energy savings and demand reduction impacts. The EM&V Consultant will also verify and submit the results achieved from completed programs to the Companies for inclusion in any reports to the Commission. For a description of the program assessment activities to be performed by the EM&V Consultant, see the discussion in Sections 5.1.2.1 and 5.1.2.4 above, and Section 6.2 through 6.4 below.

**6.2 *Describe process evaluations and how results will be used to improve programs.***

For purposes of these Plans, *process evaluation* is viewed as providing the explanatory depth to improve program processes, better understand market barriers and opportunities, and support identification of opportunities for improving program implementation, including marketing and promotion, delivery, tracking and verification. *Impact evaluations* quantify and validate the extent of energy saved and demand reduced as a result of a program. Thus, impact evaluation identifies how much of an impact a program has, while process evaluation tells you why.

There is a feedback loop among program design and implementation, impact evaluation, and process evaluation. Program design and implementation, and evaluation are elements in a cyclical feedback process. Initial program design is informed by prior baseline and market potential studies. Ongoing impact evaluation quantifies whether a program is meeting its goals and may raise questions related to program processes and design. Process evaluation tells the story behind how the impact was achieved, and points the way toward improving program impacts by providing insight into program operations. Thus, the three elements work together to create a better, more effective program.

**6.3 *Describe strategy for coordinating with the statewide Independent Program Evaluator.***

The Companies and EM&V Consultant will engage with the Commission Staff and/or the selected statewide Independent Program Evaluator as appropriate during the Plan period. Representatives from the Companies' evaluation team, as well as the EM&V Consultant will attend scheduled meetings with the Commission Staff and/or statewide Independent Program Evaluator to ensure compliance with statewide EM&V directives, share ideas and suggestions regarding the approach being taken at the Companies, and otherwise assist the Companies in shaping and performing a prudent and effective evaluation strategy in coordination with the Commission Staff and/or the statewide Independent Program Evaluator directives.

Additionally, the EM&V Consultant will conduct evaluations on each program included in the approved Plans while coordinating efforts with Commission Staff and/or the statewide Independent Program Evaluator to minimize duplication of work. Documentation required by Commission Staff and/or the statewide Independent Program Evaluator to fulfill its responsibilities will be provided as requested.

The EM&V planning process will also include Commission Staff and/or the statewide Independent Program Evaluator to enable its advice and consent to enhance EM&V efforts, as appropriate. The EM&V Consultant will facilitate ongoing Company communications with Commission Staff and/or the statewide Independent Program Evaluator to ensure the highest practicable level of coordination, particularly for EM&V field activities and other time-sensitive EM&V tasks and processes.

### **6.4 *Describe program-by-program utility evaluation, measurement and verification activities.***

#### **Overview**

This section presents the outline for EM&V plans for the Companies' EE/PDR programs that are being proposed in these Plans. EM&V efforts evolve over time and change as programs move from initial roll-out with few participants to full-scale implementation. The Companies have and will continue to also include a detailed EM&V report with their annual EE/PDR status reports that outlines in more detail the EM&V process followed for each approved program.

The Companies will continue to engage their EM&V Consultant who will develop and implement EM&V processes and procedures. While EM&V plans are written on a program-by-program basis, the Companies will utilize synergies among programs and between Companies to reduce redundant work. EM&V plans may be refined over time to include best practices and lessons learned. The EM&V Consultant will utilize the format required by Commission Staff and/or the statewide Independent Program Evaluator for evaluation plans and will include the following topics:

#### **Introduction and Program Background**

Includes program description, measures covered, markets targeted, program implementation activities, applicable budgets and expected program participation.

#### **Evaluation Objectives**

The overall objective for the impact evaluation is to quantify and validate the extent of *ex post* energy saved and demand reduced as a result of a program. Process evaluation is viewed as providing the explanatory depth to improve program processes, better understand market barriers and opportunities, and support identification of opportunities for improving program implementation, including marketing and promotion, delivery, tracking and verification. Thus, impact evaluation identifies how much of an impact a program has, while process evaluation tells you why.

#### **Overall Evaluation Approach**

- **Impact Evaluation**

Programs include documentation requirements supporting documentation of expected ("ex-ante") impact estimates that reside in tracking and reporting databases. Samples of participant applications are selected for EM&V. After the samples of projects are selected, and the program implementation contractor provides documentation pertaining to the projects, the first step in the EM&V effort is to review the documentation. Documentation that is reviewed for sampled projects may include program forms, databases, reports, billing data, logger data, weather data, and any other potentially useful data.

Program-level gross ex post savings are calculated by applying achieved savings realization rates calculated for the analysis sample to program-level data for reported savings. Realization rates describe the relationship between verified savings and program expected savings estimates. The realization rates are calculated as the ratio of the EM&V Consultants' calculated measure savings to the ex-ante reported savings.

- **Process Evaluation**

As an initial step in the process evaluation, the EM&V Consultant will review program documentation pertaining to program development and implementation, marketing materials, program procedures, program websites, and other program documentation as it becomes available. This includes any application forms, databases, and tracking systems to verify relevant information needed for process interviews is collected.

Additionally, where applicable the EM&V Consultant may also incorporate program manager interviews, participant (and in some cases non-participant) customer surveys, and trade ally surveys. Program manager interviews explore researchable issues and help inform the customer survey design. The interviews identify stated program goals and objectives, assess the effectiveness of the programs' operations relative to the defined program goals and objectives, capture program processes and flows, and explore potential ways to implement the programs more cost-effectively. Surveys are used to gather data on decision-making criteria and on the attitudes and behavior of decision-makers. Participants are questioned regarding their knowledge of the program, their level of interest in the program, and their reasons for participating, while non-participant surveys identify market barriers that could be addressed in program design. The survey of trade allies also allows the EM&V Consultant to gather information on the size of the market for energy efficiency measures that can be used in the assessment of market potential for the Companies' programs.

### **Sampling Plan**

- **Residential Programs**

Sampling of program participants (and in some cases non-participants) will vary among the programs according to participants, measures, and methods of installation. Where appropriate, the sample will be stratified by measure using proportional stratification. The advantage of a proportionally stratified random sample is that greater precision can be achieved than a simple random sample of the same size. Additionally, proportional stratification guards against an underrepresentation of any one particular measure. Sample stratification is particularly useful when there are clear differences in energy savings between each stratum, and when each stratum is relatively homogenous.

- **Commercial & Industrial Programs**

EM&V sampling will occur concurrently with program implementation. Projects are added to the program tracking system as they are submitted and accumulate over time. As a result, sample selection is spread over the entire program year.

Stratified sampling is performed to account for skewed distributions of savings and to reduce the sample sizes required to satisfy the desired precision requirements. By developing strata such that the projects within each stratum are relatively homogeneous with respect to expected kWh savings, a smaller sample is required from each stratum in order to arrive at desired precision estimates. When performing sampling for a skewed population, stratified sampling methods are preferred because a group of projects with less variance in expected savings requires a relatively smaller sample size in order to reach a given precision and level of confidence.

Projects with high kWh savings contribute significantly to the variance in expected savings and are included in the sample with certainty. The EM&V Consultant will select a site-level ex ante kWh

threshold above which all projects at a site will be selected for the sample with certainty. The remaining projects will then be assigned to a kWh stratum according to the level of the expected site-level kWh savings and are chosen at random within each stratum.

- **Customer Action Program**

The EM&V Consultant will employ a variety of EM&V approaches that will be used depending on the specific measure to support claimed savings. Customer Action Program savings may be supported by independent evaluator surveys to obtain data supporting verified energy savings. The surveys will collect information such as customer demographics, customer building characteristics including, heating and cooling systems, lighting and controls, home appliances and equipment, miscellaneous end uses, customer energy use practices and behavior, conservation efforts, and the characteristics of any new and replaced equipment as well as other information as required. The Companies and independent evaluators may also work with retailers, administrators and trade allies to obtain project specific information, particularly for commercial and industrial markets. On-site visits may also be conducted for a sample of customers to collect information regarding the characteristics of the building structure (e.g., insulation levels) and of space conditioning equipment, and for installed conservation measures. Market data on the distribution of energy efficient products may be acquired through organizations such as EnergyStar, the Air-Conditioning, Heating & Refrigeration Institute and the Association of Home Appliance Manufacturers to support the total number of units of each measure type in the Companies' service territories.

Market research completed using the methods described will be to a statistical confidence level in order to extrapolate findings to the population of customers in the Companies' service territories.

### **Reporting**

The EM&V Consultant will facilitate ongoing communication with Commission Staff and/or the statewide Independent Program Evaluator to ensure the highest practicable level of coordination. As required, program evaluations will be submitted in conjunction with the Annual Portfolio Status Report.

### **Evaluation Schedule**

The timing of EM&V activities and reporting can have a significant effect on the accuracy and usefulness of findings. Where applicable, EM&V sampling will occur concurrently with program implementation providing for early feedback to program implementers. This approach requires the EM&V and implementation staff to work closely together to develop methods to collect data as part of the standard program implementation practices. While evaluation activities are ongoing, evaluation reports will be included in the Annual Portfolio Status Report.

Evaluation elements that will vary with each program are discussed below.

- **Process Interviews**: involve a form of qualitative research in which a group of people are asked about their attitude towards a product, service, or concept.
- **Surveys**: (phone, mail or web-based) involve qualitative or quantitative research in which information is obtained from a sample of a population. References to surveys of "non-participants" will generally be based on market surveys related to program awareness that may include participants and non-participants.
- **Billing Histories or Metered Data Analysis**: involve use of historic energy usage as an input for energy savings or peak load reduction impacts, analysis of interval metered data or installation of data loggers to support estimates.

- File Reviews: involve processes associated with the collection and validation of application forms created by the Companies and their program contractors in consultation with their EM&V Consultant for use by customers and their agents to document the energy efficiency measures performed in each program. Program applications document specific information required to estimate and verify program energy savings and peak demand reduction impacts.
- On-Site Verification: involves verification inspection processes (generally of samples of participants) to validate application information. Direct installation programs, in which a company contractor delivers services, includes “on-site verification” by definition.



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### 7.0 COST RECOVERY- MECHANISM

#### 7.1 *Provide and describe tariffs and a cost recovery mechanism.*

Except for certain costs incurred through the Companies' T&D Improvements Program, Companies' ELR Rider, and Smart Grid Modernization Initiative, the Companies will continue to collect costs associated with demand side management, energy efficiency and peak demand reduction including lost distribution revenue through their current Demand Side Management and Energy Efficiency Rider (Rider DSE), which has already been approved by the Commission.

As previously ordered by the Commission in Case No. 12-2190-EL-POR, *et al.*, the Companies are proposing to continue to offer capacity resources associated with the energy efficiency and peak demand reduction resources into future PJM Capacity Auctions and to continue the 80%/20% revenue sharing mechanism between the customers and the Companies. Also, as previously ordered by the Commission in Case No. 12-2190-EL-POR, *et al.*, the Companies, as a condition of participating in the EE/PDR Programs, will require participating customers to tender ownership of any energy credits owned by the customers, absent a change in policy approved by the Commission. Projects from customers who participate in the Mercantile Customer Program will be exempt from this requirement.

The Plans also continue a shared savings mechanism that encourages the Companies, through financial incentives, to exceed their statutorily mandated EE/PDR goals ("Shared Savings Mechanism"). The amount of the shared savings, as calculated below, will be recovered through the Companies' Rider DSE2 as set forth in the Rider. The Shared Savings Mechanism is the same as approved by the Commission in the Companies' Previous EE/PDR Portfolio Plans except for the changes approved by the Commission in the Companies' Stipulated ESP IV and includes the following key features:

- The Shared Savings Mechanism would be triggered only if the Companies exceed both their Annual and Cumulative energy saving targets as set forth in R.C. 4928.66(A)(1)(a) in any given year.
- The Shared Savings Mechanism will be calculated annually on an individual EDU basis, consistent with information presented in each EDU's annual compliance report.
  - The Shared Savings Mechanism will be determined based upon discounted net lifetime benefits as calculated by the Utility Cost Test ("UCT") with the same avoided cost rates and discount rates as utilized in the Companies' Plans. The EDU will receive a percentage of Total Discounted Net Lifetime UCT Benefits based upon the amount of over compliance achieved by the Companies, as shown in the following table:

Incentive Tier	Compliance Percentage	Incentive Percentage
1	<= 100%	0.0%
2	>100-105%	5.0%
3	>105-110%	7.5%
4	>110-115%	10.0%
5	>115%	13.0%

- The savings of all programs will contribute to the calculations of whether the Companies have exceeded their benchmarks for any particular year and in doing so, have triggered the Shared Savings Mechanism.
- The Total Discounted Net Lifetime Benefits of all cost-effective energy efficiency programs (as determined by the UCT) are eligible for shared savings. However, the Companies' T&D projects and projects that receive any funding from the Universal Service Fund as established in RC §4928.51 shall be excluded from the Total Discounted Net Lifetime Benefits calculation, even if cost-effective, and will not be included in the Portfolio's Adjusted Net Benefits.<sup>26</sup>
- For purposes of determining if the Annual energy targets in this Shared Savings Mechanism have been met, the Companies may include only Annual savings that are reflected in the Companies' Portfolio Status Reports for the year in which the Shared Savings Mechanism is being calculated, and not banked energy efficiency savings from previous years. This Shared Savings Mechanism shall in no way preclude the Companies from applying banked energy efficiency savings from previous years towards the goals established in R.C. 4928.66(A)(1)(a).

The amount of the shared savings will be calculated consistent with the methodology outlined above and pursuant to the Commission's March 31, 2016 Opinion and Order in the Companies' Stipulated ESP IV, including the cap of \$25 million after-tax per year in total across the Companies.

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<sup>26</sup> See, RC § 4928.66 (A)(2)(d)(i)(IV) and (V).

### 8.0 COST EFFECTIVENESS

#### 8.1. *Explain and demonstrate how the proposed portfolio will be cost effective as defined by the Total Resource Cost Test (TRC) under proposed Rule 4901:1-39-01(W).*

The savings generated through these Plans are based upon the requirements and guidance of the TRM as approved by the Commission in Case No. 09-512-GE-UNC and other public sources, which have been used in developing the key inputs to the analysis of the EE/PDR technologies or measures proposed in this Plan.

The costs calculated in the TRC test include the sum of costs incurred by both the Companies and any participating customers. The benefits calculated in the TRC test include the avoided supply costs, including generation, transmission and distribution capacity costs; avoided energy supply costs; and avoided operation and maintenance costs.

The avoided generation capacity and energy supply costs are based on the Companies' forecast of generation capacity and energy prices in the ATSI region of PJM. The avoided transmission and distribution capacity costs are based on the Avoided T&D Study<sup>27</sup> undertaken by the Companies.

The benefits were then calculated using the measure kWh and kW savings multiplied by the assumed number of measure units and the avoided capacity and energy costs. Similarly, avoided operation and maintenance costs were assessed for certain measures and multiplied by the assumed number of measure units. Annual benefits over the measure life-time were discounted using the Companies' overall post-tax weighted average cost of capital ("WACC") of 8.48 percent.

The costs were calculated by adding the costs of the various programs incurred by the Companies and the participating customers, including, incremental cost, implementation and program delivery, and administrative costs. Costs are assembled at the plan, program or sub-program level and assigned to all measures within the program and/or sub-program. Annual costs over the plan period were also discounted using the Companies' overall post-tax WACC.

Additional costs were included in the cost effectiveness testing that, while not included in the Plans or program budgets, arise from provisions in the Companies' Stipulated ESP IV. These costs will encourage energy efficiency across various customer segments, and have been allocated at that level for the purposes of the TRC calculation.

As a result, these Plans are cost-effective based on the TRC test as described above, and using the formula set forth in § 4901:1-39-01(Y). The results of the TRC test are presented in PUCO Table 1, which can be found in Appendix C-4 of this Plan, and are expressed as both a net present value and a benefit-cost ratio.

#### 8.2. *Provide background and describe the development and results contained in PUCO Tables 7A through 7G.*

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<sup>27</sup> Avoided T&D Study, performed by Harbourfront Group, Inc., dated April, 2016.

## 8.0 COST EFFECTIVENESS

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EE/PDR Program Plans

PUCO Tables 7A through 7G summarize TRC test results for each of the five customer segments on an individual program basis, plus the Mercantile Customer Program and the Companies' T&D Improvements Program. These tables are available in Appendix C-4.

### 9.0 PLAN COMPLIANCE INFORMATION AND OTHER KEY ISSUES

**9.1. *Summarize how programs in the portfolio meet the following design criteria (sub-sections may reference other chapters of the plan as they may restate what was included elsewhere in the plan, and are collected here only for convenience of review):***

#### **9.1.1. *Potential for broad participation within the targeted customer class***

The portfolio of EE/PDR programs offers comprehensive participation opportunities to the customers and communities within the Companies' service territories. While the basis of the Plans include the Companies' prior EE/PDR program portfolios, many of the programs have been expanded, providing enhanced opportunities for additional customer participation and savings opportunities.

The residential customer base can be segmented into four program groups including 1) General Service customers 2) Electric Heat and/or Central Air Conditioning customers 4) Low Income customers and 5) New Residential Construction. Each of these residential segments is targeted through the proposed suite of EE/PDR programs.

These programs contain measures designed for either the collective Residential customer base, or specific segments. As an example, all residential customers can participate in the Energy Efficient Products program and the Appliance Turn-In Program subject to program requirements, while Electric Heat and/or Central Air Conditioning customers are targeted for the Comprehensive Audit measure in the Energy Efficient Homes Program or the Direct Load Control Program. Low Income residential customers can participate in any of the above, plus the Low Income Program, which is specifically designed for income constrained customers. In addition, the residential construction segment is targeted by the Energy Efficient Homes Program.

The business and government sectors have programs covering a broad range of energy efficiency opportunities. The Energy Solutions for Business Program for both the Small and Large Enterprise sectors includes various sub-programs targeting both energy efficient buildings, equipment and operations. There is also a Government Tariff Lighting Program, with various lighting measures targeting government entities.

#### **9.1.2. *Cost-effectiveness on a portfolio basis***

The Plan for each company is cost-effective, with portfolio ratios of 1.6 for OE, 1.7 for CEI, and 1.7 for TE. Details are presented in PUCO Table 1 in Appendix C-4.

#### **9.1.3. *Benefit to all members of a customer class, including non-participants***

Benefits to all members of the customer class are outlined in Section 9.1.1.

Non-participants in all classes will also benefit by the educational services and marketing concerning the value of energy efficiency technologies and actions. Regardless of their level of program participation, community members will be made aware of the Companies' programs. This awareness will help even non-participants to make more informed decisions regarding their energy usage.

#### **9.1.4. *Likely magnitude of aggregate energy savings or peak-demand reduction***

The magnitude of aggregate energy savings and peak-demand reduction is presented in PUCO Table 2, Table Summary of Portfolio Energy and Demand Savings, which can be found in Appendix C-4.

### 9.1.5. *Non-energy benefits*

Residential and C&I customers receive a number of non-energy benefits through these Plans. Residential benefits may include:

- Increased comfort, both in businesses and in the home;
- Improved quality of the housing stock;
- Lower proportion of household income that is devoted to energy costs; and
- Increased ability to pay bills, both in terms of overall amount and timeliness.

C&I non-energy benefits may include:

- Reduced operating costs;
- Improved quality of building stock;
- Increased knowledge about how to control energy costs;
- Improved property values;
- Ability to claim green status; and
- Increased employee satisfaction.

Broader non-energy benefits to the service territory may include:

- Increased public safety and decreased community maintenance costs through the implementation of energy efficient technology;
- Increased employment benefits through the potential creation of “green” jobs; and
- Societal benefits resulting from reduced air emissions.

### 9.1.6. *Equity among customer classes*

PUCO Table 5, Rate Class Budget and Parity Analysis, included in Appendix C-4 demonstrates equity among customer classes.

## 9.2. ***Describe relative advantages or disadvantages of energy efficiency and peak-demand reduction programs for the construction of new facilities, replacement of retiring capital stock, or retrofitting existing capital stock.***

In theory, energy efficiency and peak demand reduction programs can potentially postpone the construction of new generation. However, these programs will not become a substitute for such construction, especially since certain customers can opt out of, or override, a program. As generating stations age and the country’s appetite for electricity grows, new generating stations and transmission facilities will still need to be constructed. In order to maximize the period in which EE/PDR programs postpone such construction, the Commission should encourage programs that are, in essence, a reliable substitution for the generation they displace.

The MW and MWh reductions associated with the substitution of older, less efficient appliances and end uses with newer, more efficient appliances and end uses for both the residential and C&I sectors are the most reliable and enduring. This is so because the replacement of old, less efficient, electric consuming devices with new, more efficient ones requires only one act by the consumer. The programs that foster such technology upgrades not only produce enduring energy savings over the measures’ lives but they also contribute to peak-related savings since, often, this more efficient equipment generally has a lower system-

coincident peak contribution than the equipment it replaces. The Plan demonstrates this dual benefit feature of energy efficiency programs.

Conversely, programs in which a customer can choose whether to actively participate are less predictable substitutions for the generation they displace. For example, if a customer has the option of over-riding a peak reduction device, the utility cannot rely on the program as a total substitution for the generation it is intended to replace. This ability to over-ride the program also makes it more difficult to accurately determine the actual amount of generation the program displaces and makes planning for resources more difficult.

**9.3. *Describe potential to integrate the proposed programs with similar programs offered by other utilities, if such integration produces the most cost-effective results and is in the public interest.***

While the Companies are not opposed to working with the other Ohio utilities to develop cost effective statewide EE/PDR programs, the Companies believe that any such initiative must be coordinated through the Commission. Periodically the Companies participate in joint calls with the other Ohio utilities to discuss pertinent issues related to either the implementation of current programs or future portfolio filings. As part of the Companies review of best practice programs, a review was conducted of programs offered in the other utilities current portfolio plans to coordinate program designs where possible.

**9.4. *Describe the degree to which measures may be bundled within a program so as to avoid lost opportunities to attain energy savings or peak reductions that would not be cost-effective or would be less cost-effective if installed individually.***

A wide range of measures were considered or evaluated for potential inclusion in this portfolio, with those showing acceptable potential appearing in final program designs. These Plans incorporate all of the cost effective measures and programs from that analysis, as well as other measures and programs that may have been less cost effective on their own but were included to provide contributions to the program or portfolio of programs. There are several reasons why it is important to include a wide range of measure options for consumers and businesses when designing programs:

- Many less cost effective measures still produce sizeable energy savings and provide value to customers and the Companies;
- Less cost effective measures can become more cost effective when bundled with others, by sharing the administrative and program operations costs across many measures; and
- Several of the individually less cost effective measures can be obtained through lower cost program options, such as energy efficiency kits, thus keeping their cost benefit ratios as high as possible.

The Companies also revised the program portfolios which included the bundling of programs and measures, and leveraging common program costs to maximize program opportunities and cost-effectiveness. As an example, the new Energy Solutions for Business Programs – Small and Large, includes measures previously provided under the Energy Efficient Equipment and Energy Efficient Buildings programs. By combining these programs, administrative costs and program oversight costs should be reduced while streamlining program processes and simplifying customer participation in the programs.

**9.5. *Describe the degree to which the program designs engage the energy efficiency supply chain and leverage partners in program delivery.***



The Companies will continue to coordinate programs with trade allies, community based organizations, and other local market participants through outreach, training and potential co-marketing to ensure that these partners are aware of the Companies' programs, are able to articulate program features and benefits to potential customers and can support customers in their decision to undertake energy efficiency actions. The Companies' implementation strategy relies on a broad range of contractors, partners, trade allies, community agencies, and other entities engaged in energy efficiency to promote, deliver, and support the effective deployment of programs. The Companies will continue to use outside vendors to deliver services in support of many of their programs, with some vendors operating as turnkey program delivery contractors, and others providing specific functions across multiple programs. In addition, many of the Companies' programs depend on trade allies and other market partners to engage customers, promote programs, evaluate projects, and install energy efficient equipment. The Companies may be offering contractors incentives for select measures in exchange for providing end use customers education and awareness of efficient products. The Companies' objective is to strike a reasonable balance of costs, customer value, customer choice, quality of service, and energy savings.

The Companies' Supply Chain Group will be involved with external entities by utilizing bids and/or negotiating contract awards and extensions, as most appropriate, given the situation and the partner(s) involved. Supply Chain creates Purchase Orders, Contracts, or other written agreements with EE/PDR suppliers to ensure a control process is in place for appropriate financial terms, legal safeguards, compliance with FirstEnergy procurement and contracting policies and procedures, and management of these outside suppliers. This group deals with suppliers in a fair and impartial way so that no supplier is given an improper competitive advantage over another. Offers for goods and services are objectively evaluated, with buying decisions based on the best interests of FirstEnergy and its customers. In addition to cost, these decisions are based on terms that include:

- fair and equitable to buyer and seller;
- competitive to the maximum extent practicable;
- founded on a sound business basis; and
- appropriate financial terms and legal safeguards.

The Companies will continue to leverage their relationships throughout FirstEnergy's service territory when possible, in an effort to minimize costs by creating economies of scale and efficiencies through consistency. For example, ADM Associates Inc. which is the Companies' independent evaluation contractor for Ohio and Pennsylvania at the time of this filing, also assisted FirstEnergy's Maryland and Pennsylvania utilities with the development of EE/PDR Plans and programs during 2014 and 2015 . Much of this work, including program design, measure projections and modeling was leveraged in the development of this Plan, thus providing the opportunity to leverage certain tasks and avoid the costs of duplicate efforts. FirstEnergy has also developed systems, such as its tracking and reporting system that it plans to utilize in all states in which its utilities operate energy efficiency programs. Where applicable, costs for such systems are spread over larger customer bases across multiple jurisdictions, thus reducing costs for all on an individual customer basis.

**9.6. *Describe the degree to which the programs successfully address market barriers or market failures.***

## 9.0 PLAN COMPLIANCE INFORMATION AND OTHER KEY ISSUES

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EE/PDR Program Plans

The programs in the Companies' EE/PDR Plans address several barriers that face both consumers and businesses regarding energy efficiency actions they can take. The most common barriers are addressed below:

- **Lack of adequate information about energy efficiency options** – The Plans address the potential for a lack of information in the Companies' service territories through both broad-based marketing campaigns, and program-specific marketing elements. The Plans also include a behavior program where the Companies will provide Energy Usage Reports to residential customers including information about energy efficiency opportunities that are available to them. Additionally, both Residential and C&I customers will have access to energy efficiency audits and other educational based programs enabling customers to obtain customized information about their homes or businesses, energy efficiency and conservation information and available incentives for participating in company programs.
- **Higher first cost of energy efficient equipment, appliances and building upgrades** - Several programs provide incentives that bring the first cost of equipment and projects down by covering some of the incremental costs over standard options. For low income customers, many measures and services are offered without any additional up-front costs.
- **No comprehensive service to identify all savings opportunities in a home or building** - The Portfolio includes comprehensive programs for Residential and C&I customers through various energy audit and education options.
- **Lack of experience with high efficiency technologies** – The Companies' proposed programs include energy efficiency kits designed to introduce Residential and Small Enterprise customers to common efficiency measures. These kits include information such as technology highlights, instructions for proper use of kit contents, and information on how to take advantage of the Companies' suite of EE/PDR programs. Small Enterprise customers will also be targeted with an audit with direct install measures providing similar customer engagement, education and information.
- **Limited discretionary funds in low income households** - In recognition of this barrier, residential programs include either waiver of fees, significant rebates, and/or direct installation of measures to ensure that low income households can fully benefit from the portfolio of programs being offered.
- **High disposal cost and lack of knowledge of proper appliance disposal** - The Appliance Turn-In Program addresses the concerns of customers with outdated energy intensive appliances through: 1) incentives for relinquishing the unit(s); 2) lowered energy bills; 3) knowledge that the unit(s) are disposed of in an environmentally friendly manner; and 4) a program design that does not require the purchase of a new appliance to participate in this program.

### 9.7. *Describe the degree to which the programs leverage knowledge gained from existing programs successes and failures.*

There has been experience in the delivery of basic energy efficiency programs nationally for at least two decades, and a wide body of literature exists with findings related to successful implementation strategies and best practices for achieving results. The Companies have reviewed key energy efficiency industry reports documenting best practices, along with industry awards and other utility offerings that have demonstrated proven results. This well-documented experience from elsewhere is augmented with the experience that the Companies have gained from implementing their programs since 2009, all of which is embedded in the Plans, and the experience of the Companies' affiliates from implementing programs over the same timeframe in both

Ohio and other jurisdictions. The final set of programs recommended in these Plans represents a combination of tried-and-true delivery approaches of commercially available technologies that have a high probability of being accepted by consumers and business customers during the Plan Period, and to a lesser degree, newer and innovative programs and delivery approaches that expand the opportunities and savings of the portfolio to target additional customers and end uses.

The Companies' experience through their own and their affiliates' program implementation activities across four states has revealed important lessons regarding implementation vendor expectations, consumer marketing and education, and the importance of gaining the support of local contractors and other program allies. The provisions established in the Stipulated ESP IV necessitate effective consumer marketing and education campaigns that engage local trade allies and contractors. These lessons are factored into the Companies' EE/PDR Plan implementation activities. While many programs from the Companies' Prior Plans are included in the Plans, the Companies will learn additional lessons from process evaluations as the portfolio of programs and measures are launched and additional experience is gained. Importantly, the portfolios rely on a solid foundation of established program designs and vendor experiences spanning many years across many jurisdictions. The portfolios build off of existing successes, while newly introduced programs provide incremental savings opportunities.

### ***9.8. Describe the degree to which the programs promote market transformation.***

Market transformation occurs when the overall market for a product, such as high efficiency LED light bulbs, becomes the new standard model, rather than the outlier. The primary ways in which the programs in this portfolio address market transformation are: 1) by providing customers with unbiased customized information about the opportunities that exist in their homes and the specific types of products they can buy to achieve those savings; 2) by promoting the products that customers can easily obtain so that customers can immediately experience the quality, hassle free nature of the products and test their claims for lowering utility bills; 3) by providing customers with audits and other educational approaches enabling them to understand what opportunities are available to them and technology upgrades that promote energy savings; 4) by helping customers to understand how bill savings will offset initial incremental investment; and 5) increased standards applicable to certain technologies promote energy efficiency supply chain improvements as manufacturers and distributors will discontinue lesser efficient technologies over time. As customers experience these benefits, the demand for the offered products should increase until the higher efficient technology becomes the norm.

### 10.0 LIST OF APPENDICES

Separate Appendices A – C are provided for OE, CEI, and TE as follows:

- Appendix A: Results of Prior Plans and Projections
- Appendix B: Portfolio Budget and Savings Detail
  - Appendix B-1: Budgets by Cost Category by Year and Total
  - Appendix B-2: Savings by Sub-program by Year and Total
  - Appendix B-3: Plan Budget Cost Categories
- Appendix C: Program Assumptions & PUCO Tables
  - Appendix C-1: EE&C / DR Program Measure Assumptions
  - Appendix C-2: Forecasted Number of Units
  - Appendix C-3: Portfolio Rebate and Measure Eligibility Table
  - Appendix C-4:
    - PUCO 1: Portfolio Summary of Lifetime Costs and Benefits
    - PUCO 2: Summary of Portfolio Energy and Demand Savings
    - PUCO 3: Summary of Portfolio Costs
    - PUCO 4: Program Summaries
    - PUCO 5: Budget and Parity Analysis Summary
    - PUCO 5A: Energy Savings and Parity Analysis Summary
    - PUCO 6A: Portfolio-Specific Assignment of EE&C Costs
    - PUCO 6B: Allocation of Common Costs to Applicable Customer Sector
    - PUCO 6C: Summary of Portfolio EE&C Costs
    - PUCO 7A-7G: TRC Benefits Table
- Appendix D: Market Potential Study

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# **Ohio Edison - Appendices**

## **Ohio Edison - Appendix A: Results of Existing Plan**

# Appendix A-1 Summary Annualized Energy and Demand Portfolio Impacts, 2009 - 2015

Cumulative 2009 - 2015 Energy Efficiency and Peak Demand Reduction Results		
Utility	Energy Savings, MWh <sup>1, 2</sup>	Coincident Peak Demand Reductions, MW <sup>1, 2, 3</sup>
OE	1,741,966	287
CEI	1,504,135	221
TE	702,081	119
<b>TOTAL</b>	<b>3,948,182</b>	<b>627</b>
<p><sup>1</sup> Includes preliminary estimate of cumulative 2013-2015 Portfolio Results plus results of the Companies' 2009-2012 Portfolio progress. Also includes projects pending PUCO approval as well as prior year Transmission and Distribution projects pending before the Commission in Dockets 12-1550-EL-EEC et. seq., and 13-1188-EL-EEC et. seq.</p> <p><sup>2</sup> 2015 values are based on preliminary estimates. Values shown through 2014 are based on the Companies' Annual Compliance Filings.</p> <p><sup>3</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.</p>		



## Appendix A-2 Summary Annualized Energy and Demand Portfolio Impacts

2016 Projection Energy Efficiency and Incremental Coincident Peak Demand Reduction Results		
Utility	Energy Savings, MWh <sup>1</sup>	Coincident Peak Demand Reductions, MW <sup>1, 2</sup>
OE	126,329	21
CEI	85,256	12
TE	44,976	7
<b>TOTAL</b>	<b>256,561</b>	<b>39</b>
<sup>1</sup> Values shown are preliminary estimates and include projections for the Companies existing Low Income Program, Mercantile Customer Program, Transmission and Distribution Savings and Customer Action Program. <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

Cumulative EOY 2016 Estimated Energy Efficiency and Coincident Peak Demand Reduction Results <sup>1</sup>		
Utility	Energy Savings, MWh	Coincident Peak Demand Reductions, MW <sup>2</sup>
OE	1,868,294	308
CEI	1,589,391	233
TE	747,057	126
<b>TOTAL</b>	<b>4,204,743</b>	<b>666</b>
<sup>1</sup> Sum of Appendix A-1 and 2016 Projection <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

## **Ohio Edison - Appendix B: Portfolio Budget Detail**

Appendix B-1: Program Cost by Program Year

Ohio Edison - Program Year 2017					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$2,549,078	\$729,764	\$3,278,842
		Sub-Total	\$2,549,078	\$729,764	\$3,278,842
	Energy Efficient Homes Program	School Education	\$663,661	\$415,976	\$1,079,636
		EE Kits	\$827,261	\$3,621,188	\$4,448,449
		Audits & Education	\$752,803	\$561,550	\$1,314,353
		Behavioral	\$2,394,812	\$0	\$2,394,812
		New Homes	\$623,960	\$880,525	\$1,504,485
		Smart Thermostat	\$162,573	\$497,200	\$659,773
		Sub-Total	\$5,425,070	\$5,976,439	\$11,401,509
	Energy Efficient Products Program	Appliances	\$115,097	\$743,570	\$858,667
		Consumer Electronics	\$58,275	\$159,706	\$217,981
		Lighting	\$1,553,827	\$1,612,510	\$3,166,337
		HVAC	\$135,479	\$1,268,219	\$1,403,697
		Sub-Total	\$1,862,678	\$3,784,005	\$5,646,683
	Customer Action Program - Res	Customer Action Program - Res	\$302,348	\$0	\$302,348
		Sub-Total	\$302,348	\$0	\$302,348
	Residential Demand Response Program	Direct Load Control	\$334,319	\$0	\$334,319
		Sub-Total	\$334,319	\$0	\$334,319
	Low Income Energy Efficiency Program	Community Connections	\$240,764	\$0	\$240,764
		LI - New Homes	\$99,669	\$6,899	\$106,568
		Sub-Total	\$340,433	\$6,899	\$347,333
	Residential Total			\$10,813,927	\$10,497,107
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$197,206	\$499,734	\$696,941
		Lighting - SCI	\$1,219,515	\$2,619,371	\$3,838,886
		Food Service	\$69,687	\$172,313	\$242,000
		Appliance Turn In - SCI	\$322,403	\$13,251	\$335,654
		Appliances - SCI	\$73,659	\$34,976	\$108,634
		Consumer Electronics - SCI	\$58,147	\$16,702	\$74,849
		Agricultural	\$111,984	\$50,663	\$162,647
		Data Centers - SCI	\$302,709	\$165,942	\$468,650
		Custom - SCI	\$849,505	\$1,608,281	\$2,457,787
		Retro - Commissioning - SCI	\$384,765	\$455,501	\$840,266
		Custom Buildings - SCI	\$519,726	\$713,435	\$1,233,161
		Audits & Education - SCI	\$3,439,805	\$5,461,394	\$8,901,199
		Sub-Total	\$7,549,111	\$11,811,561	\$19,360,672
	Customer Action Program - SCI	Customer Action Program - SCI	\$303,134	\$0	\$303,134
		Sub-Total	\$303,134	\$0	\$303,134
Small C&I Total			\$7,852,245	\$11,811,561	\$19,663,806
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$263,125	\$394,788	\$657,913
		Lighting - LCI	\$483,464	\$746,952	\$1,230,416
		Data Centers - LCI	\$438,920	\$270,592	\$709,512
		Custom - LCI	\$2,081,219	\$3,138,385	\$5,219,604
		Retro - Commissioning - LCI	\$190,689	\$140,154	\$330,843
		Custom Buildings - LCI	\$645,273	\$778,659	\$1,423,933
		Audits & Education - LCI	\$679,693	\$264,000	\$943,693
			Sub-Total	\$4,782,384	\$5,733,530
	C&I Demand Response Program - Large	Demand Response - LCI	\$5,200	\$0	\$5,200
		Sub-Total	\$5,200	\$0	\$5,200
	Customer Action Program - LCI	Customer Action Program - LCI	\$112,010	\$0	\$112,010
		Sub-Total	\$112,010	\$0	\$112,010
Large C&I Total			\$4,899,594	\$5,733,530	\$10,633,123
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$55,126	\$31,750	\$86,876
		Sub-Total	\$55,126	\$31,750	\$86,876
Non - Residential Total			\$12,806,965	\$17,576,841	\$30,383,805
Mercantile	Mercantile Customer Program	Mercantile	\$195,613	\$0	\$195,613
		Sub-Total	\$195,613	\$0	\$195,613
Mercantile Total			\$195,613	\$0	\$195,613
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000
		Sub-Total	\$5,000	\$0	\$5,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
Other Total			\$5,000	\$0	\$5,000
Total			\$23,821,505	\$28,073,948	\$51,895,453

Appendix B-1: Program Cost by Program Year

Ohio Edison - Program Year 2018					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$2,459,256	\$729,764	\$3,189,021
		Sub-Total	\$2,459,256	\$729,764	\$3,189,021
	Energy Efficient Homes Program	School Education	\$530,799	\$415,976	\$946,774
		EE Kits	\$656,908	\$3,621,188	\$4,278,096
		Audits & Education	\$626,860	\$561,550	\$1,188,410
		Behavioral	\$2,221,458	\$0	\$2,221,458
		New Homes	\$445,207	\$880,525	\$1,325,732
		Smart Thermostat	\$152,572	\$497,200	\$649,772
		Sub-Total	\$4,633,804	\$5,976,439	\$10,610,243
		Energy Efficient Products Program	Appliances	\$94,296	\$743,570
	Consumer Electronics		\$49,402	\$159,706	\$209,108
	Lighting		\$1,200,670	\$1,782,413	\$2,983,083
	HVAC		\$122,224	\$1,268,219	\$1,390,443
	Sub-Total		\$1,466,592	\$3,953,908	\$5,420,499
	Customer Action Program - Res	Customer Action Program - Res	\$300,774	\$0	\$300,774
		Sub-Total	\$300,774	\$0	\$300,774
	Residential Demand Response Program	Direct Load Control	\$331,241	\$0	\$331,241
		Sub-Total	\$331,241	\$0	\$331,241
	Low Income Energy Efficiency Program	Community Connections	\$228,309	\$0	\$228,309
		LI - New Homes	\$56,543	\$6,899	\$63,442
		Sub-Total	\$284,852	\$6,899	\$291,751
	Residential Total			\$9,476,518	\$10,667,010
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$174,746	\$504,083	\$678,829
		Lighting - SCI	\$1,182,875	\$2,730,570	\$3,913,446
		Food Service	\$52,579	\$188,210	\$240,789
		Appliance Turn In - SCI	\$307,795	\$14,606	\$322,400
		Appliances - SCI	\$56,735	\$38,609	\$95,343
		Consumer Electronics - SCI	\$40,364	\$18,769	\$59,133
		Agricultural	\$97,129	\$55,913	\$153,042
		Data Centers - SCI	\$309,919	\$178,900	\$488,819
		Custom - SCI	\$879,279	\$1,775,804	\$2,655,084
		Retro - Commissioning - SCI	\$390,187	\$490,539	\$880,726
		Custom Buildings - SCI	\$546,389	\$793,092	\$1,339,481
		Audits & Education - SCI	\$3,411,069	\$6,147,620	\$9,558,690
	Sub-Total	\$7,449,067	\$12,936,714	\$20,385,781	
	Customer Action Program - SCI	Customer Action Program - SCI	\$301,488	\$0	\$301,488
		Sub-Total	\$301,488	\$0	\$301,488
Small C&I Total			\$7,750,554	\$12,936,714	\$20,687,268
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$207,837	\$400,718	\$608,554
		Lighting - LCI	\$441,189	\$827,221	\$1,268,410
		Data Centers - LCI	\$400,518	\$270,966	\$671,484
		Custom - LCI	\$1,703,232	\$3,303,985	\$5,007,217
		Retro - Commissioning - LCI	\$165,832	\$151,834	\$317,666
		Custom Buildings - LCI	\$624,194	\$834,026	\$1,458,220
		Audits & Education - LCI	\$548,745	\$276,000	\$824,745
		Sub-Total	\$4,091,547	\$6,064,749	\$10,156,296
	C&I Demand Response Program - Large	Demand Response - LCI	\$5,200	\$0	\$5,200
		Sub-Total	\$5,200	\$0	\$5,200
	Customer Action Program - LCI	Customer Action Program - LCI	\$110,104	\$0	\$110,104
		Sub-Total	\$110,104	\$0	\$110,104
Large C&I Total			\$4,206,851	\$6,064,749	\$10,271,600
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$43,159	\$52,375	\$95,534
		Sub-Total	\$43,159	\$52,375	\$95,534
Non - Residential Total			\$12,000,565	\$19,053,838	\$31,054,403
Mercantile	Mercantile Customer Program	Mercantile	\$158,498	\$0	\$158,498
		Sub-Total	\$158,498	\$0	\$158,498
Mercantile Total			\$158,498	\$0	\$158,498
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000
		Sub-Total	\$5,000	\$0	\$5,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
Other Total			\$5,000	\$0	\$5,000
Total			\$21,640,581	\$29,720,848	\$51,361,429

Appendix B-1: Program Cost by Program Year

Ohio Edison - Program Year 2019					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$2,643,011	\$789,327	\$3,432,338
		Sub-Total	\$2,643,011	\$789,327	\$3,432,338
	Energy Efficient Homes Program	School Education	\$541,929	\$415,976	\$957,905
		EE Kits	\$704,184	\$3,935,411	\$4,639,595
		Audits & Education	\$665,805	\$617,650	\$1,283,455
		Behavioral	\$2,215,814	\$0	\$2,215,814
		New Homes	\$471,908	\$969,100	\$1,441,008
		Smart Thermostat	\$151,791	\$497,200	\$648,991
		Sub-Total	\$4,751,431	\$6,435,337	\$11,186,768
	Energy Efficient Products Program	Appliances	\$96,774	\$766,670	\$863,444
		Consumer Electronics	\$49,554	\$159,706	\$209,260
		Lighting	\$1,191,064	\$1,707,656	\$2,898,720
		HVAC	\$132,027	\$1,393,108	\$1,525,134
	Sub-Total	\$1,469,418	\$4,027,139	\$5,496,557	
	Customer Action Program - Res	Customer Action Program - Res	\$301,886	\$0	\$301,886
		Sub-Total	\$301,886	\$0	\$301,886
	Residential Demand Response Program	Direct Load Control	\$338,412	\$0	\$338,412
		Sub-Total	\$338,412	\$0	\$338,412
	Low Income Energy Efficiency Program	Community Connections	\$228,626	\$0	\$228,626
		LI - New Homes	\$57,751	\$6,899	\$64,651
		Sub-Total	\$286,377	\$6,899	\$293,276
Residential Total			\$9,790,536	\$11,258,702	\$21,049,237
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$177,292	\$511,056	\$688,348
		Lighting - SCI	\$1,164,294	\$2,704,026	\$3,868,320
		Food Service	\$53,446	\$188,210	\$241,656
		Appliance Turn In - SCI	\$319,178	\$16,034	\$335,212
		Appliances - SCI	\$59,081	\$40,446	\$99,527
		Consumer Electronics - SCI	\$41,617	\$20,331	\$61,947
		Agricultural	\$97,999	\$55,913	\$153,911
		Data Centers - SCI	\$310,245	\$178,900	\$489,145
		Custom - SCI	\$890,486	\$1,797,483	\$2,687,970
		Retro - Commissioning - SCI	\$390,516	\$490,539	\$881,055
		Custom Buildings - SCI	\$546,726	\$793,092	\$1,339,818
		Audits & Education - SCI	\$3,446,451	\$6,147,620	\$9,594,071
	Sub-Total	\$7,497,331	\$12,943,650	\$20,440,980	
	Customer Action Program - SCI	Customer Action Program - SCI	\$302,651	\$0	\$302,651
		Sub-Total	\$302,651	\$0	\$302,651
Small C&I Total			\$7,799,982	\$12,943,650	\$20,743,631
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$216,864	\$420,200	\$637,064
		Lighting - LCI	\$469,149	\$906,363	\$1,375,512
		Data Centers - LCI	\$414,182	\$286,433	\$700,615
		Custom - LCI	\$1,807,588	\$3,539,775	\$5,347,363
		Retro - Commissioning - LCI	\$174,919	\$163,513	\$338,432
		Custom Buildings - LCI	\$665,078	\$898,506	\$1,563,584
		Audits & Education - LCI	\$559,332	\$324,000	\$883,332
		Sub-Total	\$4,307,112	\$6,538,790	\$10,845,902
	C&I Demand Response Program - Large	Demand Response - LCI	\$5,200	\$0	\$5,200
		Sub-Total	\$5,200	\$0	\$5,200
	Customer Action Program - LCI	Customer Action Program - LCI	\$111,451	\$0	\$111,451
		Sub-Total	\$111,451	\$0	\$111,451
Large C&I Total			\$4,423,763	\$6,538,790	\$10,962,552
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$43,726	\$52,375	\$96,101
		Sub-Total	\$43,726	\$52,375	\$96,101
Non - Residential Total			\$12,267,470	\$19,534,814	\$31,802,284
Mercantile	Mercantile Customer Program	Mercantile	\$159,162	\$0	\$159,162
		Sub-Total	\$159,162	\$0	\$159,162
Mercantile Total			\$159,162	\$0	\$159,162
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000
		Sub-Total	\$5,000	\$0	\$5,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
Other Total			\$5,000	\$0	\$5,000
Total			\$22,222,167	\$30,793,516	\$53,015,683

Appendix B-1: Program Cost by Program Year

Ohio Edison - Program Year 2017 - 2019					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$7,651,346	\$2,248,856	\$9,900,201
		Sub-Total	\$7,651,346	\$2,248,856	\$9,900,201
	Energy Efficient Homes Program	School Education	\$1,736,389	\$1,247,927	\$2,984,315
		EE Kits	\$2,188,353	\$11,177,788	\$13,366,141
		Audits & Education	\$2,045,468	\$1,740,750	\$3,786,218
		Behavioral	\$6,832,084	\$0	\$6,832,084
		New Homes	\$1,541,075	\$2,730,150	\$4,271,225
		Smart Thermostat	\$466,936	\$1,491,600	\$1,958,536
		Sub-Total	\$14,810,305	\$18,388,215	\$33,198,519
		Energy Efficient Products Program	Appliances	\$306,166	\$2,253,810
	Consumer Electronics		\$157,230	\$479,118	\$636,348
	Lighting		\$3,945,561	\$5,102,579	\$9,048,140
	HVAC		\$389,730	\$3,929,545	\$4,319,275
	Sub-Total		\$4,798,687	\$11,765,052	\$16,563,739
	Customer Action Program - Res	Customer Action Program - Res	\$905,008	\$0	\$905,008
		Sub-Total	\$905,008	\$0	\$905,008
	Residential Demand Response Program	Direct Load Control	\$1,003,972	\$0	\$1,003,972
		Sub-Total	\$1,003,972	\$0	\$1,003,972
	Low Income Energy Efficiency Program	Community Connections	\$697,699	\$0	\$697,699
		LI - New Homes	\$213,964	\$20,697	\$234,661
		Sub-Total	\$911,662	\$20,697	\$932,360
Residential Total			\$30,080,981	\$32,422,819	\$62,503,800
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$549,244	\$1,514,873	\$2,064,117
		Lighting - SCI	\$3,566,685	\$8,053,967	\$11,620,652
		Food Service	\$175,712	\$548,733	\$724,444
		Appliance Turn In - SCI	\$949,376	\$43,890	\$993,266
		Appliances - SCI	\$189,474	\$114,030	\$303,504
		Consumer Electronics - SCI	\$140,128	\$55,801	\$195,929
		Agricultural	\$307,112	\$162,488	\$469,599
		Data Centers - SCI	\$922,873	\$523,742	\$1,446,615
		Custom - SCI	\$2,619,271	\$5,181,569	\$7,800,840
		Retro - Commissioning - SCI	\$1,165,467	\$1,436,579	\$2,602,047
		Custom Buildings - SCI	\$1,612,841	\$2,299,618	\$3,912,459
		Audits & Education - SCI	\$10,297,325	\$17,756,635	\$28,053,960
		Sub-Total	\$22,495,508	\$37,691,925	\$60,187,433
	Customer Action Program - SCI	Customer Action Program - SCI	\$907,272	\$0	\$907,272
		Sub-Total	\$907,272	\$0	\$907,272
Small C&I Total			\$23,402,781	\$37,691,925	\$61,094,705
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$687,826	\$1,215,705	\$1,903,531
		Lighting - LCI	\$1,393,802	\$2,480,536	\$3,874,338
		Data Centers - LCI	\$1,253,621	\$827,990	\$2,081,611
		Custom - LCI	\$5,592,039	\$9,982,146	\$15,574,185
		Retro - Commissioning - LCI	\$531,439	\$455,501	\$986,940
		Custom Buildings - LCI	\$1,934,546	\$2,511,190	\$4,445,736
		Audits & Education - LCI	\$1,787,770	\$864,000	\$2,651,770
		Sub-Total	\$13,181,043	\$18,337,068	\$31,518,111
	C&I Demand Response Program - Large	Demand Response - LCI	\$15,600	\$0	\$15,600
		Sub-Total	\$15,600	\$0	\$15,600
	Customer Action Program - LCI	Customer Action Program - LCI	\$333,565	\$0	\$333,565
		Sub-Total	\$333,565	\$0	\$333,565
Large C&I Total			\$13,530,208	\$18,337,068	\$31,867,276
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$142,011	\$136,500	\$278,511
		Sub-Total	\$142,011	\$136,500	\$278,511
Non - Residential Total			\$37,074,999	\$56,165,493	\$93,240,492
Mercantile	Mercantile Customer Program	Mercantile	\$513,273	\$0	\$513,273
		Sub-Total	\$513,273	\$0	\$513,273
Mercantile Total			\$513,273	\$0	\$513,273
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$15,000	\$0	\$15,000
		Sub-Total	\$15,000	\$0	\$15,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
Other Total			\$15,000	\$0	\$15,000
Total			\$67,684,253	\$88,588,312	\$156,272,565

Appendix B-2: Program Savings by Program Year

Ohio Edison			2017		2018		2019		Total		
Sector	Program	Sub-Program	kWh	kW	kWh	kW	kWh	kW	kWh	kW	
Residential	Appliance Turn In Program	Appliance Turn In	20,855,066	4,387	20,855,066	4,387	22,557,065	4,746	64,267,196	13,520	
		Sub-Total	20,855,066	4,387	20,855,066	4,387	22,557,065	4,746	64,267,196	13,520	
	Energy Efficient Homes Program	School Education	3,216,202	390	3,216,202	390	3,216,202	390	9,648,607	1,170	
		EE Kits	27,715,189	3,440	27,715,189	3,440	30,120,128	3,739	85,550,507	10,620	
		Audits & Education	2,753,511	494	2,753,511	494	3,028,863	544	8,535,885	1,533	
		Behavioral	37,554,991	4,287	37,554,991	4,287	37,554,991	4,287	112,664,974	12,861	
		New Homes	2,563,373	613	2,563,373	613	2,822,311	675	7,949,058	1,900	
		Smart Thermostat	816,576	93	816,576	93	816,576	93	2,449,729	280	
		Sub-Total	74,619,843	9,318	74,619,843	9,318	77,559,073	9,728	226,798,760	28,364	
	Energy Efficient Products Program	Appliances	4,166,556	585	4,166,556	585	4,283,771	597	12,616,882	1,767	
		Consumer Electronics	3,320,775	503	3,320,775	503	3,320,775	503	9,962,325	1,509	
		Lighting	29,432,289	3,113	28,451,532	3,009	25,931,644	2,743	83,815,465	8,865	
		HVAC	4,489,502	1,093	4,489,502	1,093	4,935,099	1,202	13,914,103	3,388	
		Sub-Total	41,409,121	5,294	40,428,364	5,190	38,471,289	5,045	120,308,774	15,529	
	Customer Action Program - Res	Customer Action Program - Res	43,750,520	4,994	23,897,564	2,728	13,113,350	1,497	80,761,435	9,219	
		Sub-Total	43,750,520	4,994	23,897,564	2,728	13,113,350	1,497	80,761,435	9,219	
	Residential Demand Response Program	Direct Load Control	0	5,081	0	5,031	0	4,980	0	5,031	
		Sub-Total	0	5,081	0	5,031	0	4,980	0	5,031	
	Low Income Energy Efficiency Program	Community Connections	2,487,347	284	2,487,347	284	2,487,347	284	7,462,041	852	
		LI - New Homes	22,228	11	22,228	11	22,228	11	66,683	32	
		Sub-Total	2,509,575	295	2,509,575	295	2,509,575	295	7,528,724	884	
	Residential Total			183,144,125	29,369	162,310,412	26,948	154,210,351	26,290	499,664,888	72,547
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	3,405,008	2,572	3,429,782	2,591	3,469,993	2,613	10,304,783	7,776	
		Lighting - SCI	38,176,920	7,209	39,041,689	7,345	38,348,119	7,181	115,566,729	21,735	
		Food Service	1,986,988	254	2,170,630	278	2,170,630	278	6,328,247	810	
		Appliance Turn In - SCI	359,992	63	397,013	69	435,871	76	1,192,876	208	
		Appliances - SCI	555,819	59	614,969	65	659,163	70	1,829,950	194	
		Consumer Electronics - SCI	110,988	10	124,951	11	135,132	12	371,071	34	
		Agricultural	129,423	21	143,321	23	143,321	23	416,066	68	
		Data Centers - SCI	1,337,031	153	1,442,535	165	1,442,535	165	4,222,101	482	
		Custom - SCI	22,011,337	2,597	24,304,102	2,865	24,600,808	2,908	70,916,248	8,371	
		Retro - Commissioning - SCI	6,234,098	712	6,713,644	766	6,713,644	766	19,661,385	2,244	
		Custom Buildings - SCI	9,764,250	1,115	10,854,449	1,239	10,854,449	1,239	31,473,148	3,593	
		Audits & Education - SCI	20,682,798	2,329	23,558,687	2,654	23,558,687	2,654	67,800,171	7,636	
		Sub-Total	104,754,652	17,093	112,795,772	18,072	112,532,351	17,985	330,082,775	53,150	
	Customer Action Program - SCI	Customer Action Program - SCI	4,784,939	546	4,784,939	546	4,784,939	546	14,354,816	1,639	
		Sub-Total	4,784,939	546	4,784,939	546	4,784,939	546	14,354,816	1,639	
	Small C&I Total			109,539,591	17,639	117,580,710	18,618	117,317,290	18,531	344,437,590	54,789
	Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	2,814,485	1,478	2,877,228	1,534	3,083,191	1,719	8,774,903	4,731
Lighting - LCI			10,303,950	2,015	11,145,759	2,182	12,043,665	2,354	33,493,374	6,552	
Data Centers - LCI			2,616,584	299	2,621,400	299	2,627,419	300	7,865,404	898	
Custom - LCI			40,434,173	4,630	42,567,722	4,873	45,605,574	5,230	128,607,470	14,733	
Retro - Commissioning - LCI			1,805,710	206	1,956,186	223	2,106,662	240	5,868,558	670	
Custom Buildings - LCI			10,032,050	1,145	10,745,377	1,227	11,576,122	1,321	32,353,549	3,693	
Audits & Education - LCI			3,557,019	406	3,754,631	429	3,952,243	451	11,263,894	1,286	
Sub-Total			71,563,972	10,180	75,668,303	10,767	80,994,876	11,616	228,227,152	32,563	
C&I Demand Response Program - Large		Demand Response - LCI	0	288,360	0	288,360	0	288,360	0	288,360	
		Sub-Total	0	288,360	0	288,360	0	288,360	0	288,360	
Customer Action Program - LCI		Customer Action Program - LCI	381,132	44	381,114	44	342,117	39	1,104,363	126	
		Sub-Total	381,132	44	381,114	44	342,117	39	1,104,363	126	
Large C&I Total			71,945,105	298,584	76,049,417	299,171	81,336,993	300,015	229,331,515	321,049	
Government	Government Tariff Lighting Program	Government Tariff Lighting	134,936	11	205,558	11	205,558	11	546,051	34	
		Sub-Total	134,936	11	205,558	11	205,558	11	546,051	34	
Non - Residential Total			181,619,632	316,234	193,835,684	317,800	198,859,841	318,558	574,315,157	375,871	
Mercantile	Mercantile Customer Program	Mercantile	21,681,341	2,638	21,681,341	2,638	21,681,341	2,638	65,044,022	7,914	
		Sub-Total	21,681,341	2,638	21,681,341	2,638	21,681,341	2,638	65,044,022	7,914	
Mercantile Total			21,681,341	2,638	21,681,341	2,638	21,681,341	2,638	65,044,022	7,914	
Other	Transmission & Distribution Upgrades	T&D Upgrades	0	0	6,400,000	731	6,400,000	731	12,800,000	1,461	
		Sub-Total	0	0	6,400,000	731	6,400,000	731	12,800,000	1,461	
	Smart Grid Modernization Initiative	Smart Grid	0	0	0	0	0	0	0	0	
		Sub-Total	0	0	0	0	0	0	0	0	
	Energy Special Improvement District	Energy Special Improvement District	0	0	0	0	0	0	0	0	
		Sub-Total	0	0	0	0	0	0	0	0	
Other Total			0	0	6,400,000	731	6,400,000	731	12,800,000	1,461	
Total			386,445,097	348,242	384,227,437	348,117	381,151,532	348,216	1,151,824,066	457,794	

1. kWh savings represents incremental annual savings achieved per year and in total for 2017-2019

2. kW savings represents incremental annual coincident peak demand savings from EEC measures and average annual demand savings from DR measures, per year and in total for 2017 - 2019

### Appendix B-3: Costs Elements

Ohio Edison - Cost Assumptions		
<p>The model used for developing the programs involves a build-up of direct costs based on program or subprogram fixed costs and variable costs based on participation at the measure level. Common costs are estimated at the State or Company level and allocated to each program. Program cost elements of this plan include Operations costs and Incentive costs. Operations costs include Utility Administration costs associated with portfolio management and plan development, Program Administration costs associated with program management and implementation, Marketing, Evaluation, Measurement and Verification (EMV) costs associated with EMV of the programs, Tracking and Reporting costs for tracking and reporting of the program results, and Other costs associated with the development and implementation of the Plan. The following details the assumptions for the program cost elements included in this plan:</p>		
Cost Elements	Component Detail	Description
Operations	Utility Administration	Includes costs incurred by the utility for dedicated employee labor for plan development, to oversee and manage the portfolio, and to perform duties associated with activities such as regulatory reporting or meetings to support the plan. Utility administration costs were based on Company estimated EE&C portfolio administration costs, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Program Administration	Includes utility and program implementation provider costs associated with the implementation and ongoing management of the programs including staffing, contractors, website(s), call centers, quality assurance and control processes, vendor tracking systems and other program specific activities supporting successful program implementation. Program administration costs were informed by experience for similar programs operated by FirstEnergy. Program Administration costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	Marketing	Includes costs associated with developing and providing marketing for plan and program messaging and education of the plan and programs. Marketing costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	EM&V	Includes costs for evaluation, measurement and verification activities performed by the Companies and the Companies' independent evaluator, such as surveys, M&V processes, data transfer and evaluation meetings. The EMV costs were based on 4% of the subprogram cost, and summed to the program level.
	Tracking and Reporting	Includes the costs to develop and maintain a data collection, tracking and reporting system, to develop and generate standard reports, and provide the functionality for program management ad hoc reporting. These costs were informed by existing contracts and Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Other	Other costs includes other common costs associated with the development and implementation of the plan, including research and development such as participation in research projects, pilots or demonstrations, completing market potential or other studies, consulting and legal fees, modeling software fees, and employee expenses. Other costs were informed by existing contracts or Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
Incentives	Incentives	Incentives include rebates paid to customers as well as costs associated with providing services or measures directly to customers, or mid-stream or upstream payments to program allies where applicable. Incentives were calculated based on measure level incentive and participation assumptions, and summed to the subprogram and program level.



**Ohio Edison - Appendix C:  
Program Assumptions & PUCO Tables**

Appendix C-1: Measure Assumptions

Ohio Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	8	1,376	0.22	0	50	0	Ohio TRM	DEER
			Freezer Recycling	8	1,244	0.20	0	50	0	Ohio TRM	DEER
			Room Air Conditioner Recycling	3	122	1.07	0	30	0	Ohio TRM - Adjusted	DEER
			Dehumidifier Recycling	3	1,075	0.17	0	30	0	Co Assumption	Co Assumption
	Energy Efficient Homes Program	School Education	School Education	7	318	0.04	39	45	0	PA TRM	Co Assumption
		EE Kits	Energy Efficiency Measures	7	324	0.04	40	46	0	PA TRM	Co Assumption
		Audits & Education	Comprehensive Audit	12	693	0.15	727	550	0	Co Assumption	Co Assumption
			On-Line Audit	3	142	0.02	0	0	0	Co Assumption	N/A
		Behavioral	Behavioral	1	158	0.02	0	0	0	Co Assumption	N/A
		New Homes	New Construction -Townhouse and Duplexs	15	1,499	0.35	1,264	425	0	Co Assumption	Co Assumption
			New Construction - Two-on-Two Condos	15	1,499	0.35	1,264	1,000	0	Co Assumption	Co Assumption
			New Construction - Single Family Detached	15	2,498	0.59	2,106	1,000	0	Co Assumption	Co Assumption
			New Construction - Multi Family Low Rise	15	1,499	0.35	1,264	400	0	Co Assumption	Co Assumption
			New Manufactured Housing	15	923	0.44	778	350	0	Co Assumption	Co Assumption
		Smart Thermostat	Smart Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption
	Energy Efficient Products Program	Appliances	Clothes Washer	11	233	0.02	50	50	0	Ohio TRM	PA Incremental Cost DB
			Clothes Dryer - (Elec w Moisture Sensor)	16	152	0.02	112	50	0	Co Assumption	PA Incremental Cost DB
			Freezers	14	133	0.02	7	10	0	Co Assumption	PA Incremental Cost DB
			Refrigerators	14	150	0.03	25	25	0	Ohio TRM	PA Incremental Cost DB
			Dehumidifiers	12	182	0.03	20	20	0	Ohio TRM	PA Incremental Cost DB
			Water Heater - Heat Pump	10	1,688	0.23	605	375	0	Ohio TRM	DEER
		Consumer Electronics	Home Technology & Automation	8	420	0.20	200	100	0	Co Assumption	Co Assumption
			Monitors	4	15	0.00	20	1	0	PA TRM	Co Assumption
			Computers	4	133	0.02	30	3	0	PA TRM	Co Assumption
			Imaging	5	73	0.01	25	2	0	PA TRM	Co Assumption
			TVs	6	74	0.01	20	4	0	PA TRM	Co Assumption

Appendix C-1: Measure Assumptions

Ohio Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	7	34	0.00	2	1	0	Ohio TRM	PA Incremental Cost DB
			CFL Fixtures	10	68	0.01	32	5	0	Co Assumption	PA Incremental Cost DB
			LED Fixtures	15	74	0.01	36	7	0	Co Assumption	DEER
			LED Lamps	15	37	0.00	7	3	0	Ohio TRM - Adjusted	Co Assumption
			Residential Lighting Controls	10	38	0.00	40	5	0	Co Assumption	PA Incremental Cost DB
		HVAC	Heat Pump	18	906	0.14	471	313	0	Ohio TRM	DEER
			Central Air Conditioner	18	176	0.14	880	125	0	Ohio TRM	DEER
			Room Air Conditioner	12	27	0.03	50	36	0	Ohio TRM	PA Incremental Cost DB
			Ductless Mini-Split Heat Pump	15	938	0.16	448	125	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTAC - Multi Family	15	103	0.12	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTHP - Multi Family	15	309	0.05	255	125	0	Ohio TRM - Adjusted	Co Assumption
			Heat Pump - Water & GeoT	18	3,596	0.28	10,897	300	0	Ohio TRM	PA Incremental Cost DB
			HVAC - Maintenance	5	86	0.04	100	50	0	Ohio TRM	PA Incremental Cost DB
			Furnace Fans	14	446	0.11	360	180	0	PA TRM	PA Incremental Cost DB
			Circulation Pumps	10	158	0.02	62	40	0	Co Assumption	Co Assumption
			Programmable / SMART Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	9	1	0.0001	0.05	0	0	Co Assumption	Co Assumption
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	1	0	0.36	0	0	0	Co Assumption	Co Assumption
	Low Income Energy Efficiency Program	Community Connections	Community Connections	8	1,672	0.19	0	0	0	Co Assumption	N/A
		LI - New Homes	LI New Construction	15	923	0.44	778	314	0	Co Assumption	Co Assumption

Appendix C-1: Measure Assumptions

Ohio Edison												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	12	296	0.20	50	21	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - <=5.4 Tn - SCI	15	939	0.93	1,960	197	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - >5.4 < 20 Tn - SCI	15	3,249	3.00	1,680	328	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - >=20 Tn - SCI	15	6,978	6.45	2,500	394	0	Ohio TRM	PA Incremental Cost DB	
			Chiller - Water Cld w Full Load - SCI	20	14,098	3.26	6,500	2,625	0	PA TRM - Adjusted	PA Incremental Cost DB	
			Heat Pump - <=5.4 Tn - SCI	15	2,432	1.44	1,285	197	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - >5.4 Tn - SCI	15	3,257	3.00	1,935	328	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - Water & GeoT - SCI	15	1,748	1.61	5,870	328	0	Ohio TRM	PA Incremental Cost DB	
			HVAC - Maintenance - SCI	5	47	0.05	150	53	0	Ohio TRM	Co Assumption	
			Circulation Pumps - SCI	10	174	0.02	62	42	0	Co Assumption	Co Assumption	
			Ductless Mini-Split HP - SCI	15	825	0.42	448	492	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTAC - SCI	15	173	0.29	84	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTHP - SCI	15	586	0.29	255	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
		Lighting - SCI	CFL Fixtures - SCI	15	174	0.04	30	14	4	Co Assumption	PA Incremental Cost DB	
			CFL Lamps - SCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB	
			Lighting Controls (Daylight & Occupancy) - SCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB	
			Linear Fluorscent T8 / T5 - SCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB	
			LED Linear - SCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption	
			LED Channel Signage - SCI	15	506	0.10	22	41	0	Co Assumption	Co Assumption	
			Exit Signs - SCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB	
			LED Fixtures External - SCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB	
			LED Fixtures Internal - SCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption	
			LED Lamps - SCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption	
			LED Reach in Refrigerator / Freezer Lights - SCI	8	345	0.04	266	28	4	Ohio TRM	PA Incremental Cost DB	
			Street & Area Lighting (Customer Owned) - SCI	10	430	0.05	337	34	13	PA TRM	PA Incremental Cost DB	

Appendix C-1: Measure Assumptions

Ohio Edison												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	12	883	0.10	430	158	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Freezers - Reach In - SCI	12	4,709	0.54	430	368	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Ice Machines - SCI	9	1,218	0.21	981	263	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Refrigerated Case Cover - SCI	5	44	0.00	38	12	0	PA TRM	PA Incremental Cost DB	
			Strip Curtains - SCI	6	129	0.01	4	1	0	PA TRM	PA Incremental Cost DB	
			Anti Sweat Heater Controls - SCI	12	1,298	0.03	70	37	0	PA TRM	PA Incremental Cost DB	
			Beverage Vending Machine - Controls - SCI	5	1,633	0.00	180	95	0	PA TRM	PA Incremental Cost DB	
			Beverage Vending Machine - New EE- SCI	14	125	0.00	180	95	0	PA TRM	PA Incremental Cost DB	
			Combination Oven - SCI	12	6,368	1.22	1,584	788	0	Energy Star / Ohio TRM	DEER	
			Convection Oven - SCI	12	1,937	0.37	1,007	525	0	Energy Star / Ohio TRM	DEER	
			Steam Cookers - SCI	12	9,967	1.91	630	368	0	Energy Star / Ohio TRM	Energy Star	
			Fryers - SCI	12	1,744	0.33	105	105	0	Energy Star / Ohio TRM	Energy Star	
			Griddles - SCI	12	1,909	0.37	774	368	0	Energy Star / Ohio TRM	DEER	
			Hot Food Holding Cabinet - SCI	12	1,730	0.33	1,110	525	0	Energy Star / Ohio TRM	Ohio TRM	
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	8	1,376	0.22	0	53	0	Ohio TRM	DEER	
			Freezer Recycling - SCI	8	1,244	0.20	0	53	0	Ohio TRM	DEER	
			Room Air Conditioner Recycling - SCI	3	121	0.26	0	32	0	Ohio TRM	DEER	
			Dehumidifiers Recycling - SCI	3	1,075	0.17	0	32	0	Co Assumption	Co Assumption	
		Appliances - SCI	Clothes Washer - SCI	10	542	0.00	150	79	0	Ohio TRM	PA Incremental Cost DB	
			Clothes Dryer (Elec w Moisture Sensor) - SCI	10	352	0.00	112	58	0	Co Assumption	PA Incremental Cost DB	
			Refrigerators - SCI	12	818	0.09	25	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Water Heater - Heat Pump - SCI	10	3,377	0.46	945	394	0	Ohio TRM	PA Incremental Cost DB	
			Freezers - SCI	12	2,128	0.24	6	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Pre-Rinse Sprayers - SCI	5	25	0.00	23	53	0	Ohio TRM	DEER	

Appendix C-1: Measure Assumptions

Ohio Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	4	3,488	0.40	3,926	525	0	Co Assumption	Co Assumption
			Monitors - SCI	4	15	0.00	10	7	0	PA TRM	PA Incremental Cost DB
			Computers - SCI	4	133	0.00	12	7	0	PA TRM	PA Incremental Cost DB
			Imaging - SCI	5	104	0.00	20	13	0	PA TRM	PA Incremental Cost DB
			Small Network - SCI	4	20	0.00	15	13	0	Co Assumption	Co Assumption
		Agricultural	Efficient Dairy Equipment - SCI	15	2,053	0.29	1,000	656	0	Co Assumption	Co Assumption
			High Efficiency Fans - SCI	10	896	0.18	500	525	0	Co Assumption	Co Assumption
		Data Centers - SCI	DC - Custom Servers- SCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption
			DC - Custom HVAC - SCI	15	43,800	5.00	13,140	3,504	0	Co Assumption	Co Assumption
			DC - Audit - SCI	0	0	0.00	0	5,250	0	N/A	N/A
		Custom - SCI	Custom - Process Improvement - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption
			Custom - HVAC & Chillers - SCI	20	28,195	6.51	13,000	2,256	0	PA TRM - Adjusted	PA Incremental Cost DB
			Custom - Compressed Air - SCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption
			Custom - VFDs < 10HP - SCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB
			Custom - VFDs > 10 HP - SCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB
			Custom-Motors - Three Phase - SCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB
			Custom - Refrigeration - SCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption
		Custom Buildings - SCI	Custom - Building Improvements - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption
			Custom - Energy Management - SCI	10	35,478	4.05	10,643	2,838	0	Co Assumption	Co Assumption
		Audits & Education SCI	Energy Manager - SCI	1	16,453	1.88	0	0	0	Co Assumption	N/A
			Energy Efficiency Measures - SCI	5	302	0.04	39	39	0	PA TRM	Co Assumption
			Multi Family Audit - SCI	7	324	0.04	40	46	0	Co Assumption	Co Assumption
			Benchmarking - SCI	0	0	0.00	0	0	0	Co Assumption	N/A
			Audit - SCI	0	0	0.00	0	7,875	0	N/A	N/A
			Audits w Direct Install - SCI	12	10,291	1.17	4,116	3,293	0	Co Assumption	Co Assumption
			Behavioral - SCI	1	368	0.04	0	0	0	Co Assumption	Co Assumption
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption

# Appendix C-1: Measure Assumptions

Ohio Edison												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	15	939	0.93	1,960	188	0	Ohio TRM	PA Incremental Cost DB	
			Chiller - Water Cld w Full Load - LCI	20	42,293	9.77	19,500	7,500	0	PA TRM - Adjusted	PA Incremental Cost DB	
			Air Conditioning - >5.4 < 20 Tn - LCI	15	3,249	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - >=20 Tn - LCI	15	6,978	6.45	2,500	375	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pump - <=5.4 Tn - LCI	15	2,432	1.44	1,285	188	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - >5.4 Tn - LCI	15	3,257	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - Water & GeoT - LCI	15	1,748	1.61	5,870	313	0	Ohio TRM	PA Incremental Cost DB	
			Ductless Mini-Split HP - LCI	15	825	0.42	448	300	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTAC - LCI	15	173	0.29	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTHP - LCI	15	586	0.29	255	80	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
		Lighting - LCI	CFL Fixtures - LCI	15	174	0.04	30	10	4	Co Assumption	PA Incremental Cost DB	
			CFL Lamps - LCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB	
			Lighting Controls (Daylight & Occupancy) - LCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB	
			Linear Fluorescent T8 / T5 - LCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB	
			LED Linear - LCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption	
			LED Channel Signage - LCI	15	506	0.10	35	41	0	Co Assumption	PA Incremental Cost DB	
			Exit Signs - LCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB	
			LED Fixtures External - LCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB	
			LED Fixtures Internal - LCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption	
			LED Lamps - LCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption	
			Street & Area Lighting (Customer Owned) - LCI	10	430	0.00	337	34	13	PA TRM	PA Incremental Cost DB	
		Data Centers - LCI	DC - Custom HVAC - LCI	15	350,400	40.00	105,120	28,032	0	Co Assumption	Co Assumption	
			DC - Custom Servers - LCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption	
			DC - Audit - LCI	0	0	0.00	0	7,500	0	N/A	N/A	

Appendix C-1: Measure Assumptions

Ohio Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - HVAC & Chillers - LCI	20	28,195	6.51	13,000	2,256	0	PA TRM - Adjusted	PA Incremental Cost DB
			Custom - Compressed Air - LCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption
			Custom - VFDs < 10HP - LCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB
			Custom - VFDs > 10 HP - LCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB
			Custom-Motors - Three Phase - LCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB
			Custom - Refrigeration - LCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption
		Custom Buildings - LCI	Custom - Building Improvements - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - Energy Management - LCI	10	289,080	33.00	100,000	23,126	0	Co Assumption	Co Assumption
		Audits & Education LCI	Audit - LCI	0	0	0.00	0	12,000	0	N/A	N/A
			Continuous Improvement - LCI	1	158,820	18.13	0	0	0	Co Assumption	Co Assumption
			Energy Manager - LCI	1	32,906	3.76	0	0	0	Co Assumption	Co Assumption
			Benchmarking - LCI	0	0	0.00	0	0	0	Co Assumption	Co Assumption
	C&I Demand Response Program - Large	Demand Response LCI	LC&I Contracted DR - PJM	1	0	1,000.00	N/A	N/A	N/A	Co Assumption	Co Assumption
			ELR Interruptible Tariff	1	0	1.00	N/A	N/A	N/A	Co Assumption	Co Assumption
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption



# Appendix C-1: Measure Assumptions

Ohio Edison												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	10	400	0.05	170	90	189	Ohio TRM	PA Incremental Cost DB	
			Street & Area Lighting (Tariff / Utility Owned) - Gov	10	241	0.00	0	0	15	Ohio TRM	Co Assumption	
			Street & Area Lighting (Tariff / Customer Owned) -	10	430	0.00	337	138	15	PA TRM	PA Incremental Cost DB	

# Appendix C-1: Measure Assumptions

Ohio Edison												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	10	20,504,389	2,494.86	0	0	0	Co Assumption	Co Assumption	
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	15	1	0.00	N/A	N/A	N/A	Co Assumption	Co Assumption	
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption	
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption	

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	11,241	11,241	12,159
			Freezer Recycling	2,616	2,616	2,829
			Room Air Conditioner Recycling	916	916	991
			Dehumidifier Recycling	199	199	215
	Energy Efficient Homes Program	School Education	School Education	9,245	9,245	9,245
		EE Kits	Energy Efficiency Measures	78,077	78,077	84,852
		Audits & Education	Comprehensive Audit	1,021	1,021	1,123
			On-Line Audit	12,745	12,745	14,020
		Behavioral	Behavioral	216,800	216,800	216,800
		New Homes	New Construction -Townhouse and Duplexs	383	383	422
			New Construction - Two-on-Two Condos	46	46	50
			New Construction - Single Family Detached	644	644	709
			New Construction - Multi Family Low Rise	37	37	41
			New Manufactured Housing	37	37	41
		Smart Thermostat	Smart Thermostat	4,972	4,972	4,972
	Energy Efficient Products Program	Appliances	Clothes Washer	3,868	3,868	4,255
			Clothes Dryer - (Elec w Moisture Sensor)	986	986	986
			Freezers	1,528	1,528	1,528
			Refrigerators	6,068	6,068	6,068
			Dehumidifiers	1,507	1,507	1,507
			Water Heater - Heat Pump	810	810	820
		Consumer Electronics	Home Technology & Automation	1	1	1
			Monitors	3,740	3,740	3,740
			Computers	964	964	964
			Imaging	81	81	81
			TVs	38,203	38,203	38,203

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	378,285	251,285	186,657
			CFL Fixtures	131	131	61
			LED Fixtures	97	114	126
			LED Lamps	378,285	469,603	466,462
			Residential Lighting Controls	693	693	762
		HVAC	Heat Pump	1,485	1,485	1,633
			Central Air Conditioner	2,040	2,040	2,244
			Room Air Conditioner	3,557	3,557	3,912
			Ductless Mini-Split Heat Pump	1,063	1,063	1,169
			PTAC - Multi Family	87	87	96
			PTHP - Multi Family	104	104	114
			Heat Pump - Water & GeoT	259	259	285
			HVAC - Maintenance	3,359	3,359	3,695
			Furnace Fans	38	38	42
			Circulation Pumps	5	5	5
			Programmable / SMART Thermostat	173	173	173
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	39,958,462	21,826,253	11,976,756
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	13,000	12,870	12,741
	Low Income Energy Efficiency Program	Community Connections	Community Connections	1,359	1,359	1,359
		LI - New Homes	LI New Construction	22	22	22

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	402	410	418
			Air Conditioning - <=5.4 Tn - SCI	548	548	548
			Air Conditioning - >5.4 < 20 Tn - SCI	161	161	161
			Air Conditioning - >=20 Tn - SCI	54	55	56
			Chiller - Water Cld w Full Load - SCI	18	18	19
			Heat Pump - <=5.4 Tn - SCI	145	145	145
			Heat Pumps - >5.4 Tn - SCI	60	60	60
			Heat Pumps - Water & GeoT - SCI	45	46	47
			HVAC - Maintenance - SCI	25	25	25
			Circulation Pumps - SCI	624	624	624
			Ductless Mini-Split HP - SCI	244	249	254
			PTAC - SCI	458	467	476
			PTHP - SCI	522	532	542
		Lighting - SCI	CFL Fixtures - SCI	319	333	262
			CFL Lamps - SCI	36,459	16,098	10,029
			Lighting Controls (Daylight & Occupancy) - SCI	25,958	27,028	28,178
			Linear Fluorscent T8 / T5 - SCI	62,191	61,197	53,382
			LED Linear - SCI	57,258	67,858	72,157
			LED Channel Signage - SCI	353	367	383
			Exit Signs - SCI	2,366	2,629	2,743
			LED Fixtures External - SCI	12,058	13,399	13,984
			LED Fixtures Internal - SCI	1,063	1,180	1,232
			LED Lamps - SCI	49,110	57,063	52,631
			LED Reach in Refrigerator / Freezer Lights - SCI	6,724	7,003	7,300
			Street & Area Lighting (Customer Owned) - SCI	3,972	4,136	4,312

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	26	28	28
			Freezers - Reach In - SCI	102	114	114
			Ice Machines - SCI	46	50	50
			Refrigerated Case Cover - SCI	1,112	1,228	1,228
			Strip Curtains - SCI	1,606	1,770	1,770
			Anti Sweat Heater Controls - SCI	140	154	154
			Beverage Vending Machine - Controls - SCI	49	49	49
			Beverage Vending Machine - New EE- SCI	172	188	188
			Combination Oven - SCI	26	28	28
			Convection Oven - SCI	20	22	22
			Steam Cookers - SCI	32	34	34
			Fryers - SCI	42	48	48
			Griddles - SCI	28	32	32
			Hot Food Holding Cabinet - SCI	38	40	40
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	197	217	239
			Freezer Recycling - SCI	41	45	49
			Room Air Conditioner Recycling - SCI	20	22	24
			Dehumidifiers Recycling - SCI	4	5	5
		Appliances - SCI	Clothes Washer - SCI	40	46	50
			Clothes Dryer (Elec w Moisture Sensor) - SCI	102	114	124
			Refrigerators - SCI	288	318	350
			Water Heater - Heat Pump - SCI	38	42	42
			Freezers - SCI	40	44	48
			Pre-Rinse Sprayers - SCI	45	45	45

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	23	26	28
			Monitors - SCI	171	189	208
			Computers - SCI	64	71	78
			Imaging - SCI	64	71	78
			Small Network - SCI	171	189	208
		Agricultural	Efficient Dairy Equipment - SCI	34	38	38
			High Efficiency Fans - SCI	54	59	59
		Data Centers - SCI	DC - Custom Servers- SCI	141	156	156
			DC - Custom HVAC - SCI	26	28	28
			DC - Audit - SCI	13	14	14
		Custom - SCI	Custom - Process Improvement - SCI	285	314	314
			Custom - HVAC & Chillers - SCI	27	29	32
			Custom - Compressed Air - SCI	25	28	31
			Custom - VFDs < 10HP - SCI	43	47	47
			Custom - VFDs > 10 HP - SCI	21	24	24
			Custom-Motors - Three Phase - SCI	37	41	45
			Custom - Refrigeration - SCI	23	25	28
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	39	42	42
		Custom Buildings - SCI	Custom - Building Improvements - SCI	156	173	173
			Custom - Energy Management - SCI	3	4	4
		Audits & Education - SCI	Energy Manager - SCI	52	58	58
			Energy Efficiency Measures - SCI	1,198	1,322	1,322
			Multi Family Audit - SCI	75	75	75
			Benchmarking - SCI	52	58	58
			Audit - SCI	210	220	220
			Audits w Direct Install - SCI	1,141	1,324	1,324
			Behavioral - SCI	16,050	17,700	17,700
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	4,370,206	4,370,206	4,370,206

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	38	40	47
			Chiller - Water Cld w Full Load - LCI	36	36	36
			Air Conditioning - >5.4 < 20 Tn - LCI	35	37	43
			Air Conditioning - >=20 Tn - LCI	77	81	95
			Heat Pump - <=5.4 Tn - LCI	91	96	112
			Heat Pumps - >5.4 Tn - LCI	12	13	15
			Heat Pumps - Water & GeoT - LCI	51	51	51
			Ductless Mini-Split HP - LCI	19	20	24
			PTAC - LCI	532	560	654
			PTHP - LCI	110	116	135
		Lighting - LCI	CFL Fixtures - LCI	1	1	1
			CFL Lamps - LCI	9,616	5,242	3,115
			Lighting Controls (Daylight & Occupancy) - LCI	10,416	10,974	12,815
			Linear Fluorescent T8 / T5 - LCI	21,970	18,246	14,577
			LED Linear - LCI	13,731	18,246	23,323
			LED Channel Signage - LCI	50	53	56
			Exit Signs - LCI	1,021	1,076	1,257
			LED Fixtures External - LCI	8,492	9,482	11,666
			LED Fixtures Internal - LCI	53	59	72
			LED Lamps - LCI	11,752	16,598	15,206
			Street & Area Lighting (Customer Owned) - LCI	380	380	400
		Data Centers - LCI	DC - Custom HVAC - LCI	7	7	7
			DC - Custom Servers - LCI	147	155	165
			DC - Audit - LCI	9	9	11

**Appendix C-2: Number of Units**

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	89	94	100
			Custom - HVAC & Chillers - LCI	6	6	9
			Custom - Compressed Air - LCI	19	20	21
			Custom - VFDs < 10HP - LCI	23	23	27
			Custom - VFDs > 10 HP - LCI	33	33	39
			Custom-Motors - Three Phase - LCI	4	4	5
			Custom - Refrigeration - LCI	5	5	6
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	12	13	14
		Custom Buildings - LCI	Custom - Building Improvements - LCI	22	23	25
			Custom - Energy Management - LCI	3	4	4
		Audits & Education - LCI	Audit - LCI	22	23	27
			Continuous Improvement - LCI	18	19	20
			Energy Manager - LCI	18	19	20
			Benchmarking - LCI	18	19	20
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	1	1	1
			ELR Interruptible Tariff	288,360	288,360	288,360
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	369,780	369,762	331,927



## Appendix C-2: Number of Units

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	200	200	200
			Street & Area Lighting (Tariff / Utility Owned) - Gov	1	1	1
			Street & Area Lighting (Tariff / Customer Owned) - Gov	100	250	250

## Appendix C-2: Number of Units

Ohio Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	1	1	1
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	0	6,400,000	6,400,000
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	1	1	1
Other	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	1	1	1

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Freezer Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Room Air Conditioner Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
			Dehumidifier Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
	Energy Efficient Homes Program	School Education	School Education	Adoption of an energy efficiency school curriculum or other engagement which encourages efficient practices & installation of energy efficiency measures at home. Student families are offered an energy efficiency kit to introduce simple retrofit measures.	NA	
		EE Kits	Energy Efficiency Measures	Opt In Kit with low cost energy efficiency measures mailed at the customers request.	NA	
		Audits & Education	Comprehensive Audit	Provides a Customized Home Energy Report for single or multi-family residence. Comprehensive measures that are eligible for incentives, as a result of diagnostics and testing include, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc. Manufactured homes are also eligible.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			On-Line Audit	Energy education and awareness supporting installation of measures and behaviors that reduce consumption of energy and demand.	NA	
		Behavioral	Behavioral	Reports containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of measures and efficiencies behaviors that reduces consumption of energy and demand.	NA	
		New Homes	New Construction -Townhouse and Duplexs	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,125	per unit
			New Construction - Two-on-Two Condos	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$825	per unit
			New Construction - Single Family Detached	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,875	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).
2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.
3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).
4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Homes Program	New Homes	New Construction - Multi Family Low Rise	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$600	per unit
			New Manufactured Housing	New residential modular or manufactured home. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
		Smart Thermostat	Smart Thermostat	Deployment of a program specific smart thermostat to residential customers with either of the following HVAC systems: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump.	\$100	per unit
	Energy Efficient Products Program	Appliances	Clothes Washer	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer, including appliances that can be interconnected to home energy management systems.	\$100	per unit
			Clothes Dryer - (Elec w Moisture Sensor)	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer	\$600	per unit
			Freezers	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Refrigerators	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Dehumidifiers	Purchase and installation of a new Energy Star rated unit	\$25	per unit
			Water Heater - Heat Pump	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
		Consumer Electronics	Home Technology & Automation	Purchase and installation of emerging technologies related to the control of in-home appliances, lighting, HVAC equipment, etc.	75% of equipment cost	per unit
			Monitors	Purchase and installation of an Energy Star rated unit	\$8	per unit
			Computers	Purchase and installation of an Energy Star rated unit	\$8	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	Consumer Electronics	Imaging	Purchase and installation of an Energy Star rated unit	\$8	per unit
			TVs	Purchase and installation of an Energy Star V7.0 rated Television	\$8	per unit
		Lighting	CFL Lamps	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL) at participating retailers.	\$3	NTE Cost of Lamp
			CFL Fixtures	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture
			LED Fixtures	Purchase and installation of an energy efficient luminaire with integral LED lamp.	\$50	per fixture
			LED Lamps	Purchase and installation of an energy efficient LED lamp at participating retailers.	\$5	NTE Cost of Lamp
			Residential Lighting Controls	The purchase and installation of an occupancy sensor, dimmers or other energy saving controllers inside the home	\$25	per unit
		HVAC	Heat Pump	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER or 8.5 HSPF. Includes variable refrigerant flow (VRF) systems.	\$1,000	per unit
			Central Air Conditioner	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER. Includes variable flow (VRF) systems.	\$800	per unit
			Room Air Conditioner	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Ductless Mini-Split Heat Pump	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5	\$400	per unit
			PTAC - Multi Family	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	HVAC	PTHP - Multi Family	Replacement of a packaged terminal unit prior to end of life or a installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit
			Heat Pump - Water & GeoT	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$1,500	per unit
			HVAC - Maintenance	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: • Check refrigerant charge level and correct as necessary. • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil and Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement.	\$85	per unit
			Furnace Fans	Replacement of an existing fan with a brushless permanent magnet (BPM) or electrically commutated motor (ECM) at the time of an HVAC tune-up or installation of a new CAC or HP. Purchase of a new gas furnace with a BPM or ECM motor is also eligible.	\$150	per unit
			Circulation Pumps	Replacement of existing single speed circulation pump or new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	
			Programmable / SMART Thermostat	New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control HVAC systems with either of the following: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump.	Up to 75% of thermostat cost	per unit
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	NA	NA	
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	Residential customers that have split system Central Air Conditioning.	\$50	per year (participation)
	Low Income Energy Efficiency Program	Community Connections	Community Connections	Residential customers and landlords of residents eligible for one of the following programs: (i) the Ohio Home Weatherization Assistance Program (HWAP); (ii) Percent of Income Payment Plan (PIPP); or (iii) Home Energy Assistance Program (HEAP).	NA	
		LI - New Homes	LI New Construction	New construction of low-income housing to be constructed in accordance applicable Energy Star standard or built at a higher efficiency level than the current adopted building code. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Air Conditioning - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Air Conditioning - >5.4 < 20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Air Conditioning - >=20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
			Chiller - Water Cld w Full Load - SCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is not included in this measure.	\$45 / Ton	NTE 50% of PC
			Heat Pump - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - SCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			HVAC - Maintenance - SCI	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: • Check refrigerant charge level and correct as necessary. • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil, • Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement, and installation of smart thermostat or smart thermostat with advanced features.	\$50	per ton
			Circulation Pumps - SCI	Replacement of existing single speed circulation pump or installation of a new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	per unit
			Ductless Mini-Split HP - SCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
		Lighting - SCI	CFL Fixtures - SCI	Purchase and installation of a new energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture

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Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Lighting - SCI	CFL Lamps - SCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - SCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - SCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - SCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - SCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - SCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED type exit sign or photoluminescent sign.	\$23	per sign
			LED Fixtures External - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - SCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			LED Reach in Refrigerator / Freezer Lights - SCI	Replacement of linear fluorescent refrigerator, cooler or freezer lights lighting with LED lighting.	\$75	per door
			Street & Area Lighting (Customer Owned) - SCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
		Food Service	Refrigerators - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in refrigerator.	\$165	per unit

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Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Freezers - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in freezer.	\$165	per unit
			Ice Machines - SCI	Replacement of inefficient ice machine prior to end of life or new unit that is Energy Star rated.	\$590 0-500 lbs \$980 501-1000 lbs \$1100 over 1000 lbs	per unit
			Refrigerated Case Cover - SCI	Replacement or new installation of refrigerated case covers.	\$32	per linear foot
			Strip Curtains - SCI	Replacement or new installation of polyethylene strip curtains on walk in freezers and coolers covering the entire door frame. Eligible units must be open a least 2.5 hrs/day.	\$3	per square-ft
			Anti Sweat Heater Controls - SCI	New installation of door heater controls on glass doors for refrigerators, coolers or freezers.	\$60	per door
			Beverage Vending Machine - Controls - SCI	Retrofit controls for a non Energy Star rated vending machine.	\$115	per unit
			Beverage Vending Machine - New EE-SCI	Purchase and installation of new Energy Star rated vending machine.	\$130	per unit
			Combination Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$1,380	per unit
			Convection Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$700	per unit
			Steam Cookers - SCI	Replacement or new installation of Energy Star qualified electric units with 3-6 pans. A qualifying steam cooker must meet a minimum cooking efficiency of 50 percent and meet idle energy rates specified by pan capacity.	\$250 - 3 pan \$375 - 4 pan \$500 - 5 pan \$600 - 6 pan	per unit
			Fryers - SCI	Replacement or new installation of Energy Star qualified electric units.	\$325	per unit
			Griddles - SCI	Replacement or new installation of Energy Star qualified electric units.	\$500	per unit

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Ohio Edison						
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Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Hot Food Holding Cabinet - SCI	Replacement or new installation of full, three quarter and half sized ENERGY STAR qualified units with idle energy rate of 0.04 kW/CF.	\$500 - full size \$375 - 3/4 size \$225 - 1/2 size	per unit
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Freezer Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Room Air Conditioner Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
			Dehumidifiers Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
		Appliances - SCI	Clothes Washer - SCI	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer. Commercial clothes washers and "coin op" units are also eligible.	\$100	per unit
			Clothes Dryer (Elec w Moisture Sensor) - SCI	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer. Commercial and "coin op" unit are also eligible.	\$600	per unit
			Refrigerators - SCI	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Water Heater - Heat Pump - SCI	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
			Freezers - SCI	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Pre-Rinse Sprayers - SCI	Replacement of existing sprayer with new unit that use 1.6 GPM or less, on/off squeeze lever, and cleaning of performance of at least 26 seconds. Electric water heating only.	\$55	per unit
		Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	Replacement or new installation of a UPS (less than 12 kW) that exceeds the minimum average efficiency standard as determined by Table 1 of the Energy Star UPS standard. Table 2 of the standard shall be used in calculating the loading of the UPS.	\$220	per kW

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Ohio Edison						
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Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Monitors - SCI	Purchase and installation of Energy Star rated unit.	\$15	per unit
			Computers - SCI	Purchase and installation of an Energy Star rated unit.	\$15	per unit
			Imaging - SCI	Purchase and installation of Energy Star rated imaging equipment including but not limited to: scanners, copier, printers, fax machines and multi-function machines.	\$30	per unit
			Small Network - SCI	Purchase and installation of network level software that controls desktop computers and monitors power settings with the network. Software must be capable of measuring and managing power consumption of each individual PC. Laptops are not eligible.	\$15	per PC
		Agricultural	Efficient Dairy Equipment - SCI	Purchase and installation of more efficient electric driven equipment in retrofit applications.	\$0.10 per kWh saved	
			High Efficiency Fans - SCI	Purchase and installation of a new high efficiency ventilation fans in retrofit applications.	\$0.10 per kWh saved	
		Data Centers - SCI	DC - Custom Servers- SCI	Replacement of existing server equipment or installation of new energy efficient server equipment meeting Energy Star or other energy efficiency requirements.	\$40	
			DC - Custom HVAC - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Audit - SCI	Comprehensive Energy Audit for data center facility recommending installation of efficient equipment, such as: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment, server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - SCI	Custom - Process Improvement - SCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%, and includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - SCI	Replacement or retrofit of existing air compressor systems, including but no limited to: new compressors, air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC

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Ohio Edison						
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Small Enterprise	C&I Energy Solutions for Business Program - Small	Custom - SCI	Custom - VFDs < 10HP - SCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - SCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - SCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - SCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	Adjustment of Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - SCI	Custom - Building Improvements - SCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with the square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Energy Management - SCI	Installation of new energy management system to control lighting, hvac and other building systems. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	\$0.10 per kWh saved. Up to 75% of thermostat cost.	
		Audits & Education SCI	Energy Manager - SCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Energy Efficiency Measures - SCI	Opt In Kit with energy efficiency measures mailed at the customers request.	NA	
			Multi Family Audit - SCI	Provides a Customized Home Energy Report to multi-family residences served under a commercial rate tariff. Comprehensive measures eligible for incentive based on applicable diagnostics and testing includes, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			Benchmarking - SCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
			Audit - SCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed. Up to 50% of the cost of comprehensive measures installed.	

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Small Enterprise	C&I Energy Solutions for Business Program - Small	Audits & Education SCI	Audits w Direct Install - SCI	Provides an audit with the direct installation (DI) of qualified energy efficiency measures. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	80% of the cost of the DI measuers NTE \$6,000	
			Behavioral - SCI	Energy Intelligence Software tool that provides reporting containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of energy efficiency measures and behaviors that reduces consumption of energy and demand.	NA	
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	NA	NA	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Chiller - Water Cld w Full Load - LCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is NOT included in this measure.	\$45 / Ton	NTE 50% of PC
			Air Conditioning - >5.4 < 20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pump - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - LCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			Ductless Mini-Split HP - LCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton

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Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - >=20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
		Lighting - LCI	CFL Fixtures - LCI	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s).	\$20	per fixture
			CFL Lamps - LCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - LCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - LCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - LCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - LCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - LCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED or photoluminescent exit sign.	\$23	per sign
			LED Fixtures External - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - LCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			Street & Area Lighting (Customer Owned) - LCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture

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Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Data Centers - LCI	DC - Custom HVAC - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Custom Servers - LCI	Replacement or retrofit of existing data center equipment including, but not limited to: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment, server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling, and UPS efficiency upgrades.	\$0.10 per kWh saved.	
			DC - Audit - LCI	Comprehensive Energy Audit for data center facilities recommending installation of efficient equipment, building shell/envelop improvements, building operating changes, or other energy efficiency improvements.	Up to 50% of the audit cost plus up to remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - LCI	Custom - Process Improvement - LCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - LCI	Replacement or retrofit of existing air compressor systems, including but not limited to: new compressors, air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - VFDs < 10HP - LCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - LCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - LCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - LCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	Adjust Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - LCI	Custom - Building Improvements - LCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom Buildings - LCI	Custom - Energy Management - LCI	Installation of new energy management system in buildings to control lighting, hvac and other building systems.	\$0.10 per kWh saved.	
		Audits & Education LCI	Audit - LCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of Audit Cost plus up to remaining 50% of Audit Cost if audit recommended measures are installed	
			Continuous Improvement - LCI	Shared resource for the largest commercial/industrial customers that provides consulting services to integrate energy efficiency as a core business practice.	NA	
			Energy Manager - LCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Benchmarking - LCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	Large commercial, industrial and government customers participating in PJM programs and/or contracted curtailment attributes w/ curtailment providers and/or individual customers.	NA	
			ELR Interruptible Tariff	Large commercial, industrial and governmental customers on the Companies ELR tariff.	NA	
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	NA	NA	
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	Replacement of incandescent traffic & pedestrian signals with LED signals.	\$90	per signal
			Street & Area Lighting (Tariff / Utility Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	NA	
			Street & Area Lighting (Tariff / Customer Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	Self directed projects completed by large commercial and industrial mercantile customers.	NA	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

### Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy

Ohio Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	Transmission and distribution system improvements that results in electric energy savings.	NA	
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	Smart Grid Modernization initiatives that results in electric energy savings.	NA	
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	Electric energy savings resulting from projects completed as part of an Energy Special Improvement District.	NA	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).
2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.
3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).
4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.



## Appendix C-4

### PUCO 1: Portfolio Summary of Lifetime Costs and Benefits

<b>Ohio Edison</b> <b>Portfolio Summary of Lifetime Costs and Benefits</b> <b>Net Lifetime Benefits, and TRC per the California Standard Practice Manual</b>					
<b>Portfolio</b>	<b>Discount Rate</b>	<b>Total Discounted Lifetime Costs (\$000) <sup>1</sup></b>	<b>Total Discounted Lifetime Benefits (\$000)</b>	<b>Total Discounted Net Lifetime Benefits (\$000)</b>	<b>Cost- Benefit Ratio (TRC)</b>
<b>Residential (inclusive of Low- Income)</b>	8.48%	92,635	146,752	54,117	1.6
<b>Small Enterprise</b>	8.48%	115,387	178,996	63,609	1.6
<b>Mercantile</b>	8.48%	477	24,776	24,299	51.9
<b>Mercantile-Utility (Large Enterprise)</b>	8.48%	78,167	120,518	42,350	1.5
<b>Governmental</b>	8.48%	409	976	567	2.4
<b>Other</b>	8.48%	14	-	(14)	N/A
<b>Total</b>	<b>8.48%</b>	<b>287,089</b>	<b>472,018</b>	<b>184,928</b>	<b>1.6</b>

1. Includes certain costs outside of Plan budgets according to the Stipulated ESPIV.

## Appendix C-4

### PUCO 2: Summary of Portfolio Energy and Demand Savings

Ohio Edison Summary of Portfolio Energy and Demand Savings						
MWh Saved for Consumption Reductions kW Saved for Peak Load Reductions	Program Year 2017		Program Year 2018		Program Year 2019	
	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>
Residential Sector (inclusive of Low- Income) - Cumulative Projected Portfolio Savings	183,144	29,369	345,455	51,236	499,665	72,496
Small Enterprise - Cumulative Projected Portfolio Savings	109,540	17,639	227,120	36,257	344,438	54,789
Mercantile - Cumulative Projected Portfolio Savings	21,681	2,638	43,363	5,276	65,044	7,914
Mercantile-Utility (Large Enterprise) - Cumulative Projected Portfolio Savings	71,945	298,584	147,995	309,394	229,332	321,049
Government Sector - Cumulative Projected Portfolio Savings	135	11	340	22	546	34
Other - Cumulative Projected Portfolio Savings	0	0	6,400	731	12,800	1,461
<b>Portfolio Plan Total - Cumulative Projected Savings</b>	<b>386,445</b>	<b>348,242</b>	<b>770,673</b>	<b>402,917</b>	<b>1,151,824</b>	<b>457,743</b>
Cumulative Results projected through 2016 (Appendix A-2)	1,868,294	307,676	1,868,294	307,676	1,868,294	307,676
<b>Total Cumulative Projected Savings</b>	<b>2,254,739</b>	<b>655,917</b>	<b>2,638,967</b>	<b>710,593</b>	<b>3,020,118</b>	<b>765,419</b>
SB 310 Target (Table 3)	1,242,688	275,900	1,447,860	317,000	1,678,384	353,700
% (Over / Under)	181%	238%	182%	224%	180%	216%

1. Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions achieved in previous years.

## Appendix C-4

### PUCO 3: Summary of Portfolio Costs

Ohio Edison Summary of Portfolio Costs			
	Program Year 2017	Program Year 2018	Program Year 2019
	Portfolio Budget (\$)	Portfolio Budget (\$)	Portfolio Budget (\$)
Residential Portfolio (inclusive of Low-Income) Annual Budget	21,311,034	20,143,528	21,049,237
Small Enterprise Portfolio Annual Budget	19,663,806	20,687,268	20,743,631
Mercantile Portfolio Annual Budget	195,613	158,498	159,162
Mercantile-Utility (Large Enterprise) Portfolio Annual Budget	10,633,123	10,271,600	10,962,552
Government Portfolio Annual Budget	86,876	95,534	96,101
Other Portfolio Annual Budget	5,000	5,000	5,000
<b>Total Portfolio Annual Budget</b>	<b>51,895,453</b>	<b>51,361,429</b>	<b>53,015,683</b>

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PUCO 4: Program Summaries

Ohio Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Residential Portfolio Programs (inclusive of Low Income)		X	Residential Demand Response Program	Res	The program consists of a customer having their central air conditioning compressor cycled during summer peak load periods.	-	15,092	0.0%
	X		Appliance Turn In Program	Res	This program provides rebates and removal and recycle services to consumers for turning in working appliances.	508,647	91,108	13.8%
	X		Energy Efficient Products Program	Res	This program promotes the purchase of energy efficient products, such as HVAC equipment, appliances, lighting, home electronics and other energy saving home products, through consumer rebates or incentives and support to retailers and manufacturers.	1,440,622	187,332	39.0%
	X		Energy Efficient Homes Program	Res	This program provides customers with energy efficiency education and awareness along with measures and incentives to improve energy efficiency of homes.	953,103	133,894	25.8%
	X		Low Income Energy Efficiency Program	LI Res	The low-income program provides weatherization services, home audits and installation of energy efficiency measures for low-income customers under the Community Connections sub program. The program also provides incentives for the construction of new energy efficient housing or major rehabilitation of existing housing for low-income customers.	60,697	7,294	1.6%
	X		Customer Action Program - Res	Res	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	726,853	82,974	19.7%
	Total for Plan					3,689,922	517,694	31.3%

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PUCO 4: Program Summaries

Ohio Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Small Enterprise	X		C&I Energy Solutions for Business Program - Small	Small C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized processes, applications or end uses to higher efficiency processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	3,917,952	662,641	95.5%
	X		Customer Action Program - SCI	Small C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	186,613	21,303	4.5%
	Total for Plan					4,104,564	683,944	34.8%

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PUCO 4: Program Summaries

Ohio Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Mercantile	X		Mercantile Customer Program	Large C&I	Captures energy efficiency and peak demand reduction projects committed to the Company by Mercantile customers as provided for by O.R.C. 4928.01 and 4928.66	650,440	79,142	100.0%
	Total for Plan					650,440	79,142	5.5%
Mercantile-Utility (Large Enterprise)		X	C&I Demand Response Program - Large	Large C&I	The program captures load curtailment and curtailable capacity from the Companies' Interruptible Load Program (Economic Load Response Rider) and from additional demand resources including resources participating in the PJM market or through contracts for demand response attributes with customers or PJM CSPs.	-	865,080	0.0%
	X		C&I Energy Solutions for Business Program - Large	Large C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized equipment, processes, applications or end uses to higher efficiency equipment, processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	3,121,548	450,945	99.5%
	X		Customer Action Program - LCI	Large C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	14,357	1,639	0.5%
	Total for Plan					3,135,905	1,317,664	26.6%

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PUCO 4: Program Summaries

Ohio Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Government Portfolio Programs	X		Government Tariff Lighting Program	Gov't	The program provides financial incentives and support to customers for implementing energy efficient street lighting or traffic lighting technologies on customer owned and maintained installations.	5,461	335	100.0%
	Total for Plan					5,461	335	0.0%
Other	X		Transmission & Distribution Upgrades	T&D	Capture savings achieved through various T&D projects that reduce line losses, which in turn results in a more efficient delivery system.	192,000	21,918	100.0%
	X		Smart Grid Modernization Initiative	T&D	Captures energy savings from the project to produce an integrated system of protection, performance, efficiency and economy that extends across the energy delivery system.	-	-	0.0%
	X		Energy Special Improvement District	T&D	Incorporation of State Legislation that permits Ohio townships and municipalities to create Energy Special Improvement Districts offering constituents Property Assessed Clean Energy (PACE) financing for qualifying energy efficiency projects.	-	-	0.0%
	Total for Plan					192,000	21,918	1.6%

## Appendix C-4

### PUCO 5: Budget and Parity Analysis Summary

Ohio Edison						
Customer Class	3 Year Budget	% of Total EDC Budget	% of Total Budget of Customer Programs	2015 Revenue by Customer Class	% of Total Customer Revenue	Difference
Residential ( <i>inclusive of Low-Income</i> )	62,503,800					
<b>Residential Subtotal</b>	62,503,800	40.0%	40.0%	728,148,411	57.3%	-17%
Small Enterprise	61,094,705					
<b>Small Enterprise Total</b>	61,094,705	39.1%	39.1%	354,706,509	27.9%	11%
Mercantile-Utility (Large Enterprise)	31,867,276					
Mercantile	513,273					
<b>Mercantile Subtotal</b>	32,380,549	20.7%	20.7%	173,626,130	13.7%	7%
Government	278,511	0.2%	0.2%	14,446,554	1.1%	-1%
Other	15,000	0.0%	0.0%			
<b>EDC TOTAL</b>	<b>156,272,565</b>	<b>100%</b>	<b>100%</b>	<b>1,270,927,604</b>	<b>100%</b>	



## Appendix C-4

### PUCO 5A: Energy Savings and Parity Analysis Summary

Ohio Edison						
Customer Class	3 Year Cumulative Energy Savings (MWh)	% of Total EDC Energy Savings	% of Total Energy Savings of Customer Programs	2015 Sales by Customer Class (MWh)	% of Total Customer Sales	Difference
Residential	499,665	43.4%				
<b>Residential Subtotal</b>	499,665	43.4%	43.4%	9,221,743	38.0%	5%
Small Enterprise	344,438	29.9%				
<b>Small Enterprise Total</b>	344,438	29.9%	29.9%	6,662,100	27.4%	2%
Mercantile-Utility (Large Enterprise)	229,332	19.9%				
Mercantile	65,044	5.6%				
<b>Mercantile Subtotal</b>	294,376	25.6%	25.6%	8,265,885	34.0%	-8%
Government	546	0.0%	0.0%	141,923	0.6%	-1%
Other	12,800	1.1%	1.1%			
<b>EDC TOTAL</b>	<b>1,151,824</b>	<b>100%</b>	<b>100%</b>	<b>24,291,651</b>	<b>100%</b>	

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Ohio Edison Residential Portfolio (including Low-Income)			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
<b>Peak Demand Reduction Programs</b>			
Residential Demand Response Program	0	906,318	906,318
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>906,318</b>	<b>906,318</b>
<b>Energy Efficiency Programs</b>			
Appliance Turn In Program	2,248,856	6,915,951	9,164,807
Energy Efficient Products Program	11,765,052	4,369,663	16,134,714
Energy Efficient Homes Program	18,388,215	13,373,024	31,761,239
Low Income Energy Efficiency Program	20,697	646,922	667,619
Customer Action Program - Res	0	764,702	764,702
<b>EE Program Subtotal</b>	<b>32,422,819</b>	<b>26,070,262</b>	<b>58,493,081</b>
<b>Totals</b>	<b>32,422,819</b>	<b>26,976,581</b>	<b>59,399,400</b>

Ohio Edison Small Enterprise			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
C&I Energy Solutions for Business Program - Small	37,691,925	20,653,450	58,345,374
Customer Action Program - SCI	0	760,560	760,560
<b>Totals</b>	<b>37,691,925</b>	<b>21,414,009</b>	<b>59,105,934</b>

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Ohio Edison Mercantile			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Mercantile Customer Program	0	263,491	263,491
<b>Totals</b>	<b>0</b>	<b>263,491</b>	<b>263,491</b>

Ohio Edison Mercantile Utility (Large Enterprise)			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
<b>Peak Demand Reduction Programs</b>			
C&I Demand Response Program - Large	0	600	600
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>600</b>	<b>600</b>
<b>Energy Efficiency Programs</b>			
C&I Energy Solutions for Business Program - Large	18,337,068	11,051,863	29,388,931
Customer Action Program - LCI	0	163,735	163,735
<b>EE Program Subtotal</b>	<b>18,337,068</b>	<b>11,215,598</b>	<b>29,552,666</b>
<b>Totals</b>	<b>18,337,068</b>	<b>11,216,198</b>	<b>29,553,266</b>

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Ohio Edison Government			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Government Tariff Lighting Program	136,500	100,011	236,511
<b>Totals</b>	<b>136,500</b>	<b>100,011</b>	<b>236,511</b>

Ohio Edison Other			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Transmission & Distribution Upgrades	0	0	0
Smart Grid Modernization Initiative	0	0	0
Energy Special Improvement District	0	0	0
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0</b>

Appendix C-4

PUCO 6B: Allocation of Common Costs to Applicable Customer Sector

Ohio Edison										
Common Cost Element	EE Program (check box)	PDR Program (check box)	Total Cost (\$)	Basis for Cost Allocation	Class Cost Allocaton (\$)					
					Residential (Including Low-Income)	Small Enterprise (Small C&I)	Mercantile	Mercantile-Utility (Large C&I)	Other	Government
Utility Administration	X	X	\$3,765,376	FERC Form 1 Sales	\$1,555,787	\$946,532	\$118,881	\$1,109,187	\$15,000	\$19,989
Tracking and Reporting	X	X	\$1,743,432	FERC Form 1 Sales	\$694,035	\$455,723	\$57,237	\$526,813	\$0	\$9,624
Other	X	X	\$2,205,154	FERC Form 1 Sales	\$854,578	\$586,516	\$73,664	\$678,010	\$0	\$12,386
Totals			\$7,713,963		\$3,104,400	\$1,988,771	\$249,782	\$2,314,010	\$15,000	\$42,000

## Appendix C-4

### PUCO 6C: Summary of Portfolio EE&C Costs

Ohio Edison	Total Sector Portfolio-specific Costs	Total Common Costs	Total of All Costs
Residential (Including Low-Income)	\$59,399,400	\$3,104,400	\$62,503,800
Small Enterprise	\$59,105,934	\$1,988,771	\$61,094,705
Mercantile	\$263,491	\$249,782	\$513,273
Mercantile-Utility (Large Enterprise)	\$29,553,266	\$2,314,010	\$31,867,276
Other	\$0	\$15,000	\$15,000
Government	\$236,511	\$42,000	\$278,511
<b>Totals</b>	<b>\$148,558,602</b>	<b>\$7,713,963</b>	<b>\$156,272,565</b>

Appendix C-4

PUCO 7A-B: TRC Benefits Table - Residential

Residential (inclusive of Low- Income)	Ohio Edison TRC Benefits By Program Per Year (\$000)									
	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Residential Demand Response Program	2017		334	363			5,081		0	
	2018		331	458			5,031		0	
	2019		338	547			4,980		0	
	Total	1.3	927	1,250	1,250	-		15,092		0
Appliance Turn In Program	2017		2,549	1,155			4,387		20,855	
	2018		2,459	2,499			8,775		41,710	
	2019		2,643	4,152			13,520		64,267	
	Total	3.3	7,062	23,067	7,585	15,482		91,108		508,647
Energy Efficient Products Program	2017		13,515	2,046			5,294		41,409	
	2018		13,567	4,282			10,484		81,837	
	2019		14,101	6,685			15,529		120,309	
	Total	1.4	38,004	51,446	13,475	37,972		187,332		1,440,622
Energy Efficient Homes Program	2017		12,650	3,677			9,318		74,620	
	2018		11,858	5,856			18,636		149,240	
	2019		12,523	8,466			28,364		226,799	
	Total	1.2	34,223	40,609	10,816	29,793		133,894		953,103
Low Income Energy Efficiency Program	2017		2,847	122			295		2,510	
	2018		2,791	258			589		5,019	
	2019		2,793	410			884		7,529	
	Total <sup>3</sup>	0.3	7,793	2,440	597	1,843		7,294		60,697
Customer Action Program - Res	2017		2,300	2,079			4,994		43,751	
	2018		1,392	3,373			7,722		67,648	
	2019		901	4,239			9,219		80,761	
	Total	6.4	4,349	27,940	5,910	22,030		82,974		726,853
Total <sup>4</sup>		1.6	92,635	146,752	39,633	107,119		517,694		3,689,922
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs. 2: The on and off peak energy costs are combined in a sum of avoided energy costs. 3: Includes cost for the OPAE Community Connections program according to the Stipulated ESPIV. 4: Includes cost for the City of Akron Energy Efficiency Program according to the Stipulated ESPIV.										

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PUCO 7C: TRC Benefits Table - Small Enterprise

Small Enterprise	Ohio Edison TRC Benefits By Program Per Year (\$000)																				
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved												
							Annual	Lifetime	Annual	Lifetime											
C&I Energy Solutions for Business Program - Small	2017		38,662	6,317			17,093		104,755												
	2018		41,835	13,541			35,165		217,550												
	2019		42,610	21,495			53,150		330,083												
	Total	1.5	113,901	172,628	47,487	103,456		662,641		3,917,952											
Customer Action Program - SCI	2017		303	230			546		4,785												
	2018		301	482			1,092		9,570												
	2019		303	760			1,639		14,355												
	Total	7.6	838	6,368	1,370	4,998		21,303		186,613											
Total <sup>3</sup>							1.6		115,387		178,996		48,857		108,455		683,944		4,104,564		
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.																					
2: The on and off peak energy costs are combined in a sum of avoided energy costs.																					
3: Includes cost for the COSE Ohio Energy Efficiency Program and Administrator payments, and the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.																					



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PUCO 7D: TRC Benefits Table - Mercantile

Mercantile	Ohio Edison TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Mercantile Customer Program	2017		196	1,057			2,638		21,681	
	2018		158	2,232			5,276		43,363	
	2019		159	3,543			7,914		65,044	
	Total	51.9	477	24,776	6,144	18,633	79,142	650,440		
Total	51.9	477	24,776	6,144	18,633	79,142	650,440			
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

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PUCO 7E: TRC Benefits Table - Mercantile Utility (Large Enterprise)

Mercantile Utility (Large Enterprise)	Ohio Edison TRC Benefits By Program Per Year (\$000)									
	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
C&I Demand Response Program - Large	2017		5				288,360		0	
	2018		5				288,360		0	
	2019		5				288,360		0	
	Total	N/A	14					865,080		0
C&I Energy Solutions for Business Program - Large	2017		26,567	3,941			10,180		71,564	
	2018		27,466	8,449			20,947		147,232	
	2019		30,090	13,801			32,563		228,227	
	Total	1.5	77,455	120,021	31,956	80,623		450,945		3,121,548
Customer Action Program - LCI	2017		179	18			44		381	
	2018		177	39			87		762	
	2019		171	59			126		1,104	
	Total	1.0	487	496	107	390		1,639		14,357
Total <sup>3</sup>		1.5	78,167	120,518	32,062	81,013		1,317,664		3,135,905
<p>1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.</p> <p>2: The on and off peak energy costs are combined in a sum of avoided energy costs.</p> <p>3: Includes cost for the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.</p>										

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PUCO 7F: TRC Benefits Table - Government

Government	Ohio Edison TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Government Tariff Lighting Program	2017		123	45	26	143	11	335	135	5,461
	2018		161	96			22		340	
	2019		162	147			34		546	
	Total	2.4	409	976						
Total		2.4	409	976	26	143	335		5,461	
1:      Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2:      The on and off peak energy costs are combined in a sum of avoided energy costs.										

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PUCO 7G: TRC Benefits Table - Other

Other	Ohio Edison TRC Benefits By Program Per Year (\$000)									
	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Transmission & Distribution Upgrades	2017		5				0		0	
	2018		5				731		6,400	
	2019		5				1,461		12,800	
	Total	N/A	14					21,918		192,000
Smart Grid Modernization Initiative	2017		-	-			0		0	
	2018		-	-			0		0	
	2019		-	-			0		0	
	Total	N/A	-	-	-	-		0		0
Energy Special Improvement District	2017		-	-			0		0	
	2018		-	-			0		0	
	2019		-	-			0		0	
	Total	N/A	-	-	-	-		0		0
Total			14	-	-	-		21,918		192,000
<p>1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.</p> <p>2: The on and off peak energy costs are combined in a sum of avoided energy costs.</p>										

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# **Cleveland Electric Illuminating - Appendices**

**Cleveland Electric Illuminating  
- Appendix A:  
Results of Existing Plan**

# Appendix A-1 Summary Annualized Energy and Demand Portfolio Impacts, 2009 - 2015

Cumulative 2009 - 2015 Energy Efficiency and Peak Demand Reduction Results		
Utility	Energy Savings, MWh <sup>1, 2</sup>	Coincident Peak Demand Reductions, MW <sup>1, 2, 3</sup>
OE	1,741,966	287
CEI	1,504,135	221
TE	702,081	119
<b>TOTAL</b>	<b>3,948,182</b>	<b>627</b>
<p><sup>1</sup> Includes preliminary estimate of cumulative 2013-2015 Portfolio Results plus results of the Companies' 2009-2012 Portfolio progress. Also includes projects pending PUCO approval as well as prior year Transmission and Distribution projects pending before the Commission in Dockets 12-1550-EL-EEC et. seq., and 13-1188-EL-EEC et. seq.</p> <p><sup>2</sup> 2015 values are based on preliminary estimates. Values shown through 2014 are based on the Companies' Annual Compliance Filings.</p> <p><sup>3</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.</p>		



## Appendix A-2 Summary Annualized Energy and Demand Portfolio Impacts

2016 Projection Energy Efficiency and Incremental Coincident Peak Demand Reduction Results		
Utility	Energy Savings, MWh <sup>1</sup>	Coincident Peak Demand Reductions, MW <sup>1, 2</sup>
OE	126,329	21
CEI	85,256	12
TE	44,976	7
<b>TOTAL</b>	<b>256,561</b>	<b>39</b>
<sup>1</sup> Values shown are preliminary estimates and include projections for the Companies existing Low Income Program, Mercantile Customer Program, Transmission and Distribution Savings and Customer Action Program. <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

Cumulative EOY 2016 Estimated Energy Efficiency and Coincident Peak Demand Reduction Results <sup>1</sup>		
Utility	Energy Savings, MWh	Coincident Peak Demand Reductions, MW <sup>2</sup>
OE	1,868,294	308
CEI	1,589,391	233
TE	747,057	126
<b>TOTAL</b>	<b>4,204,743</b>	<b>666</b>
<sup>1</sup> Sum of Appendix A-1 and 2016 Projection <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

**Cleveland Electric Illuminating  
- Appendix B:  
Portfolio Budget Detail**

Appendix B-1: Program Cost by Program Year

Cleveland Electric Illuminating - Program Year 2017						
Sector	Program	Sub-Program	Operations	Incentives	Total	
Residential	Appliance Turn In Program	Appliance Turn In	\$1,831,736	\$523,605	\$2,355,341	
		Sub-Total	\$1,831,736	\$523,605	\$2,355,341	
	Energy Efficient Homes Program	School Education	\$335,628	\$311,813	\$647,441	
		EE Kits	\$520,826	\$2,597,727	\$3,118,553	
		Audits & Education	\$516,278	\$402,600	\$918,878	
		Behavioral	\$1,721,964	\$0	\$1,721,964	
		New Homes	\$467,901	\$633,375	\$1,101,276	
		Smart Thermostat	\$162,574	\$356,600	\$519,174	
		Sub-Total	\$3,725,170	\$4,302,115	\$8,027,285	
		Energy Efficient Products Program	Appliances	\$74,880	\$533,275	\$608,155
	Consumer Electronics		\$46,849	\$138,907	\$185,756	
	Lighting		\$748,255	\$1,294,590	\$2,042,845	
	HVAC		\$87,457	\$911,076	\$998,534	
	Sub-Total		\$957,441	\$2,877,848	\$3,835,289	
	Customer Action Program - Res	Customer Action Program - Res	\$127,774	\$0	\$127,774	
		Sub-Total	\$127,774	\$0	\$127,774	
	Residential Demand Response Program	Direct Load Control	\$196,567	\$0	\$196,567	
		Sub-Total	\$196,567	\$0	\$196,567	
	Low Income Energy Efficiency Program	Community Connections	\$181,814	\$0	\$181,814	
		LI - New Homes	\$72,416	\$5,645	\$78,060	
		Sub-Total	\$254,229	\$5,645	\$259,874	
Residential Total			\$7,092,917	\$7,709,213	\$14,802,130	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$159,926	\$375,344	\$535,270	
		Lighting - SCI	\$957,277	\$1,983,006	\$2,940,282	
		Food Service	\$59,707	\$130,384	\$190,091	
		Appliance Turn In - SCI	\$257,290	\$9,860	\$267,149	
		Appliances - SCI	\$63,077	\$26,922	\$89,999	
		Consumer Electronics - SCI	\$50,798	\$12,390	\$63,188	
		Agricultural	\$91,883	\$37,538	\$129,421	
		Data Centers - SCI	\$261,197	\$171,278	\$432,476	
		Custom - SCI	\$662,785	\$1,206,778	\$1,869,563	
		Retro - Commissioning - SCI	\$339,437	\$373,744	\$713,181	
		Custom Buildings - SCI	\$419,935	\$538,885	\$958,820	
		Audits & Education - SCI	\$2,722,256	\$3,904,695	\$6,626,951	
		Sub-Total	\$6,045,568	\$8,770,823	\$14,816,392	
		Customer Action Program - SCI	Customer Action Program - SCI	\$284,851	\$0	\$284,851
	Sub-Total		\$284,851	\$0	\$284,851	
	Small C&I Total			\$6,330,420	\$8,770,823	\$15,101,243
	Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$152,171	\$187,640	\$339,811
Lighting - LCI			\$259,577	\$366,295	\$625,872	
Data Centers - LCI			\$252,040	\$117,413	\$369,453	
Custom - LCI			\$1,061,250	\$1,428,178	\$2,489,428	
Retro - Commissioning - LCI			\$134,285	\$58,398	\$192,683	
Custom Buildings - LCI			\$377,818	\$400,893	\$778,710	
Audits & Education - LCI			\$682,252	\$132,000	\$814,252	
Sub-Total			\$2,919,393	\$2,690,817	\$5,610,210	
C&I Demand Response Program - Large		Demand Response - LCI	\$5,200	\$0	\$5,200	
		Sub-Total	\$5,200	\$0	\$5,200	
Customer Action Program - LCI		Customer Action Program - LCI	\$250,517	\$0	\$250,517	
		Sub-Total	\$250,517	\$0	\$250,517	
Large C&I Total			\$3,175,110	\$2,690,817	\$5,865,927	
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$56,899	\$77,750	\$134,649	
		Sub-Total	\$56,899	\$77,750	\$134,649	
Non - Residential Total			\$9,562,429	\$11,539,390	\$21,101,819	
Mercantile	Mercantile Customer Program	Mercantile	\$333,639	\$0	\$333,639	
		Sub-Total	\$333,639	\$0	\$333,639	
Mercantile Total			\$333,639	\$0	\$333,639	
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000	
		Sub-Total	\$5,000	\$0	\$5,000	
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0	
Sub-Total		\$0	\$0	\$0		
Other Total			\$5,000	\$0	\$5,000	
Total			\$16,993,985	\$19,248,603	\$36,242,588	

Appendix B-1: Program Cost by Program Year

Cleveland Electric Illuminating - Program Year 2018					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$1,768,189	\$523,605	\$2,291,794
		Sub-Total	\$1,768,189	\$523,605	\$2,291,794
	Energy Efficient Homes Program	School Education	\$270,489	\$311,813	\$582,302
		EE Kits	\$435,893	\$2,597,727	\$3,033,621
		Audits & Education	\$430,389	\$402,600	\$832,989
		Behavioral	\$1,575,058	\$0	\$1,575,058
		New Homes	\$341,688	\$633,375	\$975,063
		Smart Thermostat	\$150,769	\$356,600	\$507,369
		Sub-Total	\$3,204,286	\$4,302,115	\$7,506,402
		Energy Efficient Products Program	Appliances	\$66,267	\$533,275
	Consumer Electronics		\$42,113	\$138,907	\$181,020
	Lighting		\$614,319	\$1,533,246	\$2,147,564
	HVAC		\$81,346	\$911,076	\$992,423
	Sub-Total		\$804,045	\$3,116,504	\$3,920,549
	Customer Action Program - Res	Customer Action Program - Res	\$127,111	\$0	\$127,111
		Sub-Total	\$127,111	\$0	\$127,111
	Residential Demand Response Program	Direct Load Control	\$195,172	\$0	\$195,172
		Sub-Total	\$195,172	\$0	\$195,172
	Low Income Energy Efficiency Program	Community Connections	\$169,534	\$0	\$169,534
		LI - New Homes	\$42,041	\$5,645	\$47,685
		Sub-Total	\$211,575	\$5,645	\$217,219
Residential Total			\$6,310,378	\$7,947,869	\$14,258,247
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$138,648	\$381,007	\$519,655
		Lighting - SCI	\$907,852	\$2,056,510	\$2,964,363
		Food Service	\$43,193	\$141,144	\$184,337
		Appliance Turn In - SCI	\$238,962	\$10,868	\$249,829
		Appliances - SCI	\$46,660	\$29,789	\$76,448
		Consumer Electronics - SCI	\$33,895	\$13,814	\$47,709
		Agricultural	\$75,503	\$40,425	\$115,928
		Data Centers - SCI	\$260,050	\$189,300	\$449,350
		Custom - SCI	\$673,336	\$1,332,641	\$2,005,977
		Retro - Commissioning - SCI	\$338,825	\$408,783	\$747,608
		Custom Buildings - SCI	\$424,688	\$593,110	\$1,017,799
		Audits & Education - SCI	\$3,026,508	\$4,438,055	\$7,464,563
		Sub-Total	\$6,208,120	\$9,635,445	\$15,843,566
	Customer Action Program - SCI	Customer Action Program - SCI	\$283,651	\$0	\$283,651
		Sub-Total	\$283,651	\$0	\$283,651
	Small C&I Total			\$6,491,771	\$9,635,445
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$115,840	\$187,978	\$303,818
		Lighting - LCI	\$234,816	\$410,209	\$645,025
		Data Centers - LCI	\$213,815	\$117,460	\$331,274
		Custom - LCI	\$775,968	\$1,460,418	\$2,236,386
		Retro - Commissioning - LCI	\$109,356	\$70,077	\$179,433
		Custom Buildings - LCI	\$333,192	\$400,893	\$734,084
		Audits & Education - LCI	\$554,551	\$132,000	\$686,551
		Sub-Total	\$2,337,537	\$2,779,034	\$5,116,572
	C&I Demand Response Program - Large	Demand Response - LCI	\$5,200	\$0	\$5,200
		Sub-Total	\$5,200	\$0	\$5,200
	Customer Action Program - LCI	Customer Action Program - LCI	\$249,368	\$0	\$249,368
		Sub-Total	\$249,368	\$0	\$249,368
Large C&I Total			\$2,592,105	\$2,779,034	\$5,371,139
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$57,188	\$146,500	\$203,688
		Sub-Total	\$57,188	\$146,500	\$203,688
Non - Residential Total			\$9,141,064	\$12,560,980	\$21,702,044
Mercantile	Mercantile Customer Program	Mercantile	\$259,103	\$0	\$259,103
		Sub-Total	\$259,103	\$0	\$259,103
Mercantile Total			\$259,103	\$0	\$259,103
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000
		Sub-Total	\$5,000	\$0	\$5,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
Sub-Total		\$0	\$0	\$0	
Other Total			\$5,000	\$0	\$5,000
Total			\$15,715,546	\$20,508,848	\$36,224,394

Appendix B-1: Program Cost by Program Year

Cleveland Electric Illuminating - Program Year 2019					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$1,900,022	\$566,388	\$2,466,410
		Sub-Total	\$1,900,022	\$566,388	\$2,466,410
	Energy Efficient Homes Program	School Education	\$276,171	\$311,813	\$587,984
		EE Kits	\$469,009	\$2,823,133	\$3,292,142
		Audits & Education	\$456,777	\$443,300	\$900,077
		Behavioral	\$1,571,631	\$0	\$1,571,631
		New Homes	\$358,057	\$683,875	\$1,041,932
		Smart Thermostat	\$149,936	\$356,600	\$506,536
		Sub-Total	\$3,281,581	\$4,618,721	\$7,900,302
		Energy Efficient Products Program	Appliances	\$69,757	\$569,725
	Consumer Electronics		\$45,572	\$152,791	\$198,363
	Lighting		\$588,551	\$1,404,814	\$1,993,364
	HVAC		\$88,112	\$1,000,480	\$1,088,592
	Sub-Total		\$791,991	\$3,127,810	\$3,919,801
	Customer Action Program - Res	Customer Action Program - Res	\$127,580	\$0	\$127,580
		Sub-Total	\$127,580	\$0	\$127,580
	Residential Demand Response Program	Direct Load Control	\$199,470	\$0	\$199,470
		Sub-Total	\$199,470	\$0	\$199,470
	Low Income Energy Efficiency Program	Community Connections	\$169,853	\$0	\$169,853
		LI - New Homes	\$42,954	\$5,645	\$48,598
		Sub-Total	\$212,807	\$5,645	\$218,452
Residential Total			\$6,513,452	\$8,318,563	\$14,832,014
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$140,315	\$384,632	\$524,947
		Lighting - SCI	\$892,853	\$2,035,019	\$2,927,872
		Food Service	\$43,930	\$141,144	\$185,074
		Appliance Turn In - SCI	\$247,850	\$11,981	\$259,831
		Appliances - SCI	\$48,659	\$31,416	\$80,075
		Consumer Electronics - SCI	\$34,995	\$15,238	\$50,233
		Agricultural	\$78,256	\$42,394	\$120,650
		Data Centers - SCI	\$260,517	\$189,300	\$449,817
		Custom - SCI	\$681,148	\$1,347,303	\$2,028,451
		Retro - Commissioning - SCI	\$339,293	\$408,783	\$748,075
		Custom Buildings - SCI	\$425,156	\$593,110	\$1,018,266
		Audits & Education - SCI	\$3,061,450	\$4,438,055	\$7,499,506
		Sub-Total	\$6,254,422	\$9,638,374	\$15,892,796
	Customer Action Program - SCI	Customer Action Program - SCI	\$284,499	\$0	\$284,499
		Sub-Total	\$284,499	\$0	\$284,499
	Small C&I Total			\$6,538,921	\$9,638,374
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$120,588	\$197,435	\$318,023
		Lighting - LCI	\$241,558	\$432,563	\$674,120
		Data Centers - LCI	\$241,895	\$153,225	\$395,120
		Custom - LCI	\$831,679	\$1,583,863	\$2,415,543
		Retro - Commissioning - LCI	\$109,730	\$70,077	\$179,807
		Custom Buildings - LCI	\$354,157	\$433,133	\$787,289
		Audits & Education - LCI	\$564,092	\$156,000	\$720,092
		Sub-Total	\$2,463,699	\$3,026,296	\$5,489,995
	C&I Demand Response Program - Large	Demand Response - LCI	\$5,200	\$0	\$5,200
		Sub-Total	\$5,200	\$0	\$5,200
	Customer Action Program - LCI	Customer Action Program - LCI	\$250,180	\$0	\$250,180
		Sub-Total	\$250,180	\$0	\$250,180
Large C&I Total			\$2,719,079	\$3,026,296	\$5,745,375
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$57,642	\$146,500	\$204,142
		Sub-Total	\$57,642	\$146,500	\$204,142
Non - Residential Total			\$9,315,642	\$12,811,171	\$22,126,813
Mercantile	Mercantile Customer Program	Mercantile	\$260,437	\$0	\$260,437
		Sub-Total	\$260,437	\$0	\$260,437
Mercantile Total			\$260,437	\$0	\$260,437
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000
		Sub-Total	\$5,000	\$0	\$5,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
Sub-Total		\$0	\$0	\$0	
Other Total			\$5,000	\$0	\$5,000
Total			\$16,094,530	\$21,129,734	\$37,224,264

Appendix B-1: Program Cost by Program Year

Cleveland Electric Illuminating - Program Year 2017 - 2019					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$5,499,947	\$1,613,598	\$7,113,545
		Sub-Total	\$5,499,947	\$1,613,598	\$7,113,545
	Energy Efficient Homes Program	School Education	\$882,288	\$935,439	\$1,817,727
		EE Kits	\$1,425,728	\$8,018,588	\$9,444,316
		Audits & Education	\$1,403,444	\$1,248,500	\$2,651,944
		Behavioral	\$4,868,653	\$0	\$4,868,653
		New Homes	\$1,167,646	\$1,950,625	\$3,118,271
		Smart Thermostat	\$463,279	\$1,069,800	\$1,533,079
		Sub-Total	\$10,211,037	\$13,222,952	\$23,433,989
		Energy Efficient Products Program	Appliances	\$210,904	\$1,636,275
	Consumer Electronics		\$134,533	\$430,605	\$565,138
	Lighting		\$1,951,125	\$4,232,649	\$6,183,773
	HVAC		\$256,916	\$2,822,633	\$3,079,548
	Sub-Total		\$2,553,478	\$9,122,161	\$11,675,639
	Customer Action Program - Res	Customer Action Program - Res	\$382,465	\$0	\$382,465
		Sub-Total	\$382,465	\$0	\$382,465
	Residential Demand Response Program	Direct Load Control	\$591,209	\$0	\$591,209
		Sub-Total	\$591,209	\$0	\$591,209
	Low Income Energy Efficiency Program	Community Connections	\$521,201	\$0	\$521,201
		LI - New Homes	\$157,410	\$16,934	\$174,344
		Sub-Total	\$678,611	\$16,934	\$695,545
Residential Total			\$19,916,747	\$23,975,645	\$43,892,392
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$438,889	\$1,140,983	\$1,579,872
		Lighting - SCI	\$2,757,982	\$6,074,535	\$8,832,517
		Food Service	\$146,831	\$412,671	\$559,502
		Appliance Turn In - SCI	\$744,102	\$32,708	\$776,809
		Appliances - SCI	\$158,396	\$88,127	\$246,523
		Consumer Electronics - SCI	\$119,688	\$41,442	\$161,130
		Agricultural	\$245,642	\$120,356	\$365,999
		Data Centers - SCI	\$781,763	\$549,879	\$1,331,642
		Custom - SCI	\$2,017,269	\$3,886,722	\$5,903,991
		Retro - Commissioning - SCI	\$1,017,555	\$1,191,310	\$2,208,865
		Custom Buildings - SCI	\$1,269,779	\$1,725,106	\$2,994,885
		Audits & Education - SCI	\$8,810,214	\$12,780,806	\$21,591,020
		Sub-Total	\$18,508,111	\$28,044,643	\$46,552,754
	Customer Action Program - SCI	Customer Action Program - SCI	\$853,001	\$0	\$853,001
		Sub-Total	\$853,001	\$0	\$853,001
	Small C&I Total			\$19,361,112	\$28,044,643
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$388,599	\$573,053	\$961,652
		Lighting - LCI	\$735,951	\$1,209,067	\$1,945,018
		Data Centers - LCI	\$707,750	\$388,098	\$1,095,848
		Custom - LCI	\$2,668,898	\$4,472,459	\$7,141,357
		Retro - Commissioning - LCI	\$353,371	\$198,552	\$551,923
		Custom Buildings - LCI	\$1,065,166	\$1,234,918	\$2,300,084
		Audits & Education - LCI	\$1,800,895	\$420,000	\$2,220,895
		Sub-Total	\$7,720,629	\$8,496,147	\$16,216,777
	C&I Demand Response Program - Large	Demand Response - LCI	\$15,600	\$0	\$15,600
		Sub-Total	\$15,600	\$0	\$15,600
	Customer Action Program - LCI	Customer Action Program - LCI	\$750,065	\$0	\$750,065
		Sub-Total	\$750,065	\$0	\$750,065
Large C&I Total			\$8,486,294	\$8,496,147	\$16,982,442
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$171,729	\$370,750	\$542,479
		Sub-Total	\$171,729	\$370,750	\$542,479
Non - Residential Total			\$28,019,135	\$36,911,541	\$64,930,675
Mercantile	Mercantile Customer Program	Mercantile	\$853,179	\$0	\$853,179
		Sub-Total	\$853,179	\$0	\$853,179
Mercantile Total			\$853,179	\$0	\$853,179
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$15,000	\$0	\$15,000
		Sub-Total	\$15,000	\$0	\$15,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
Other Total			\$15,000	\$0	\$15,000
Total			\$48,804,061	\$60,887,186	\$109,691,246



Appendix B-2: Program Savings by Program Year

Cleveland Electric Illuminating			2017		2018		2019		Total	
Sector	Program	Sub-Program	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Residential	Appliance Turn In Program	Appliance Turn In	14,964,827	3,148	14,964,827	3,148	16,187,388	3,405	46,117,042	9,701
		Sub-Total	14,964,827	3,148	14,964,827	3,148	16,187,388	3,405	46,117,042	9,701
	Energy Efficient Homes Program	School Education	2,410,847	292	2,410,847	292	2,410,847	292	7,232,542	877
		EE Kits	19,882,011	2,468	19,882,011	2,468	21,607,177	2,682	61,371,199	7,618
		Audits & Education	3,156,014	678	3,156,014	678	3,472,083	746	9,784,111	2,102
		Behavioral	24,415,324	2,787	24,415,324	2,787	24,415,324	2,787	73,245,972	8,361
		New Homes	2,086,323	638	2,086,323	638	2,239,561	685	6,412,206	1,961
		Smart Thermostat	585,662	67	585,662	67	585,662	67	1,756,986	201
		Sub-Total	52,536,180	6,931	52,536,180	6,931	54,730,655	7,260	159,803,016	21,121
	Energy Efficient Products Program	Appliances	2,974,758	416	2,974,758	416	3,155,557	439	9,105,073	1,271
		Consumer Electronics	2,887,944	437	2,887,944	437	3,176,814	481	8,952,702	1,356
		Lighting	23,632,446	2,500	24,171,332	2,557	21,335,971	2,257	69,139,749	7,313
		HVAC	3,102,230	785	3,102,230	785	3,406,971	863	9,611,430	2,433
		Sub-Total	32,597,377	4,138	33,136,263	4,195	31,075,314	4,039	96,808,954	12,373
	Customer Action Program - Res	Customer Action Program - Res	25,994,819	2,967	14,051,026	1,604	7,596,826	867	47,642,671	5,439
		Sub-Total	25,994,819	2,967	14,051,026	1,604	7,596,826	867	47,642,671	5,439
	Residential Demand Response Program	Direct Load Control	0	2,893	0	2,864	0	2,835	0	2,864
		Sub-Total	0	2,893	0	2,864	0	2,835	0	2,864
	Low Income Energy Efficiency Program	Community Connections	2,646,407	302	2,646,407	302	2,646,407	302	7,939,222	906
		LI - New Homes	17,673	9	17,673	9	17,673	9	53,020	26
		Sub-Total	2,664,081	311	2,664,081	311	2,664,081	311	7,992,242	932
Residential Total			128,757,284	20,387	117,352,377	19,052	112,254,263	18,717	358,363,924	52,429
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	2,601,512	1,925	2,637,804	1,944	2,660,060	1,961	7,899,375	5,830
		Lighting - SCI	28,922,442	5,472	29,409,632	5,541	28,859,422	5,412	87,191,496	16,426
		Food Service	1,498,192	190	1,626,694	207	1,626,694	207	4,751,580	604
		Appliance Turn In - SCI	267,843	47	295,837	52	325,655	57	889,334	155
		Appliances - SCI	422,995	45	466,824	50	503,857	54	1,393,677	149
		Consumer Electronics - SCI	82,277	7	91,748	8	101,219	9	275,244	25
		Agricultural	96,719	16	104,159	17	110,903	18	311,782	51
		Data Centers - SCI	978,954	112	1,081,901	124	1,081,901	124	3,142,757	359
		Custom - SCI	16,516,272	1,946	18,238,853	2,149	18,439,526	2,178	53,194,651	6,274
		Retro - Commissioning - SCI	5,115,157	584	5,594,703	639	5,594,703	639	16,304,563	1,861
		Custom Buildings - SCI	7,375,321	842	8,117,453	927	8,117,453	927	23,610,227	2,695
		Audits & Education - SCI	10,603,845	1,213	22,056,248	2,561	22,056,248	2,561	54,716,342	6,335
		Sub-Total	74,481,529	12,399	89,721,857	14,218	89,477,642	14,146	253,681,027	40,763
	Customer Action Program - SCI	Customer Action Program - SCI	4,722,089	539	4,722,089	539	4,722,089	539	14,166,267	1,617
		Sub-Total	4,722,089	539	4,722,089	539	4,722,089	539	14,166,267	1,617
Small C&I Total			79,203,618	12,938	94,443,946	14,757	94,199,731	14,685	267,847,295	42,380
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	1,371,242	709	1,372,780	711	1,476,422	802	4,220,444	2,222
		Lighting - LCI	5,043,714	981	5,532,186	1,077	5,749,819	1,115	16,325,718	3,173
		Data Centers - LCI	1,126,209	129	1,126,811	129	1,490,978	170	3,743,997	427
		Custom - LCI	18,400,287	2,107	18,815,659	2,155	20,406,101	2,339	57,622,047	6,601
		Retro - Commissioning - LCI	752,379	86	902,855	103	902,855	103	2,558,090	292
		Custom Buildings - LCI	5,165,003	590	5,165,003	590	5,580,375	637	15,910,380	1,816
		Audits & Education - LCI	1,914,175	219	1,914,175	219	1,948,092	222	5,776,442	659
	Sub-Total	33,773,009	4,820	34,829,468	4,982	37,554,641	5,389	106,157,118	15,191	
	C&I Demand Response Program - Large	Demand Response - LCI	0	189,720	0	189,720	0	189,720	0	189,720
		Sub-Total	0	189,720	0	189,720	0	189,720	0	189,720
	Customer Action Program - LCI	Customer Action Program - LCI	2,660,505	304	2,294,879	262	2,084,984	238	7,040,368	804
Sub-Total		2,660,505	304	2,294,879	262	2,084,984	238	7,040,368	804	
Large C&I Total			36,433,514	194,844	37,124,347	194,964	39,639,625	195,347	113,197,486	205,715
Government	Government Tariff Lighting Program	Government Tariff Lighting	279,463	6	514,867	6	514,867	6	1,309,197	17
		Sub-Total	279,463	6	514,867	6	514,867	6	1,309,197	17
Non - Residential Total			115,916,595	207,787	132,083,160	209,727	134,354,223	210,037	382,353,977	248,112
Mercantile	Mercantile Customer Program	Mercantile	29,412,649	3,579	29,412,649	3,579	29,412,649	3,579	88,237,947	10,736
		Sub-Total	29,412,649	3,579	29,412,649	3,579	29,412,649	3,579	88,237,947	10,736
Mercantile Total			29,412,649	3,579	29,412,649	3,579	29,412,649	3,579	88,237,947	10,736
Other	Transmission & Distribution Upgrades	T&D Upgrades	2,500,000	285	2,200,000	251	2,200,000	251	6,900,000	788
		Sub-Total	2,500,000	285	2,200,000	251	2,200,000	251	6,900,000	788
	Smart Grid Modernization Initiative	Smart Grid	0	0	0	0	0	0	0	0
		Sub-Total	0	0	0	0	0	0	0	0
	Energy Special Improvement District	Energy Special Improvement District	0	0	0	0	0	0	0	0
Sub-Total		0	0	0	0	0	0	0	0	
Other Total			2,500,000	285	2,200,000	251	2,200,000	251	6,900,000	788
Total			276,586,528	232,039	281,048,185	232,609	278,221,135	232,585	835,855,848	312,065

1. kWh savings represents incremental annual savings achieved per year and in total for 2017-2019

2. kW savings represents incremental annual coincident peak demand savings from EEC measures and average annual demand savings from DR measures, per year and in total for 2017 - 2019

## Appendix B-3: Costs Elements

Cleveland Electric Illuminating - Cost Assumptions		
<p>The model used for developing the programs involves a build-up of direct costs based on program or subprogram fixed costs and variable costs based on participation at the measure level. Common costs are estimated at the State or Company level and allocated to each program. Program cost elements of this plan include Operations costs and Incentive costs. Operations costs include Utility Administration costs associated with portfolio management and plan development, Program Administration costs associated with program management and implementation, Marketing, Evaluation, Measurement and Verification (EMV) costs associated with EMV of the programs, Tracking and Reporting costs for tracking and reporting of the program results, and Other costs associated with the development and implementation of the Plan. The following details the assumptions for the program cost elements included in this plan:</p>		
Cost Elements	Component Detail	Description
Operations	Utility Administration	Includes costs incurred by the utility for dedicated employee labor for plan development, to oversee and manage the portfolio, and to perform duties associated with activities such as regulatory reporting or meetings to support the plan. Utility administration costs were based on Company estimated EE&C portfolio administration costs, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Program Administration	Includes utility and program implementation provider costs associated with the implementation and ongoing management of the programs including staffing, contractors, website(s), call centers, quality assurance and control processes, vendor tracking systems and other program specific activities supporting successful program implementation. Program administration costs were informed by experience for similar programs operated by FirstEnergy. Program Administration costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	Marketing	Includes costs associated with developing and providing marketing for plan and program messaging and education of the plan and programs. Marketing costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	EM&V	Includes costs for evaluation, measurement and verification activities performed by the Companies and the Companies' independent evaluator, such as surveys, M&V processes, data transfer and evaluation meetings. The EMV costs were based on 4% of the subprogram cost, and summed to the program level.
	Tracking and Reporting	Includes the costs to develop and maintain a data collection, tracking and reporting system, to develop and generate standard reports, and provide the functionality for program management ad hoc reporting. These costs were informed by existing contracts and Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Other	Other costs includes other common costs associated with the development and implementation of the plan, including research and development such as participation in research projects, pilots or demonstrations, completing market potential or other studies, consulting and legal fees, modeling software fees, and employee expenses. Other costs were informed by existing contracts or Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
Incentives	Incentives	Incentives include rebates paid to customers as well as costs associated with providing services or measures directly to customers, or mid-stream or upstream payments to program allies where applicable. Incentives were calculated based on measure level incentive and participation assumptions, and summed to the subprogram and program level.



**Cleveland Electric Illuminating  
- Appendix C:  
Program Assumptions & PUCO Tables**

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	8	1,376	0.22	0	50	0	Ohio TRM	DEER
			Freezer Recycling	8	1,244	0.20	0	50	0	Ohio TRM	DEER
			Room Air Conditioner Recycling	3	122	1.07	0	30	0	Ohio TRM - Adjusted	DEER
			Dehumidifier Recycling	3	1,075	0.17	0	30	0	Co Assumption	Co Assumption
	Energy Efficient Homes Program	School Education	School Education	7	318	0.04	39	45	0	PA TRM	Co Assumption
		EE Kits	Energy Efficiency Measures	7	324	0.04	40	46	0	PA TRM	Co Assumption
		Audits & Education	Comprehensive Audit	12	633	0.13	665	550	0	Co Assumption	Co Assumption
			On-Line Audit	3	265	0.06	0	0	0	Co Assumption	N/A
		Behavioral	Behavioral	1	144	0.02	0	0	0	Co Assumption	N/A
		New Homes	New Construction -Townhouse and Duplexs	15	1,692	0.51	1,426	425	0	Co Assumption	Co Assumption
			New Construction - Two-on-Two Condos	15	1,692	0.51	1,426	1,000	0	Co Assumption	Co Assumption
			New Construction - Single Family Detached	15	2,820	0.86	2,377	1,000	0	Co Assumption	Co Assumption
			New Construction - Multi Family Low Rise	15	1,692	0.51	1,426	400	0	Co Assumption	Co Assumption
			New Manufactured Housing	15	897	0.44	756	350	0	Co Assumption	Co Assumption
		Smart Thermostat	Smart Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption
	Energy Efficient Products Program	Appliances	Clothes Washer	11	233	0.02	50	50	0	Ohio TRM	PA Incremental Cost DB
			Clothes Dryer - (Elec w Moisture Sensor)	16	152	0.02	112	50	0	Co Assumption	PA Incremental Cost DB
			Freezers	14	133	0.02	7	10	0	Co Assumption	PA Incremental Cost DB
			Refrigerators	14	150	0.03	25	25	0	Ohio TRM	PA Incremental Cost DB
			Dehumidifiers	12	182	0.03	20	20	0	Ohio TRM	PA Incremental Cost DB
			Water Heater - Heat Pump	10	1,688	0.23	605	375	0	Ohio TRM	DEER
		Consumer Electronics	Home Technology & Automation	8	420	0.20	200	100	0	Co Assumption	Co Assumption
			Monitors	4	15	0.00	20	1	0	PA TRM	Co Assumption
			Computers	4	133	0.02	30	3	0	PA TRM	Co Assumption
			Imaging	5	73	0.01	25	2	0	PA TRM	Co Assumption
			TVs	6	74	0.01	20	4	0	PA TRM	Co Assumption

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	7	34	0.00	2	1	0	Ohio TRM	PA Incremental Cost DB	
			CFL Fixtures	10	68	0.01	32	5	0	Co Assumption	PA Incremental Cost DB	
			LED Fixtures	15	74	0.01	36	7	0	Co Assumption	DEER	
			LED Lamps	15	37	0.00	7	3	0	Ohio TRM - Adjusted	Co Assumption	
			Residential Lighting Controls	10	38	0.00	40	5	0	Co Assumption	PA Incremental Cost DB	
		HVAC	Heat Pump	18	880	0.14	471	313	0	Ohio TRM	DEER	
			Central Air Conditioner	18	157	0.14	880	125	0	Ohio TRM	DEER	
			Room Air Conditioner	12	27	0.03	50	36	0	Ohio TRM	PA Incremental Cost DB	
			Ductless Mini-Split Heat Pump	15	908	0.16	448	125	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTAC - Multi Family	15	92	0.12	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTHP - Multi Family	15	300	0.05	255	125	0	Ohio TRM - Adjusted	Co Assumption	
			Heat Pump - Water & GeoT	18	3,537	0.28	10,897	300	0	Ohio TRM	PA Incremental Cost DB	
			HVAC - Maintenance	5	77	0.04	100	50	0	Ohio TRM	PA Incremental Cost DB	
			Furnace Fans	14	446	0.11	360	180	0	PA TRM	PA Incremental Cost DB	
			Circulation Pumps	10	157	0.02	62	40	0	Co Assumption	Co Assumption	
			Programmable / SMART Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption	
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	9	1	0.0001	0.05	0	0	Co Assumption	Co Assumption	
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	1	0	0.36	0	0	0	Co Assumption	Co Assumption	
	Low Income Energy Efficiency Program	Community Connections	Community Connections	8	1,734	0.20	0	0	0	Co Assumption	N/A	
		LI - New Homes	LI New Construction	15	897	0.44	756	314	0	Co Assumption	Co Assumption	

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	12	303	0.20	50	21	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - <=5.4 Tn - SCI	15	962	0.93	1,960	197	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - >5.4 < 20 Tn - SCI	15	3,326	3.00	1,680	328	0	Ohio TRM	PA Incremental Cost DB	
			Air Conditioning - >=20 Tn - SCI	15	7,143	6.45	2,500	394	0	Ohio TRM	PA Incremental Cost DB	
			Chiller - Water Cld w Full Load - SCI	20	14,432	3.26	6,500	2,625	0	PA TRM - Adjusted	PA Incremental Cost DB	
			Heat Pump - <=5.4 Tn - SCI	15	2,452	1.44	1,285	197	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - >5.4 Tn - SCI	15	3,334	3.00	1,935	328	0	Ohio TRM	PA Incremental Cost DB	
			Heat Pumps - Water & GeoT - SCI	15	1,789	1.61	5,870	328	0	Ohio TRM	PA Incremental Cost DB	
			HVAC - Maintenance - SCI	5	48	0.05	150	53	0	Ohio TRM	Co Assumption	
			Circulation Pumps - SCI	10	174	0.02	62	42	0	Co Assumption	Co Assumption	
			Ductless Mini-Split HP - SCI	15	830	0.42	448	492	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTAC - SCI	15	177	0.29	84	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
			PTHP - SCI	15	590	0.29	255	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB	
		Lighting - SCI	CFL Fixtures - SCI	15	174	0.04	30	14	4	Co Assumption	PA Incremental Cost DB	
			CFL Lamps - SCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB	
			Lighting Controls (Daylight & Occupancy) - SCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB	
			Linear Fluorscent T8 / T5 - SCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB	
			LED Linear - SCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption	
			LED Channel Signage - SCI	15	506	0.10	22	41	0	Co Assumption	Co Assumption	
			Exit Signs - SCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB	
			LED Fixtures External - SCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB	
			LED Fixtures Internal - SCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption	
			LED Lamps - SCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption	
			LED Reach in Refrigerator / Freezer Lights - SCI	8	345	0.04	266	28	4	Ohio TRM	PA Incremental Cost DB	
			Street & Area Lighting (Customer Owned) - SCI	10	430	0.05	337	34	13	PA TRM	PA Incremental Cost DB	

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	12	883	0.10	430	158	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Freezers - Reach In - SCI	12	4,709	0.54	430	368	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Ice Machines - SCI	9	1,218	0.21	981	263	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Refrigerated Case Cover - SCI	5	44	0.00	38	12	0	PA TRM	PA Incremental Cost DB	
			Strip Curtains - SCI	6	129	0.01	4	1	0	PA TRM	PA Incremental Cost DB	
			Anti Sweat Heater Controls - SCI	12	1,298	0.03	70	37	0	PA TRM	PA Incremental Cost DB	
			Beverage Vending Machine - Controls - SCI	5	1,633	0.00	180	95	0	PA TRM	PA Incremental Cost DB	
			Beverage Vending Machine - New EE- SCI	14	125	0.00	180	95	0	PA TRM	PA Incremental Cost DB	
			Combination Oven - SCI	12	6,368	1.22	1,584	788	0	Energy Star / Ohio TRM	DEER	
			Convection Oven - SCI	12	1,937	0.37	1,007	525	0	Energy Star / Ohio TRM	DEER	
			Steam Cookers - SCI	12	9,967	1.91	630	368	0	Energy Star / Ohio TRM	Energy Star	
			Fryers - SCI	12	1,744	0.33	105	105	0	Energy Star / Ohio TRM	Energy Star	
			Griddles - SCI	12	1,909	0.37	774	368	0	Energy Star / Ohio TRM	DEER	
			Hot Food Holding Cabinet - SCI	12	1,730	0.33	1,110	525	0	Energy Star / Ohio TRM	Ohio TRM	
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	8	1,376	0.22	0	53	0	Ohio TRM	DEER	
			Freezer Recycling - SCI	8	1,244	0.20	0	53	0	Ohio TRM	DEER	
			Room Air Conditioner Recycling - SCI	3	121	0.26	0	32	0	Ohio TRM	DEER	
			Dehumidifiers Recycling - SCI	3	1,075	0.17	0	32	0	Co Assumption	Co Assumption	
		Appliances - SCI	Clothes Washer - SCI	10	542	0.00	150	79	0	Ohio TRM	PA Incremental Cost DB	
			Clothes Dryer (Elec w Moisture Sensor) - SCI	10	352	0.00	112	58	0	Co Assumption	PA Incremental Cost DB	
			Refrigerators - SCI	12	818	0.09	25	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Water Heater - Heat Pump - SCI	10	3,377	0.46	945	394	0	Ohio TRM	PA Incremental Cost DB	
			Freezers - SCI	12	2,128	0.24	6	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB	
			Pre-Rinse Sprayers - SCI	5	25	0.00	23	53	0	Ohio TRM	DEER	

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	4	3,488	0.40	3,926	525	0	Co Assumption	Co Assumption	
			Monitors - SCI	4	15	0.00	10	7	0	PA TRM	PA Incremental Cost DB	
			Computers - SCI	4	133	0.00	12	7	0	PA TRM	PA Incremental Cost DB	
			Imaging - SCI	5	104	0.00	20	13	0	PA TRM	PA Incremental Cost DB	
			Small Network - SCI	4	20	0.00	15	13	0	Co Assumption	Co Assumption	
		Agricultural	Efficient Dairy Equipment - SCI	15	2,053	0.29	1,000	656	0	Co Assumption	Co Assumption	
			High Efficiency Fans - SCI	10	896	0.18	500	525	0	Co Assumption	Co Assumption	
		Data Centers - SCI	DC - Custom Servers- SCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption	
			DC - Custom HVAC - SCI	15	43,800	5.00	13,140	3,504	0	Co Assumption	Co Assumption	
			DC - Audit - SCI	0	0	0.00	0	5,250	0	N/A	N/A	
		Custom - SCI	Custom - Process Improvement - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption	
			Custom - HVAC & Chillers - SCI	20	28,864	6.51	13,000	2,309	0	PA TRM - Adjusted	PA Incremental Cost DB	
			Custom - Compressed Air - SCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption	
			Custom - VFDs < 10HP - SCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB	
			Custom - VFDs > 10 HP - SCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB	
			Custom-Motors - Three Phase - SCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB	
			Custom - Refrigeration - SCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB	
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption	
		Custom Buildings - SCI	Custom - Building Improvements - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption	
			Custom - Energy Management - SCI	10	35,478	4.05	10,643	2,838	0	Co Assumption	Co Assumption	
		Audits & Education SCI	Energy Manager - SCI	1	16,453	1.88	0	0	0	Co Assumption	N/A	
			Energy Efficiency Measures - SCI	5	302	0.04	39	39	0	PA TRM	Co Assumption	
			Multi Family Audit - SCI	7	324	0.04	40	46	0	Co Assumption	Co Assumption	
			Benchmarking - SCI	0	0	0.00	0	0	0	Co Assumption	N/A	
			Audit - SCI	0	0	0.00	0	7,875	0	N/A	N/A	
			Audits w Direct Install - SCI	12	10,291	1.17	4,117	3,293	0	Co Assumption	Co Assumption	
			Behavioral - SCI	1	507	0.06	0	0	0	Co Assumption	Co Assumption	
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption	

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	15	962	0.93	1,960	188	0	Ohio TRM	PA Incremental Cost DB
			Chiller - Water Cld w Full Load - LCI	20	43,296	9.77	19,500	7,500	0	PA TRM - Adjusted	PA Incremental Cost DB
			Air Conditioning - >5.4 < 20 Tn - LCI	15	3,326	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB
			Air Conditioning - >=20 Tn - LCI	15	7,143	6.45	2,500	375	0	Ohio TRM	PA Incremental Cost DB
			Heat Pump - <=5.4 Tn - LCI	15	2,452	1.44	1,285	188	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - >5.4 Tn - LCI	15	3,334	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - Water & GeoT - LCI	15	1,789	1.61	5,870	313	0	Ohio TRM	PA Incremental Cost DB
			Ductless Mini-Split HP - LCI	15	830	0.42	448	300	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTAC - LCI	15	177	0.29	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTHP - LCI	15	590	0.29	255	80	0	Ohio TRM - Adjusted	PA Incremental Cost DB
		Lighting - LCI	CFL Fixtures - LCI	15	174	0.04	30	10	4	Co Assumption	PA Incremental Cost DB
			CFL Lamps - LCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB
			Lighting Controls (Daylight & Occupancy) - LCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB
			Linear Fluorscent T8 / T5 - LCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB
			LED Linear - LCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption
			LED Channel Signage - LCI	15	506	0.10	35	41	0	Co Assumption	PA Incremental Cost DB
			Exit Signs - LCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB
			LED Fixtures External - LCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB
			LED Fixtures Internal - LCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption
			LED Lamps - LCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption
			Street & Area Lighting (Customer Owned) - LCI	10	430	0.00	337	34	13	PA TRM	PA Incremental Cost DB
		Data Centers - LCI	DC - Custom HVAC - LCI	15	350,400	40.00	105,120	28,032	0	Co Assumption	Co Assumption
			DC - Custom Servers - LCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption
			DC - Audit - LCI	0	0	0.00	0	7,500	0	N/A	N/A

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - HVAC & Chillers - LCI	20	28,864	6.51	13,000	2,309	0	PA TRM - Adjusted	PA Incremental Cost DB
			Custom - Compressed Air - LCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption
			Custom - VFDs < 10HP - LCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB
			Custom - VFDs > 10 HP - LCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB
			Custom-Motors - Three Phase - LCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB
			Custom - Refrigeration - LCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption
		Custom Buildings - LCI	Custom - Building Improvements - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - Energy Management - LCI	10	289,080	33.00	100,000	23,126	0	Co Assumption	Co Assumption
		Audits & Education LCI	Audit - LCI	0	0	0.00	0	12,000	0	N/A	N/A
			Continuous Improvement - LCI	1	158,820	18.13	0	0	0	Co Assumption	Co Assumption
			Energy Manager - LCI	1	32,906	3.76	0	0	0	Co Assumption	Co Assumption
			Benchmarking - LCI	0	0	0.00	0	0	0	Co Assumption	Co Assumption
	C&I Demand Response Program - Large	Demand Response LCI	LC&I Contracted DR - PJM	1	0	1,000.00	N/A	N/A	N/A	Co Assumption	Co Assumption
			ELR Interruptible Tariff	1	0	1.00	N/A	N/A	N/A	Co Assumption	Co Assumption
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption



Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	10	400	0.05	170	90	189	Ohio TRM	PA Incremental Cost DB	
			Street & Area Lighting (Tariff / Utility Owned) - Gov	10	241	0.00	0	0	15	Ohio TRM	Co Assumption	
			Street & Area Lighting (Tariff / Customer Owned) - Gov	10	430	0.00	337	138	15	PA TRM	PA Incremental Cost DB	

Appendix C-1: Measure Assumptions

Cleveland Electric Illuminating												
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source	
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	10	27,816,010	3,384.50	0	0	0	Co Assumption	Co Assumption	
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	15	1	0.00	N/A	N/A	N/A	Co Assumption	Co Assumption	
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption	
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption	

**Appendix C-2: Number of Units**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	8,063	8,063	8,722
			Freezer Recycling	1,877	1,877	2,030
			Room Air Conditioner Recycling	657	657	711
			Dehumidifier Recycling	147	147	159
	Energy Efficient Homes Program	School Education	School Education	6,930	6,930	6,930
		EE Kits	Energy Efficiency Measures	56,010	56,010	60,870
		Audits & Education	Comprehensive Audit	732	732	806
			On-Line Audit	9,143	9,143	10,057
		Behavioral	Behavioral	155,200	155,200	155,200
		New Homes	New Construction -Townhouse and Duplexs	285	285	285
			New Construction - Two-on-Two Condos	30	30	33
			New Construction - Single Family Detached	462	462	508
			New Construction - Multi Family Low Rise	27	27	29
			New Manufactured Housing	27	27	29
		Smart Thermostat	Smart Thermostat	3,566	3,566	3,566
	Energy Efficient Products Program	Appliances	Clothes Washer	2,775	2,775	3,053
			Clothes Dryer - (Elec w Moisture Sensor)	758	758	774
			Freezers	1,070	1,070	1,070
			Refrigerators	4,248	4,248	4,248
			Dehumidifiers	1,055	1,055	1,055
			Water Heater - Heat Pump	583	583	641
		Consumer Electronics	Home Technology & Automation	1	1	1
			Monitors	3,277	3,277	3,605
			Computers	838	838	922
			Imaging	70	70	78
			TVs	33,219	33,219	36,541

**Appendix C-2: Number of Units**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	303,779	203,697	153,612
			CFL Fixtures	94	94	44
			LED Fixtures	82	82	90
			LED Lamps	303,779	408,006	383,882
			Residential Lighting Controls	497	497	547
		HVAC	Heat Pump	1,065	1,065	1,171
			Central Air Conditioner	1,463	1,463	1,610
			Room Air Conditioner	2,551	2,551	2,806
			Ductless Mini-Split Heat Pump	763	763	839
			PTAC - Multi Family	65	65	72
			PTHP - Multi Family	78	78	86
			Heat Pump - Water & GeoT	186	186	204
			HVAC - Maintenance	2,410	2,410	2,651
			Furnace Fans	28	28	30
			Circulation Pumps	5	5	5
			Programmable / SMART Thermostat	130	130	130
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	23,741,729	12,833,159	6,938,374
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	7,400	7,326	7,253
	Low Income Energy Efficiency Program	Community Connections	Community Connections	1,394	1,394	1,394
		LI - New Homes	LI New Construction	18	18	18

**Appendix C-2: Number of Units**

<b>Cleveland Electric Illuminating</b>						
<b>Sector</b>	<b>Program</b>	<b>Sub-Program</b>	<b>Measure</b>	<b>2017 Units</b>	<b>2018 Units</b>	<b>2019 Units</b>
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	300	305	312
			Air Conditioning - <=5.4 Tn - SCI	411	411	411
			Air Conditioning - >5.4 < 20 Tn - SCI	121	121	121
			Air Conditioning - >=20 Tn - SCI	40	41	42
			Chiller - Water Cld w Full Load - SCI	14	15	15
			Heat Pump - <=5.4 Tn - SCI	109	109	109
			Heat Pumps - >5.4 Tn - SCI	45	45	45
			Heat Pumps - Water & GeoT - SCI	33	34	35
			HVAC - Maintenance - SCI	25	25	25
			Circulation Pumps - SCI	468	468	468
			Ductless Mini-Split HP - SCI	182	185	189
			PTAC - SCI	341	347	354
			PTHP - SCI	389	397	405
		Lighting - SCI	CFL Fixtures - SCI	233	244	191
			CFL Lamps - SCI	28,179	12,184	7,457
			Lighting Controls (Daylight & Occupancy) - SCI	19,008	19,808	20,666
			Linear Fluorescent T8 / T5 - SCI	47,065	46,300	40,282
			LED Linear - SCI	43,172	51,334	54,644
			LED Channel Signage - SCI	259	270	282
			Exit Signs - SCI	1,899	1,979	2,065
			LED Fixtures External - SCI	9,675	10,082	10,518
			LED Fixtures Internal - SCI	851	887	925
			LED Lamps - SCI	37,883	44,182	40,801
			LED Reach in Refrigerator / Freezer Lights - SCI	4,924	5,132	5,354
			Street & Area Lighting (Customer Owned) - SCI	2,909	3,031	3,163

**Appendix C-2: Number of Units**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	18	18	18
			Freezers - Reach In - SCI	78	84	84
			Ice Machines - SCI	34	38	38
			Refrigerated Case Cover - SCI	878	968	968
			Strip Curtains - SCI	1,198	1,322	1,322
			Anti Sweat Heater Controls - SCI	110	122	122
			Beverage Vending Machine - Controls - SCI	37	37	37
			Beverage Vending Machine - New EE- SCI	128	142	142
			Combination Oven - SCI	18	20	20
			Convection Oven - SCI	16	16	16
			Steam Cookers - SCI	24	26	26
			Fryers - SCI	30	34	34
			Griddles - SCI	22	24	24
			Hot Food Holding Cabinet - SCI	30	32	32
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	147	162	178
			Freezer Recycling - SCI	30	33	37
			Room Air Conditioner Recycling - SCI	15	16	18
			Dehumidifiers Recycling - SCI	3	4	4
		Appliances - SCI	Clothes Washer - SCI	30	34	38
			Clothes Dryer (Elec w Moisture Sensor) - SCI	78	84	94
			Refrigerators - SCI	216	238	262
			Water Heater - Heat Pump - SCI	30	34	34
			Freezers - SCI	30	32	36
			Pre-Rinse Sprayers - SCI	34	34	34

Appendix C-2: Number of Units

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	17	19	21
			Monitors - SCI	128	142	156
			Computers - SCI	48	53	58
			Imaging - SCI	48	53	58
			Small Network - SCI	128	142	156
		Agricultural	Efficient Dairy Equipment - SCI	26	28	31
			High Efficiency Fans - SCI	39	42	42
		Data Centers - SCI	DC - Custom Servers- SCI	106	117	117
			DC - Custom HVAC - SCI	19	21	21
			DC - Audit - SCI	19	21	21
		Custom - SCI	Custom - Process Improvement - SCI	214	236	236
			Custom - HVAC & Chillers - SCI	20	22	24
			Custom - Compressed Air - SCI	19	21	23
			Custom - VFDs < 10HP - SCI	29	32	32
			Custom - VFDs > 10 HP - SCI	16	18	18
			Custom-Motors - Three Phase - SCI	27	30	33
			Custom - Refrigeration - SCI	17	19	21
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	32	35	35
		Custom Buildings - SCI	Custom - Building Improvements - SCI	118	130	130
			Custom - Energy Management - SCI	2	2	2
		Audits & Education - SCI	Energy Manager - SCI	39	42	42
			Energy Efficiency Measures - SCI	856	944	944
			Multi Family Audit - SCI	50	50	50
			Benchmarking - SCI	39	42	42
			Audit - SCI	135	145	145
			Audits w Direct Install - SCI	852	989	989
			Behavioral - SCI	0	17,700	17,700
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	4,312,804	4,312,804	4,312,804

**Appendix C-2: Number of Units**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	18	19	22
			Chiller - Water Cld w Full Load - LCI	17	17	17
			Air Conditioning - >5.4 < 20 Tn - LCI	17	17	20
			Air Conditioning - >=20 Tn - LCI	37	37	44
			Heat Pump - <=5.4 Tn - LCI	44	44	52
			Heat Pumps - >5.4 Tn - LCI	6	6	7
			Heat Pumps - Water & GeoT - LCI	25	25	25
			Ductless Mini-Split HP - LCI	9	9	11
			PTAC - LCI	254	257	301
			PTHP - LCI	53	53	62
		Lighting - LCI	CFL Fixtures - LCI	1	1	1
			CFL Lamps - LCI	4,583	2,665	1,507
			Lighting Controls (Daylight & Occupancy) - LCI	4,977	5,039	5,900
			Linear Fluorescent T8 / T5 - LCI	10,470	9,276	7,053
			LED Linear - LCI	6,544	9,276	11,285
			LED Channel Signage - LCI	26	27	28
			Exit Signs - LCI	488	494	579
			LED Fixtures External - LCI	4,531	4,587	5,371
			LED Fixtures Internal - LCI	28	28	33
			LED Lamps - LCI	5,601	8,439	7,358
			Street & Area Lighting (Customer Owned) - LCI	256	256	285
		Data Centers - LCI	DC - Custom HVAC - LCI	3	3	4
			DC - Custom Servers - LCI	71	72	77
			DC - Audit - LCI	4	4	5

**Appendix C-2: Number of Units**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	40	41	44
			Custom - HVAC & Chillers - LCI	3	3	4
			Custom - Compressed Air - LCI	10	10	11
			Custom - VFDs < 10HP - LCI	11	11	13
			Custom - VFDs > 10 HP - LCI	17	17	21
			Custom-Motors - Three Phase - LCI	2	2	2
			Custom - Refrigeration - LCI	2	2	3
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	5	6	6
		Custom Buildings - LCI	Custom - Building Improvements - LCI	11	11	12
			Custom - Energy Management - LCI	2	2	2
		Audits & Education - LCI	Audit - LCI	11	11	13
			Continuous Improvement - LCI	9	9	9
			Energy Manager - LCI	13	13	14
			Benchmarking - LCI	13	13	14
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	1	1	1
			ELR Interruptible Tariff	189,720	189,720	189,720
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	2,581,260	2,226,525	2,022,882



## Appendix C-2: Number of Units

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	100	100	100
			Street & Area Lighting (Tariff / Utility Owned) - Gov	1	1	1
			Street & Area Lighting (Tariff / Customer Owned) - Gov	500	1,000	1,000

## Appendix C-2: Number of Units

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	1	1	1
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	2,500,000	2,200,000	2,200,000
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	1	1	1
Other	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	1	1	1

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Freezer Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Room Air Conditioner Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
			Dehumidifier Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
	Energy Efficient Homes Program	School Education	School Education	Adoption of an energy efficiency school curriculum or other engagement which encourages efficient practices & installation of energy efficiency measures at home. Student families are offered an energy efficiency kit to introduce simple retrofit measures.	NA	
		EE Kits	Energy Efficiency Measures	Opt In Kit with low cost energy efficiency measures mailed at the customers request.	NA	
		Audits & Education	Comprehensive Audit	Provides a Customized Home Energy Report for single or multi-family residence. Comprehensive measures that are eligible for incentives, as a result of diagnostics and testing include, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc. Manufactured homes are also eligible.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			On-Line Audit	Energy education and awareness supporting installation of measures and behaviors that reduce consumption of energy and demand.	NA	
		Behavioral	Behavioral	Reports containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of measures and efficiencies behaviors that reduces consumption of energy and demand.	NA	
		New Homes	New Construction -Townhouse and Duplexs	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,125	per unit
			New Construction - Two-on-Two Condos	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$825	per unit
			New Construction - Single Family Detached	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,875	per unit

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Homes Program	New Homes	New Construction - Multi Family Low Rise	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$600	per unit
			New Manufactured Housing	New residential modular or manufactured home. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
		Smart Thermostat	Smart Thermostat	Deployment of a program specific smart thermostat to residential customers with either of the following HVAC systems: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump	\$100	per unit
	Energy Efficient Products Program	Appliances	Clothes Washer	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer, including appliances that can be interconnected to home energy management systems.	\$100	per unit
			Clothes Dryer - (Elec w Moisture Sensor)	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer	\$600	per unit
			Freezers	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Refrigerators	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Dehumidifiers	Purchase and installation of a new Energy Star rated unit	\$25	per unit
			Water Heater - Heat Pump	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
		Consumer Electronics	Home Technology & Automation	Purchase and installation of emerging technologies related to the control of in-home appliances, lighting, HVAC equipment, etc.	75% of equipment cost	per unit
			Monitors	Purchase and installation of an Energy Star rated unit	\$8	per unit
			Computers	Purchase and installation of an Energy Star rated unit	\$8	per unit

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	Consumer Electronics	Imaging	Purchase and installation of an Energy Star rated unit	\$8	per unit
			TVs	Purchase and installation of an Energy Star V7.0 rated Television	\$8	per unit
		Lighting	CFL Lamps	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL) at participating retailers.	\$3	NTE Cost of Lamp
			CFL Fixtures	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture
			LED Fixtures	Purchase and installation of an energy efficient luminaire with integral LED lamp.	\$50	per fixture
			LED Lamps	Purchase and installation of an energy efficient LED lamp at participating retailers.	\$5	NTE Cost of Lamp
			Residential Lighting Controls	The purchase and installation of an occupancy sensor, dimmers or other energy saving controllers inside the home	\$25	per unit
		HVAC	Heat Pump	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER or 8.5 HSPF. Includes variable refrigerant flow (VRF) systems.	\$1,000	per unit
			Central Air Conditioner	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER. Includes variable flow (VRF) systems.	\$800	per unit
			Room Air Conditioner	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Ductless Mini-Split Heat Pump	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5	\$400	per unit
			PTAC - Multi Family	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	HVAC	PTHP - Multi Family	Replacement of a packaged terminal unit prior to end of life or a installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit
			Heat Pump - Water & GeoT	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$1,500	per unit
			HVAC - Maintenance	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: • Check refrigerant charge level and correct as necessary, • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil and Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement.	\$85	per unit
			Furnace Fans	Replacement of an existing fan with a brushless permanent magnet (BPM) or electrically commutated motor (ECM) at the time of an HVAC tune-up or installation of a new CAC or HP. Purchase of a new gas furnace with a BPM or ECM motor is also eligible.	\$150	per unit
			Circulation Pumps	Replacement of existing single speed circulation pump or new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	
			Programmable / SMART Thermostat	New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control HVAC systems with either of the following: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump.	Up to 75% of thermostat cost	per unit
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	NA	NA	
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	Residential customers that have split system Central Air Conditioning.	\$50	per year (participation)
	Low Income Energy Efficiency Program	Community Connections	Community Connections	Residential customers and landlords of residents eligible for one of the following programs: (i) the Ohio Home Weatherization Assistance Program (HWAP); (ii) Percent of Income Payment Plan (PIPP); or (iii) Home Energy Assistance Program (HEAP).	NA	
		LI - New Homes	LI New Construction	New construction of low-income housing to be constructed in accordance applicable Energy Star standard or built at a higher efficiency level than the current adopted building code. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Air Conditioning - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Air Conditioning - >5.4 < 20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Air Conditioning - >=20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
			Chiller - Water Cld w Full Load - SCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is not included in this measure.	\$45 / Ton	NTE 50% of PC
			Heat Pump - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - SCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			HVAC - Maintenance - SCI	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: Check refrigerant charge level and correct as necessary. • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil, • Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement, and installation of smart thermostat or smart thermostat with advanced features.	\$50	per ton
			Circulation Pumps - SCI	Replacement of existing single speed circulation pump or installation of a new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	per unit
			Ductless Mini-Split HP - SCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
		Lighting - SCI	CFL Fixtures - SCI	Purchase and installation of a new energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Lighting - SCI	CFL Lamps - SCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - SCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - SCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - SCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - SCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - SCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED type exit sign or photoluminescent sign.	\$23	per sign
			LED Fixtures External - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - SCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			LED Reach in Refrigerator / Freezer Lights - SCI	Replacement of linear fluorescent refrigerator, cooler or freezer lights lighting with LED lighting.	\$75	per door
			Street & Area Lighting (Customer Owned) - SCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
		Food Service	Refrigerators - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in refrigerator.	\$165	per unit

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Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Freezers - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in freezer.	\$165	per unit
			Ice Machines - SCI	Replacement of inefficient ice machine prior to end of life or new unit that is Energy Star rated.	\$590 0-500 lbs \$980 501-1000 lbs \$1100 over 1000 lbs	per unit
			Refrigerated Case Cover - SCI	Replacement or new installation of refrigerated case covers.	\$32	per linear foot
			Strip Curtains - SCI	Replacement or new installation of polyethylene strip curtains on walk in freezers and coolers covering the entire door frame. Eligible units must be open a least 2.5 hrs/day.	\$3	per square-ft
			Anti Sweat Heater Controls - SCI	New installation of door heater controls on glass doors for refrigerators, coolers or freezers.	\$60	per door
			Beverage Vending Machine - Controls - SCI	Retrofit controls for a non Energy Star rated vending machine.	\$115	per unit
			Beverage Vending Machine - New EE SCI	Purchase and installation of new Energy Star rated vending machine.	\$130	per unit
			Combination Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$1,380	per unit
			Convection Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$700	per unit
			Steam Cookers - SCI	Replacement or new installation of Energy Star qualified electric units with 3-6 pans. A qualifying steam cooker must meet a minimum cooking efficiency of 50 percent and meet idle energy rates specified by pan capacity.	\$250 - 3 pan \$375 - 4 pan \$500 - 5 pan \$600 - 6 pan	per unit
			Fryers - SCI	Replacement or new installation of Energy Star qualified electric units.	\$325	per unit
			Griddles - SCI	Replacement or new installation of Energy Star qualified electric units.	\$500	per unit

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### Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Hot Food Holding Cabinet - SCI	Replacement or new installation of full, three quarter and half sized ENERGY STAR qualified units with idle energy rate of 0.04 kW/CF.	\$500 - full size \$375 - 3/4 size \$225 - 1/2 size	per unit
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Freezer Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Room Air Conditioner Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
			Dehumidifiers Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
		Appliances - SCI	Clothes Washer - SCI	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer. Commercial clothes washers and "coin op" units are also eligible.	\$100	per unit
			Clothes Dryer (Elec w Moisture Sensor) - SCI	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer. Commercial and "coin op" unit are also eligible.	\$600	per unit
			Refrigerators - SCI	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Water Heater - Heat Pump - SCI	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
			Freezers - SCI	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Pre-Rinse Sprayers - SCI	Replacement of existing sprayer with new unit that use 1.6 GPM or less, on/off squeeze lever, and cleaning of performance of at least 26 seconds. Electric water heating only.	\$55	per unit
		Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	Replacement or new installation of a UPS (less than 12 kW) that exceeds the minimum average efficiency standard as determined by Table 1 of the Energy Star UPS standard. Table 2 of the standard shall be used in calculating the loading of the UPS.	\$220	per kW

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Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Monitors - SCI	Purchase and installation of Energy Star rated unit.	\$15	per unit
			Computers - SCI	Purchase and installation of an Energy Star rated unit.	\$15	per unit
			Imaging - SCI	Purchase and installation of Energy Star rated imaging equipment including but not limited to: scanners, copier, printers, fax machines and multi-function machines.	\$30	per unit
			Small Network - SCI	Purchase and installation of network level software that controls desktop computers and monitors power settings with the network. Software must be capable of measuring and managing power consumption of each individual PC. Laptops are not eligible.	\$15	per PC
		Agricultural	Efficient Dairy Equipment - SCI	Purchase and installation of more efficient electric driven equipment in retrofit applications.	\$0.10 per kWh saved	
			High Efficiency Fans - SCI	Purchase and installation of a new high efficiency ventilation fans in retrofit applications.	\$0.10 per kWh saved	
		Data Centers - SCI	DC - Custom Servers- SCI	Replacement of existing server equipment or installation of new energy efficient server equipment meeting Energy Star or other energy efficiency requirements.	\$40	
			DC - Custom HVAC - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Audit - SCI	Comprehensive Energy Audit for data center facility recommending installation of efficient equipment, such as: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment, server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - SCI	Custom - Process Improvement - SCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%, and includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - SCI	Replacement or retrofit of existing air compressor systems, including but no limited to: new compressors air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Custom - SCI	Custom - VFDs < 10HP - SCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - SCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - SCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - SCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	Adjustment of Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - SCI	Custom - Building Improvements - SCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with the square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Energy Management - SCI	Installation of new energy management system to control lighting, hvac and other building systems. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	\$0.10 per kWh saved. Up to 75% of thermostat cost.	
		Audits & Education - SCI	Energy Manager - SCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Energy Efficiency Measures - SCI	Opt In Kit with energy efficiency measures mailed at the customers request.	NA	
			Multi Family Audit - SCI	Provides a Customized Home Energy Report to multi-family residences served under a commercial rate tariff. Comprehensive measures eligible for incentive based on applicable diagnostics and testing includes, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			Benchmarking - SCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
			Audit - SCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed. Up to 50% of the cost of comprehensive measures installed.	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Audits & Education - SCI	Audits w Direct Install - SCI	Provides an audit with the direct installation (DI) of qualified energy efficiency measures. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	80% of the cost of the DI measures NTE \$6,000	
			Behavioral - SCI	Energy Intelligence Software tool that provides reporting containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of energy efficiency measures and behaviors that reduces consumption of energy and demand.	NA	
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	NA	NA	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Chiller - Water Cld w Full Load - LCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is NOT included in this measure.	\$45 / Ton	NTE 50% of PC
			Air Conditioning - >5.4 < 20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pump - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - LCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			Ductless Mini-Split HP - LCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton

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3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - >=20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
		Lighting - LCI	CFL Fixtures - LCI	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s).	\$20	per fixture
			CFL Lamps - LCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - LCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - LCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - LCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - LCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - LCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED or photoluminescent exit sign.	\$23	per sign
			LED Fixtures External - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - LCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			Street & Area Lighting (Customer Owned) - LCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture

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### Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Data Centers - LCI	DC - Custom HVAC - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Custom Servers - LCI	Replacement or retrofit of existing data center equipment including, but not limited to: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling, and UPS efficiency upgrades.	\$0.10 per kWh saved.	
			DC - Audit - LCI	Comprehensive Energy Audit for data center facilities recommending installation of efficient equipment, building shell/envelop improvements, building operating changes, or other energy efficiency improvements.	Up to 50% of the audit cost plus up to remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - LCI	Custom - Process Improvement - LCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - LCI	Replacement or retrofit of existing air compressor systems, including but not limited to: new compressors air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - VFDs < 10HP - LCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - LCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - LCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - LCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	Adjust Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - LCI	Custom - Building Improvements - LCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom Buildings - LCI	Custom - Energy Management - LCI	Installation of new energy management system in buildings to control lighting, hvac and other building systems.	\$0.10 per kWh saved.	
		Audits & Education - LCI	Audit - LCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of Audit Cost plus up to remaining 50% of Audit Cost if audit recommended measures are installed	
			Continuous Improvement - LCI	Shared resource for the largest commercial/industrial customers that provides consulting services to integrate energy efficiency as a core business practice.	NA	
			Energy Manager - LCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Benchmarking - LCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	Large commercial, industrial and government customers participating in PJM programs and/or contracted curtailment attributes w/ curtailment providers and/or individual customers.	NA	
			ELR Interruptible Tariff	Large commercial, industrial and governmental customers on the Companies ELR tariff.	NA	
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	NA	NA	
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	Replacement of incandescent traffic & pedestrian signals with LED signals.	\$90	per signal
			Street & Area Lighting (Tariff / Utility Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	NA	
			Street & Area Lighting (Tariff / Customer Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	Self directed projects completed by large commercial and industrial mercantile customers.	NA	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

### Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy

Cleveland Electric Illuminating						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	Transmission and distribution system improvements that results in electric energy savings.	NA	
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	Smart Grid Modernization initiatives that results in electric energy savings.	NA	
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	Electric energy savings resulting from projects completed as part of an Energy Special Improvement District.	NA	

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2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.



## Appendix C-4

### PUCO 1: Portfolio Summary of Lifetime Costs and Benefits

<b>Cleveland Electric Illuminating</b> <b>Portfolio Summary of Lifetime Costs and Benefits</b> <b>Net Lifetime Benefits, and TRC per the California Standard Practice Manual</b>					
<b>Portfolio</b>	<b>Discount Rate</b>	<b>Total Discounted Lifetime Costs (\$000) <sup>1</sup></b>	<b>Total Discounted Lifetime Benefits (\$000)</b>	<b>Total Discounted Net Lifetime Benefits (\$000)</b>	<b>Cost- Benefit Ratio (TRC)</b>
<b>Residential (inclusive of Low- Income)</b>	8.48%	67,343	107,727	40,384	1.6
<b>Small Enterprise</b>	8.48%	88,719	137,105	48,386	1.5
<b>Mercantile</b>	8.48%	794	33,415	32,621	42.1
<b>Mercantile-Utility (Large Enterprise)</b>	8.48%	39,696	58,752	19,056	1.5
<b>Governmental</b>	8.48%	971	978	7	1.0
<b>Other</b>	8.48%	14	-	(14)	N/A
<b>Total</b>	<b>8.48%</b>	<b>197,537</b>	<b>337,978</b>	<b>140,441</b>	<b>1.7</b>

1. Includes certain costs outside of Plan budgets according to the Stipulated ESPIV.

## Appendix C-4

### PUCO 2: Summary of Portfolio Energy and Demand Savings

Cleveland Electric Illuminating Summary of Portfolio Energy and Demand Savings						
MWh Saved for Consumption Reductions kW Saved for Peak Load Reductions	Program Year 2017		Program Year 2018		Program Year 2019	
	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>
Residential Sector (inclusive of Low- Income) - Cumulative Projected Portfolio Savings	128,757	20,387	246,110	36,547	358,364	52,400
Small Enterprise - Cumulative Projected Portfolio Savings	79,204	12,938	173,648	27,695	267,847	42,380
Mercantile - Cumulative Projected Portfolio Savings	29,413	3,579	58,825	7,158	88,238	10,736
Mercantile-Utility (Large Enterprise) - Cumulative Projected Portfolio Savings	36,434	194,844	73,558	200,088	113,197	205,715
Government Sector - Cumulative Projected Portfolio Savings	279	6	794	11	1,309	17
Other - Cumulative Projected Portfolio Savings	2,500	285	4,700	537	6,900	788
<b>Portfolio Plan Total - Cumulative Projected Savings</b>	<b>276,587</b>	<b>232,039</b>	<b>557,635</b>	<b>272,035</b>	<b>835,856</b>	<b>312,036</b>
Cumulative Results projected through 2016 (Appendix A-2)	1,589,391	232,737	1,589,391	232,737	1,589,391	232,737
<b>Total Cumulative Projected Savings</b>	<b>1,865,978</b>	<b>464,776</b>	<b>2,147,026</b>	<b>504,772</b>	<b>2,425,247</b>	<b>544,773</b>
SB 310 Target (Table 3)	975,246	212,500	1,151,598	241,200	1,334,699	269,600
% (Over / Under)	191%	219%	186%	209%	182%	202%

1. Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions achieved in previous years.

## Appendix C-4

### PUCO 3: Summary of Portfolio Costs

Cleveland Electric Illuminating Summary of Portfolio Costs			
	Program Year 2017	Program Year 2018	Program Year 2019
	Portfolio Budget (\$)	Portfolio Budget (\$)	Portfolio Budget (\$)
Residential Portfolio (inclusive of Low-Income) Annual Budget	14,802,130	14,258,247	14,832,014
Small Enterprise Portfolio Annual Budget	15,101,243	16,127,216	16,177,296
Mercantile Portfolio Annual Budget	333,639	259,103	260,437
Mercantile-Utility (Large Enterprise) Portfolio Annual Budget	5,865,927	5,371,139	5,745,375
Government Portfolio Annual Budget	134,649	203,688	204,142
Other Portfolio Annual Budget	5,000	5,000	5,000
<b>Total Portfolio Annual Budget</b>	<b>36,242,588</b>	<b>36,224,394</b>	<b>37,224,264</b>

Appendix C-4

PUCO 4: Program Summaries

Cleveland Electric Illuminating - Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Residential Portfolio Programs (inclusive of Low Income)		X	Residential Demand Response Program	Res	The program consists of a customer having their central air conditioning compressor cycled during summer peak load periods.	-	8,591	0.0%
	X		Appliance Turn In Program	Res	This program provides rebates and removal and recycle services to consumers for turning in working appliances.	364,920	65,363	13.5%
	X		Energy Efficient Products Program	Res	This program promotes the purchase of energy efficient products, such as HVAC equipment, appliances, lighting, home electronics and other energy saving home products, through consumer rebates or incentives and support to retailers and manufacturers.	1,151,266	147,908	42.5%
	X		Energy Efficient Homes Program	Res	This program provides customers with energy efficiency education and awareness along with measures and incentives to improve energy efficiency of homes.	698,577	107,011	25.8%
	X		Low Income Energy Efficiency Program	LI Res	The low-income program provides weatherization services, home audits and installation of energy efficiency measures for low-income customers under the Community Connections sub-program. The program also provides incentives for the construction of new energy efficient housing or major rehabilitation of existing housing for low-income customers.	64,309	7,643	2.4%
	X		Customer Action Program - Res	Res	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	428,784	48,948	15.8%
	Total for Plan					2,707,856	385,463	32.3%

Appendix C-4

PUCO 4: Program Summaries

Cleveland Electric Illuminating - Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Small Enterprise	X		C&I Energy Solutions for Business Program - Small	Small C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized processes, applications or end uses to higher efficiency processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	2,962,026	500,434	94.1%
	X		Customer Action Program - SCI	Small C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	184,161	21,023	5.9%
	Total for Plan					3,146,187	521,457	37.5%

Appendix C-4

PUCO 4: Program Summaries

Cleveland Electric Illuminating - Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Mercantile	X		Mercantile Customer Program	Large C&I	Captures energy efficiency and peak demand reduction projects committed to the Company by Mercantile customers as provided for by O.R.C. 4928.01 and 4928.66	882,379	107,363	100.0%
	Total for Plan					882,379	107,363	10.5%
Mercantile-Utility (Large Enterprise)		X	C&I Demand Response Program - Large	Large C&I	The program captures load curtailment and curtailable capacity from the Companies' Interruptible Load Program (Economic Load Response Rider) and from additional demand resources including resources participating in the PJM market or through contracts for demand response attributes with customers or PJM CSPs.	-	569,160	0.0%
	X		C&I Energy Solutions for Business Program - Large	Large C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized equipment, processes, applications or end uses to higher efficiency equipment, processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	1,443,309	209,449	94.0%
	X		Customer Action Program - LCI	Large C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	91,525	10,448	6.0%
	Total for Plan					1,534,834	789,057	18.3%

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PUCO 4: Program Summaries

Cleveland Electric Illuminating - Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Government Portfolio Programs	X		Government Tariff Lighting Program	Gov't	The program provides financial incentives and support to customers for implementing energy efficient street lighting or traffic lighting technologies on customer owned and maintained installations.	13,092	168	100.0%
	Total for Plan					13,092	168	0.2%
Other	X		Transmission & Distribution Upgrades	T&D	Capture savings achieved through various T&D projects that reduce line losses, which in turn results in a more efficient delivery system.	103,500	11,815	100.0%
	X		Smart Grid Modernization Initiative	T&D	Captures energy savings from the project to produce an integrated system of protection, performance, efficiency and economy that extends across the energy delivery system.	-	-	0.0%
	X		Energy Special Improvement District	T&D	Incorporation of State Legislation that permits Ohio townships and municipalities to create Energy Special Improvement Districts offering constituents Property Assessed Clean Energy (PACE) financing for qualifying energy efficiency projects.	-	-	0.0%
	Total for Plan					103,500	11,815	1.2%

## Appendix C-4

### PUCO 5: Budget and Parity Analysis Summary

Cleveland Electric Illuminating						
Customer Class	3 Year Budget	% of Total EDC Budget	% of Total Budget of Customer Programs	2015 Revenue by Customer Class	% of Total Customer Revenue	Difference
Residential ( <i>inclusive of Low-Income</i> )	43,892,392					
<b>Residential Subtotal</b>	43,892,392	40.0%	40.0%	422,282,243	44.4%	-4%
Small Enterprise	47,405,755					
<b>Small Enterprise Total</b>	47,405,755	43.2%	43.2%	381,892,290	40.2%	3%
Mercantile-Utility (Large Enterprise)	16,982,442					
Mercantile	853,179					
<b>Mercantile Subtotal</b>	17,835,621	16.3%	16.3%	125,981,150	13.3%	3%
Government	542,479	0.5%	0.5%	20,016,445	2.1%	-2%
Other	15,000	0.0%	0.0%			
<b>EDC TOTAL</b>	<b>109,691,246</b>	<b>100%</b>	<b>100%</b>	<b>950,172,128</b>	<b>100%</b>	



## Appendix C-4

### PUCO 5A: Energy Savings and Parity Analysis Summary

Cleveland Electric Illuminating						
Customer Class	3 Year Cumulative Energy Savings (MWh)	% of Total EDC Energy Savings	% of Total Energy Savings of Customer Programs	2015 Sales by Customer Class (MWh)	% of Total Customer Sales	Difference
Residential	358,364					
<b>Residential Subtotal</b>	358,364	42.9%	42.9%	5,489,972	29.7%	13%
Small Enterprise	267,847					
<b>Small Enterprise Total</b>	267,847	32.0%	32.0%	6,547,941	35.4%	-3%
Mercantile-Utility (Large Enterprise)	113,197					
Mercantile	88,238					
<b>Mercantile Subtotal</b>	201,435	24.1%	24.1%	6,322,770	34.2%	-10%
Government	1,309	0.2%	0.2%	141,303	0.8%	-1%
Other	6,900	0.8%	0.8%			
<b>EDC TOTAL</b>	<b>835,856</b>	<b>100%</b>	<b>100%</b>	<b>18,501,986</b>	<b>100%</b>	

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Cleveland Electric Illuminating Residential Portfolio (including Low-Income)			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
<b>Peak Demand Reduction Programs</b>			
Residential Demand Response Program	0	538,939	538,939
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>538,939</b>	<b>538,939</b>
<b>Energy Efficiency Programs</b>			
Appliance Turn In Program	1,613,598	5,019,382	6,632,980
Energy Efficient Products Program	9,122,161	2,356,748	11,478,909
Energy Efficient Homes Program	13,222,952	9,278,333	22,501,285
Low Income Energy Efficiency Program	16,934	436,000	452,934
Customer Action Program - Res	0	323,363	323,363
<b>EE Program Subtotal</b>	<b>23,975,645</b>	<b>17,413,827</b>	<b>41,389,472</b>
<b>Totals</b>	<b>23,975,645</b>	<b>17,952,766</b>	<b>41,928,411</b>

Cleveland Electric Illuminating Small Enterprise			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
C&I Energy Solutions for Business Program - Small	28,044,643	16,660,127	44,704,770
Customer Action Program - SCI	0	745,999	745,999
<b>Totals</b>	<b>28,044,643</b>	<b>17,406,126</b>	<b>45,450,769</b>

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Cleveland Electric Illuminating Mercantile			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Mercantile Customer Program	0	351,565	351,565
<b>Totals</b>	<b>0</b>	<b>351,565</b>	<b>351,565</b>

Cleveland Electric Illuminating Mercantile Utility (Large Enterprise)			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
<b>Peak Demand Reduction Programs</b>			
C&I Demand Response Program - Large	0	600	600
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>600</b>	<b>600</b>
<b>Energy Efficiency Programs</b>			
C&I Energy Solutions for Business Program - Large	8,496,147	6,452,991	14,949,139
Customer Action Program - LCI	0	647,621	647,621
<b>EE Program Subtotal</b>	<b>8,496,147</b>	<b>7,100,613</b>	<b>15,596,760</b>

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Cleveland Electric Illuminating Government			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Government Tariff Lighting Program	370,750	129,299	500,049
<b>Totals</b>	<b>370,750</b>	<b>129,299</b>	<b>500,049</b>

Cleveland Electric Illuminating Other			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Transmission & Distribution Upgrades	0	0	0
Smart Grid Modernization Initiative	0	0	0
Energy Special Improvement District	0	0	0
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0</b>

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**PUCO 6B: Allocation of Common Costs to Applicable Customer Sector**

Cleveland Electric Illuminating										
Common Cost Element	EE Program (check box)	PDR Program (check box)	Total Cost (\$)	Basis for Cost Allocation	Class Cost Allocaton (\$)					
					Residential (Including Low-Income)	Small Enterprise (Small C&I)	Mercantile	Mercantile-Utility (Large C&I)	Other	Government
Utility Administration	X	X	\$2,875,992	FERC Form 1 Sales	\$1,004,534	\$930,453	\$238,738	\$667,074	\$15,000	\$20,194
Tracking and Reporting	X	X	\$1,322,737	FERC Form 1 Sales	\$436,139	\$447,981	\$114,944	\$313,951	\$0	\$9,723
Other	X	X	\$1,664,363	FERC Form 1 Sales	\$523,308	\$576,552	\$147,933	\$404,056	\$0	\$12,513
Totals			<b>\$5,863,093</b>		<b>\$1,963,981</b>	<b>\$1,954,986</b>	<b>\$501,615</b>	<b>\$1,385,081</b>	<b>\$15,000</b>	<b>\$42,430</b>

## Appendix C-4

### PUCO 6C: Summary of Portfolio EE&C Costs

Cleveland Electric Illuminating	Total Sector Portfolio-specific Costs	Total Common Costs	Total of All Costs
Residential (Including Low-Income)	\$41,928,411	\$1,963,981	\$43,892,392
Small Enterprise	\$45,450,769	\$1,954,986	\$47,405,755
Mercantile	\$351,565	\$501,615	\$853,179
Mercantile-Utility (Large Enterprise)	\$15,597,360	\$1,385,081	\$16,982,442
Other	\$0	\$15,000	\$15,000
Government	\$500,049	\$42,430	\$542,479
<b>Totals</b>	<b>\$103,828,154</b>	<b>\$5,863,093</b>	<b>\$109,691,246</b>

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PUCO 7A-B: TRC Benefits Table - Residential

Residential (inclusive of Low- Income)	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)														
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved						
							Annual	Lifetime	Annual	Lifetime					
Residential Demand Response Program	2017		197	206			2,893		0						
	2018		195	261			2,864		0						
	2019		199	312			2,835		0						
	Total	1.3	546	712	712	-		8,591		0					
Appliance Turn In Program	2017		1,832	829			3,148		14,965						
	2018		1,768	1,793			6,296		29,930						
	2019		1,900	2,980			9,701		46,117						
	Total	3.3	5,076	16,549	5,442	11,107		65,363		364,920					
Energy Efficient Products Program	2017		9,747	1,609			4,138		32,597						
	2018		10,179	3,431			8,333		65,734						
	2019		10,485	5,366			12,373		96,809						
	Total	1.5	28,039	41,045	10,657	30,387		147,908		1,151,266					
Energy Efficient Homes Program	2017		9,063	2,616			6,931		52,536						
	2018		8,543	4,295			13,861		105,072						
	2019		8,983	6,312			21,121		159,803						
	Total	1.2	24,572	30,353	8,576	21,777		107,011		698,577					
Low Income Energy Efficiency Program	2017		2,438	130			311		2,664						
	2018		2,395	274			622		5,328						
	2019		2,397	434			932		7,992						
	Total <sup>3</sup>	0.4	6,683	2,581	627	1,954		7,643		64,309					
Customer Action Program - Res	2017		1,315	1,235			2,967		25,995						
	2018		769	1,997			4,571		40,046						
	2019		474	2,501			5,439		47,643						
	Total	6.8	2,427	16,488	3,487	13,001		48,948		428,784					
Total							1.6		67,343	107,727	29,501	78,227	385,463		2,707,856
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.															
2: The on and off peak energy costs are combined in a sum of avoided energy costs.															
3: Includes cost for the OPAE Community Connections program according to the Stipulated ESPIV.															

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PUCO 7C: TRC Benefits Table - Small Enterprise

Small Enterprise	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)															
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved							
							Annual	Lifetime	Annual	Lifetime						
C&I Energy Solutions for Business Program - Small	2017		29,577	4,561			12,399		74,482							
	2018		32,010	10,504			26,617		164,203							
	2019		32,597	16,538			40,763		253,681							
	Total	1.5	87,148	130,821	35,882	78,251		500,434		2,962,026						
Customer Action Program - SCI	2017		285	227			539		4,722							
	2018		284	475			1,078		9,444							
	2019		284	750			1,617		14,166							
	Total	8.0	788	6,284	1,352	4,933		21,023		184,161						
Total <sup>3</sup>							1.5		88,719		137,105	37,234	83,183	521,457		3,146,187
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.																
2: The on and off peak energy costs are combined in a sum of avoided energy costs.																
3: Includes cost for the COSE Ohio Energy Efficiency Program and Administrator payments, and the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.																



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PUCO 7D: TRC Benefits Table - Mercantile

Mercantile	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Mercantile Customer Program	2017		334	1,425			3,579		29,413	
	2018		259	3,011			7,158		58,825	
	2019		260	4,779			10,736		88,238	
	Total	42.1	794	33,415			8,286		25,129	
Total		42.1	794	33,415	8,286	25,129		107,363		882,379
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

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PUCO 7E: TRC Benefits Table - Mercantile Utility (Large Enterprise)

Mercantile Utility (Large Enterprise)	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
C&I Demand Response Program - Large	2017		5				189,720		0	
	2018		5				189,720		0	
	2019		5				189,720		0	
	Total	N/A	14				569,160		0	
C&I Energy Solutions for Business Program - Large	2017		13,300	1,861			4,820		33,773	
	2018		13,093	3,932			9,803		68,602	
	2019		14,379	6,400			15,191		106,157	
	Total	1.5	37,588	55,594	14,783	37,147	209,449		1,443,309	
Customer Action Program - LCI	2017		715	129			304		2,661	
	2018		650	251			566		4,955	
	2019		614	375			804		7,040	
	Total	1.7	1,836	3,158	678	2,481	10,448		91,525	
Total <sup>3</sup>		1.5	39,696	58,752	15,461	39,627	789,057		1,534,834	
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										
3: Includes cost for the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.										

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PUCO 7F: TRC Benefits Table - Government

Government	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Government Tariff Lighting Program	2017		242	37			6		279	
	2018		411	92			11		794	
	2019		412	147			17		1,309	
	Total	1.0	971	978			13		342	
Total		1.0	971	978	13	342	168		13,092	
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

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PUCO 7G: TRC Benefits Table - Other

Other	Cleveland Electric Illuminating TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Transmission & Distribution Upgrades	2017		5				285		2,500	
	2018		5				537		4,700	
	2019		5				788		6,900	
	Total	N/A	14				11,815		103,500	
Smart Grid Modernization Initiative	2017		-	-			0		0	
	2018		-	-			0		0	
	2019		-	-			0		0	
	Total	N/A	-	-	-	-	0		0	
Energy Special Improvement District	2017		-	-			0		0	
	2018		-	-			0		0	
	2019		-	-			0		0	
	Total	N/A	-	-	-	-	0		0	
Total		0.0	14	-	-	-	11,815		103,500	
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

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# **Toledo Edison - Appendices**

## **Toledo Edison - Appendix A: Results of Existing Plan**

**Appendix A-1 Summary Annualized Energy and Demand Portfolio Impacts, 2009 - 2015**

<b>Cumulative 2009 - 2015 Energy Efficiency and Peak Demand Reduction Results</b>		
<b>Utility</b>	<b>Energy Savings, MWh<sup>1, 2</sup></b>	<b>Coincident Peak Demand Reductions, MW<sup>1, 2, 3</sup></b>
OE	1,741,966	287
CEI	1,504,135	221
TE	702,081	119
<b>TOTAL</b>	<b>3,948,182</b>	<b>627</b>
<p><sup>1</sup> Includes preliminary estimate of cumulative 2013-2015 Portfolio Results plus results of the Companies' 2009-2012 Portfolio progress. Also includes projects pending PUCO approval as well as prior year Transmission and Distribution projects pending before the Commission in Dockets 12-1550-EL-EEC et. seq., and 13-1188-EL-EEC et. seq.</p> <p><sup>2</sup> 2015 values are based on preliminary estimates. Values shown through 2014 are based on the Companies' Annual Compliance Filings.</p> <p><sup>3</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.</p>		



## Appendix A-2 Summary Annualized Energy and Demand Portfolio Impacts

2016 Projection Energy Efficiency and Incremental Coincident Peak Demand Reduction Results		
Utility	Energy Savings, MWh <sup>1</sup>	Coincident Peak Demand Reductions, MW <sup>1, 2</sup>
OE	126,329	21
CEI	85,256	12
TE	44,976	7
<b>TOTAL</b>	<b>256,561</b>	<b>39</b>
<sup>1</sup> Values shown are preliminary estimates and include projections for the Companies existing Low Income Program, Mercantile Customer Program, Transmission and Distribution Savings and Customer Action Program. <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

Cumulative EOY 2016 Estimated Energy Efficiency and Coincident Peak Demand Reduction Results <sup>1</sup>		
Utility	Energy Savings, MWh	Coincident Peak Demand Reductions, MW <sup>2</sup>
OE	1,868,294	308
CEI	1,589,391	233
TE	747,057	126
<b>TOTAL</b>	<b>4,204,743</b>	<b>666</b>
<sup>1</sup> Sum of Appendix A-1 and 2016 Projection <sup>2</sup> Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions.		

## **Toledo Edison - Appendix B: Portfolio Budget Detail**

Appendix B-1: Program Cost by Program Year

Toledo Edison - Program Year 2017						
Sector	Program	Sub-Program	Operations	Incentives	Total	
Residential	Appliance Turn In Program	Appliance Turn In	\$811,260	\$214,409	\$1,025,670	
		Sub-Total	\$811,260	\$214,409	\$1,025,670	
	Energy Efficient Homes Program	School Education	\$182,855	\$172,555	\$355,409	
		EE Kits	\$251,321	\$1,065,017	\$1,316,338	
		Audits & Education	\$214,388	\$165,000	\$379,388	
		Behavioral	\$722,948	\$0	\$722,948	
		New Homes	\$180,104	\$252,675	\$432,779	
		Smart Thermostat	\$52,074	\$146,200	\$198,274	
		Sub-Total	\$1,603,689	\$1,801,447	\$3,405,136	
		Energy Efficient Products Program	Appliances	\$32,514	\$221,020	\$253,534
	Consumer Electronics		\$22,877	\$57,006	\$79,883	
	Lighting		\$465,334	\$530,591	\$995,925	
	HVAC		\$39,257	\$372,535	\$411,792	
	Sub-Total		\$559,982	\$1,181,152	\$1,741,134	
	Customer Action Program - Res	Customer Action Program - Res	\$84,254	\$0	\$84,254	
		Sub-Total	\$84,254	\$0	\$84,254	
	Residential Demand Response Program	Direct Load Control	\$53,823	\$0	\$53,823	
		Sub-Total	\$53,823	\$0	\$53,823	
	Low Income Energy Efficiency Program	Community Connections	\$131,362	\$0	\$131,362	
		LI - New Homes	\$31,256	\$2,509	\$33,765	
		Sub-Total	\$162,619	\$2,509	\$165,127	
Residential Total			\$3,275,627	\$3,199,516	\$6,475,144	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$74,126	\$163,998	\$238,124	
		Lighting - SCI	\$475,576	\$1,034,068	\$1,509,645	
		Food Service	\$32,365	\$56,102	\$88,466	
		Appliance Turn In - SCI	\$186,832	\$4,211	\$191,042	
		Appliances - SCI	\$33,051	\$10,059	\$43,110	
		Consumer Electronics - SCI	\$28,389	\$4,312	\$32,701	
		Agricultural	\$41,459	\$12,731	\$54,190	
		Data Centers - SCI	\$96,638	\$63,380	\$160,018	
		Custom - SCI	\$316,530	\$600,424	\$916,954	
		Retro - Commissioning - SCI	\$127,951	\$151,834	\$279,785	
		Custom Buildings - SCI	\$193,336	\$269,443	\$462,778	
		Audits & Education - SCI	\$1,263,536	\$2,029,710	\$3,293,246	
		Sub-Total	\$2,869,789	\$4,400,272	\$7,270,060	
		Customer Action Program - SCI	Customer Action Program - SCI	\$93,578	\$0	\$93,578
	Sub-Total		\$93,578	\$0	\$93,578	
	Small C&I Total			\$2,963,367	\$4,400,272	\$7,363,638
	Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$220,960	\$151,405	\$372,365
Lighting - LCI			\$305,648	\$282,234	\$587,882	
Data Centers - LCI			\$213,733	\$73,634	\$287,366	
Custom - LCI			\$930,797	\$1,162,286	\$2,093,083	
Retro - Commissioning - LCI			\$128,718	\$46,718	\$175,436	
Custom Buildings - LCI			\$302,126	\$281,046	\$583,172	
Audits & Education - LCI			\$712,285	\$108,000	\$820,285	
Sub-Total			\$2,814,267	\$2,105,323	\$4,919,590	
C&I Demand Response Program - Large		Demand Response - LCI	\$5,200	\$0	\$5,200	
		Sub-Total	\$5,200	\$0	\$5,200	
Customer Action Program - LCI		Customer Action Program - LCI	\$96,108	\$0	\$96,108	
		Sub-Total	\$96,108	\$0	\$96,108	
Large C&I Total			\$2,915,574	\$2,105,323	\$5,020,897	
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$19,680	\$3,600	\$23,280	
		Sub-Total	\$19,680	\$3,600	\$23,280	
Non - Residential Total			\$5,898,621	\$6,509,195	\$12,407,815	
Mercantile	Mercantile Customer Program	Mercantile	\$95,642	\$0	\$95,642	
		Sub-Total	\$95,642	\$0	\$95,642	
Mercantile Total			\$95,642	\$0	\$95,642	
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000	
		Sub-Total	\$5,000	\$0	\$5,000	
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
Other Total			\$5,000	\$0	\$5,000	
Total			\$9,274,889	\$9,708,711	\$18,983,600	

Appendix B-1: Program Cost by Program Year

Toledo Edison - Program Year 2018						
Sector	Program	Sub-Program	Operations	Incentives	Total	
Residential	Appliance Turn In Program	Appliance Turn In	\$780,077	\$214,409	\$994,486	
		Sub-Total	\$780,077	\$214,409	\$994,486	
	Energy Efficient Homes Program	School Education	\$144,320	\$172,555	\$316,875	
		EE Kits	\$197,346	\$1,065,017	\$1,262,363	
		Audits & Education	\$178,616	\$165,000	\$343,616	
		Behavioral	\$608,485	\$0	\$608,485	
		New Homes	\$127,902	\$252,675	\$380,577	
		Smart Thermostat	\$48,339	\$146,200	\$194,539	
		Sub-Total	\$1,305,009	\$1,801,447	\$3,106,456	
		Energy Efficient Products Program	Appliances	\$27,086	\$221,020	\$248,106
	Consumer Electronics		\$19,995	\$57,006	\$77,001	
	Lighting		\$385,411	\$628,431	\$1,013,842	
	HVAC		\$35,071	\$372,535	\$407,606	
	Sub-Total		\$467,563	\$1,278,992	\$1,746,555	
	Customer Action Program - Res	Customer Action Program - Res	\$83,841	\$0	\$83,841	
		Sub-Total	\$83,841	\$0	\$83,841	
	Residential Demand Response Program	Direct Load Control	\$53,603	\$0	\$53,603	
		Sub-Total	\$53,603	\$0	\$53,603	
	Low Income Energy Efficiency Program	Community Connections	\$119,130	\$0	\$119,130	
		LI - New Homes	\$18,520	\$2,509	\$21,029	
		Sub-Total	\$137,650	\$2,509	\$140,159	
Residential Total			\$2,827,742	\$3,297,357	\$6,125,099	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$62,615	\$165,590	\$228,205	
		Lighting - SCI	\$454,885	\$1,067,449	\$1,522,334	
		Food Service	\$22,479	\$63,835	\$86,314	
		Appliance Turn In - SCI	\$173,474	\$4,662	\$178,136	
		Appliances - SCI	\$23,104	\$11,277	\$34,381	
		Consumer Electronics - SCI	\$18,059	\$4,955	\$23,014	
		Agricultural	\$31,060	\$13,256	\$44,316	
		Data Centers - SCI	\$100,025	\$72,368	\$172,393	
		Custom - SCI	\$321,749	\$656,858	\$978,607	
		Retro - Commissioning - SCI	\$128,648	\$163,513	\$292,161	
		Custom Buildings - SCI	\$200,666	\$296,555	\$497,221	
		Audits & Education - SCI	\$1,591,705	\$2,350,418	\$3,942,122	
		Sub-Total	\$3,128,469	\$4,870,735	\$7,999,204	
		Customer Action Program - SCI	Customer Action Program - SCI	\$92,988	\$0	\$92,988
	Sub-Total		\$92,988	\$0	\$92,988	
	Small C&I Total			\$3,221,457	\$4,870,735	\$8,092,193
	Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$147,038	\$151,818	\$298,855
Lighting - LCI			\$240,729	\$316,378	\$557,107	
Data Centers - LCI			\$170,472	\$73,634	\$244,105	
Custom - LCI			\$693,413	\$1,162,286	\$1,855,699	
Retro - Commissioning - LCI			\$89,536	\$46,718	\$136,254	
Custom Buildings - LCI			\$254,973	\$281,046	\$536,020	
Audits & Education - LCI			\$572,858	\$108,000	\$680,858	
Sub-Total			\$2,169,019	\$2,139,880	\$4,308,898	
C&I Demand Response Program - Large		Demand Response - LCI	\$5,200	\$0	\$5,200	
		Sub-Total	\$5,200	\$0	\$5,200	
Customer Action Program - LCI		Customer Action Program - LCI	\$94,306	\$0	\$94,306	
		Sub-Total	\$94,306	\$0	\$94,306	
Large C&I Total			\$2,268,525	\$2,139,880	\$4,408,404	
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$13,293	\$3,600	\$16,893	
		Sub-Total	\$13,293	\$3,600	\$16,893	
Non - Residential Total			\$5,503,275	\$7,014,215	\$12,517,490	
Mercantile	Mercantile Customer Program	Mercantile	\$83,235	\$0	\$83,235	
		Sub-Total	\$83,235	\$0	\$83,235	
Mercantile Total			\$83,235	\$0	\$83,235	
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000	
		Sub-Total	\$5,000	\$0	\$5,000	
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
Other Total			\$5,000	\$0	\$5,000	
Total			\$8,419,252	\$10,311,572	\$18,730,824	

Appendix B-1: Program Cost by Program Year

Toledo Edison - Program Year 2019						
Sector	Program	Sub-Program	Operations	Incentives	Total	
Residential	Appliance Turn In Program	Appliance Turn In	\$835,402	\$231,923	\$1,067,324	
		Sub-Total	\$835,402	\$231,923	\$1,067,324	
	Energy Efficient Homes Program	School Education	\$147,342	\$172,555	\$319,897	
		EE Kits	\$211,350	\$1,157,452	\$1,368,802	
		Audits & Education	\$188,221	\$181,500	\$369,721	
		Behavioral	\$607,142	\$0	\$607,142	
		New Homes	\$134,952	\$278,525	\$413,477	
		Smart Thermostat	\$48,038	\$146,200	\$194,238	
		Sub-Total	\$1,337,046	\$1,936,231	\$3,273,277	
		Energy Efficient Products Program	Appliances	\$28,034	\$230,470	\$258,504
	Consumer Electronics		\$21,475	\$62,699	\$84,174	
	Lighting		\$377,739	\$575,756	\$953,495	
	HVAC		\$37,930	\$409,159	\$447,088	
	Sub-Total		\$465,177	\$1,278,084	\$1,743,261	
	Customer Action Program - Res	Customer Action Program - Res	\$84,133	\$0	\$84,133	
		Sub-Total	\$84,133	\$0	\$84,133	
	Residential Demand Response Program	Direct Load Control	\$54,781	\$0	\$54,781	
		Sub-Total	\$54,781	\$0	\$54,781	
	Low Income Energy Efficiency Program	Community Connections	\$119,450	\$0	\$119,450	
		LI - New Homes	\$18,922	\$2,509	\$21,431	
		Sub-Total	\$138,372	\$2,509	\$140,881	
Residential Total			\$2,914,911	\$3,448,746	\$6,363,657	
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$63,231	\$166,932	\$230,162	
		Lighting - SCI	\$441,861	\$1,042,558	\$1,484,419	
		Food Service	\$22,880	\$63,835	\$86,715	
		Appliance Turn In - SCI	\$178,780	\$5,114	\$183,894	
		Appliances - SCI	\$24,039	\$11,981	\$36,019	
		Consumer Electronics - SCI	\$18,480	\$5,073	\$23,552	
		Agricultural	\$33,260	\$14,831	\$48,092	
		Data Centers - SCI	\$100,132	\$72,368	\$172,500	
		Custom - SCI	\$325,374	\$664,015	\$989,389	
		Retro - Commissioning - SCI	\$155,057	\$198,552	\$353,608	
		Custom Buildings - SCI	\$200,740	\$296,555	\$497,295	
		Audits & Education - SCI	\$1,605,195	\$2,350,418	\$3,955,613	
		Sub-Total	\$3,169,027	\$4,892,231	\$8,061,258	
		Customer Action Program - SCI	Customer Action Program - SCI	\$93,405	\$0	\$93,405
	Sub-Total		\$93,405	\$0	\$93,405	
	Small C&I Total			\$3,262,432	\$4,892,231	\$8,154,663
	Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$151,383	\$158,945	\$310,328
Lighting - LCI			\$246,853	\$333,680	\$580,533	
Data Centers - LCI			\$198,625	\$109,352	\$307,978	
Custom - LCI			\$734,690	\$1,250,050	\$1,984,740	
Retro - Commissioning - LCI			\$99,695	\$58,398	\$158,093	
Custom Buildings - LCI			\$254,026	\$281,046	\$535,072	
Audits & Education - LCI			\$581,493	\$108,000	\$689,493	
Sub-Total			\$2,266,766	\$2,299,472	\$4,566,238	
C&I Demand Response Program - Large		Demand Response - LCI	\$5,200	\$0	\$5,200	
		Sub-Total	\$5,200	\$0	\$5,200	
Customer Action Program - LCI		Customer Action Program - LCI	\$95,579	\$0	\$95,579	
		Sub-Total	\$95,579	\$0	\$95,579	
Large C&I Total			\$2,367,545	\$2,299,472	\$4,667,017	
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$13,522	\$3,600	\$17,122	
		Sub-Total	\$13,522	\$3,600	\$17,122	
Non - Residential Total			\$5,643,499	\$7,195,303	\$12,838,802	
Mercantile	Mercantile Customer Program	Mercantile	\$83,457	\$0	\$83,457	
		Sub-Total	\$83,457	\$0	\$83,457	
Mercantile Total			\$83,457	\$0	\$83,457	
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$5,000	\$0	\$5,000	
		Sub-Total	\$5,000	\$0	\$5,000	
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0	
		Sub-Total	\$0	\$0	\$0	
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0	
Sub-Total		\$0	\$0	\$0		
Other Total			\$5,000	\$0	\$5,000	
Total			\$8,646,867	\$10,644,049	\$19,290,916	

Appendix B-1: Program Cost by Program Year

Toledo Edison - Program Year 2017 - 2019					
Sector	Program	Sub-Program	Operations	Incentives	Total
Residential	Appliance Turn In Program	Appliance Turn In	\$2,426,739	\$660,741	\$3,087,480
		Sub-Total	\$2,426,739	\$660,741	\$3,087,480
	Energy Efficient Homes Program	School Education	\$474,517	\$517,664	\$992,181
		EE Kits	\$660,017	\$3,287,486	\$3,947,503
		Audits & Education	\$581,226	\$511,500	\$1,092,726
		Behavioral	\$1,938,575	\$0	\$1,938,575
		New Homes	\$442,958	\$783,875	\$1,226,833
		Smart Thermostat	\$148,451	\$438,600	\$587,051
		Sub-Total	\$4,245,744	\$5,539,125	\$9,784,869
		Energy Efficient Products Program	Appliances	\$87,634	\$672,510
	Consumer Electronics		\$64,347	\$176,711	\$241,058
	Lighting		\$1,228,484	\$1,734,778	\$2,963,262
	HVAC		\$112,257	\$1,154,229	\$1,266,486
	Sub-Total		\$1,492,722	\$3,738,228	\$5,230,949
	Customer Action Program - Res	Customer Action Program - Res	\$252,228	\$0	\$252,228
		Sub-Total	\$252,228	\$0	\$252,228
	Residential Demand Response Program	Direct Load Control	\$162,207	\$0	\$162,207
		Sub-Total	\$162,207	\$0	\$162,207
	Low Income Energy Efficiency Program	Community Connections	\$369,943	\$0	\$369,943
		LI - New Homes	\$68,698	\$7,526	\$76,224
		Sub-Total	\$438,641	\$7,526	\$446,167
Residential Total			\$9,018,280	\$9,945,620	\$18,963,900
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	\$199,971	\$496,520	\$696,491
		Lighting - SCI	\$1,372,322	\$3,144,075	\$4,516,398
		Food Service	\$77,724	\$183,771	\$261,495
		Appliance Turn In - SCI	\$539,087	\$13,986	\$553,073
		Appliances - SCI	\$80,194	\$33,317	\$113,511
		Consumer Electronics - SCI	\$64,928	\$14,339	\$79,267
		Agricultural	\$105,779	\$40,819	\$146,598
		Data Centers - SCI	\$296,795	\$208,116	\$504,912
		Custom - SCI	\$963,653	\$1,921,298	\$2,884,950
		Retro - Commissioning - SCI	\$411,655	\$513,898	\$925,554
		Custom Buildings - SCI	\$594,741	\$862,553	\$1,457,294
		Audits & Education - SCI	\$4,460,435	\$6,730,546	\$11,190,981
		Sub-Total	\$9,167,285	\$14,163,238	\$23,330,523
	Customer Action Program - SCI	Customer Action Program - SCI	\$279,972	\$0	\$279,972
		Sub-Total	\$279,972	\$0	\$279,972
	Small C&I Total			\$9,447,256	\$14,163,238
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	\$519,381	\$462,168	\$981,548
		Lighting - LCI	\$793,229	\$932,293	\$1,725,522
		Data Centers - LCI	\$582,830	\$256,620	\$839,449
		Custom - LCI	\$2,358,900	\$3,574,622	\$5,933,521
		Retro - Commissioning - LCI	\$317,949	\$151,834	\$469,783
		Custom Buildings - LCI	\$811,125	\$843,139	\$1,654,264
		Audits & Education - LCI	\$1,866,637	\$324,000	\$2,190,637
		Sub-Total	\$7,250,051	\$6,544,675	\$13,794,726
	C&I Demand Response Program - Large	Demand Response - LCI	\$15,600	\$0	\$15,600
		Sub-Total	\$15,600	\$0	\$15,600
	Customer Action Program - LCI	Customer Action Program - LCI	\$285,992	\$0	\$285,992
		Sub-Total	\$285,992	\$0	\$285,992
Large C&I Total			\$7,551,643	\$6,544,675	\$14,096,318
Government	Government Tariff Lighting Program	Government Tariff Lighting	\$46,494	\$10,800	\$57,294
		Sub-Total	\$46,494	\$10,800	\$57,294
Non - Residential Total			\$17,045,394	\$20,718,712	\$37,764,106
Mercantile	Mercantile Customer Program	Mercantile	\$262,334	\$0	\$262,334
		Sub-Total	\$262,334	\$0	\$262,334
Mercantile Total			\$262,334	\$0	\$262,334
Other	Transmission & Distribution Upgrades	T&D Upgrades	\$15,000	\$0	\$15,000
		Sub-Total	\$15,000	\$0	\$15,000
	Smart Grid Modernization Initiative	Smart Grid	\$0	\$0	\$0
		Sub-Total	\$0	\$0	\$0
	Energy Special Improvement District	Energy Special Improvement District	\$0	\$0	\$0
Sub-Total		\$0	\$0	\$0	
Other Total			\$15,000	\$0	\$15,000
Total			\$26,341,008	\$30,664,332	\$57,005,340



Appendix B-2: Program Savings by Program Year

Toledo Edison			2017		2018		2019		Total	
Sector	Program	Sub-Program	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Residential	Appliance Turn In Program	Appliance Turn In	6,124,616	1,288	6,124,616	1,288	6,624,846	1,394	18,874,078	3,971
		Sub-Total	6,124,616	1,288	6,124,616	1,288	6,624,846	1,394	18,874,078	3,971
	Energy Efficient Homes Program	School Education	1,334,141	162	1,334,141	162	1,334,141	162	4,002,424	485
		EE Kits	8,151,234	1,012	8,151,234	1,012	8,858,694	1,100	25,161,162	3,123
		Audits & Education	824,441	116	824,441	116	906,920	127	2,555,802	359
		Behavioral	9,087,278	1,037	9,087,278	1,037	9,087,278	1,037	27,261,834	3,112
		New Homes	635,743	174	635,743	174	700,016	191	1,971,503	538
		Smart Thermostat	240,112	27	240,112	27	240,112	27	720,335	82
		Sub-Total	20,272,949	2,528	20,272,949	2,528	21,127,161	2,645	61,673,060	7,700
	Energy Efficient Products Program	Appliances	1,239,259	174	1,239,259	174	1,286,829	180	3,765,348	528
		Consumer Electronics	1,184,194	179	1,184,194	179	1,302,681	197	3,671,069	556
		Lighting	9,687,485	1,025	9,908,363	1,048	8,745,727	925	28,341,575	2,998
		HVAC	1,308,068	321	1,308,068	321	1,438,628	353	4,054,764	995
		Sub-Total	13,419,007	1,699	13,639,885	1,722	12,773,864	1,655	39,832,756	5,076
	Customer Action Program - Res	Customer Action Program - Res	11,817,962	1,349	6,556,218	748	3,711,629	424	22,085,809	2,521
		Sub-Total	11,817,962	1,349	6,556,218	748	3,711,629	424	22,085,809	2,521
	Residential Demand Response Program	Direct Load Control	0	684	0	677	0	670	0	677
		Sub-Total	0	684	0	677	0	670	0	677
	Low Income Energy Efficiency Program	Community Connections	1,042,345	119	1,042,345	119	1,042,345	119	3,127,034	357
		LI - New Homes	7,887	4	7,887	4	7,887	4	23,660	12
		Sub-Total	1,050,231	123	1,050,231	123	1,050,231	123	3,150,694	369
Residential Total			52,684,765	7,671	47,643,900	7,087	45,287,732	6,910	145,616,398	20,314
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	1,143,897	843	1,158,122	855	1,163,270	859	3,465,288	2,558
		Lighting - SCI	15,074,727	2,863	15,251,078	2,884	14,776,808	2,784	45,102,613	8,531
		Food Service	643,136	81	731,946	94	731,946	94	2,107,028	269
		Appliance Turn In - SCI	114,591	20	126,632	22	138,528	24	379,751	66
		Appliances - SCI	166,036	18	187,813	20	204,154	22	558,003	60
		Consumer Electronics - SCI	28,711	3	33,202	3	33,653	3	95,567	9
		Agricultural	32,989	5	33,970	6	36,914	6	103,874	17
		Data Centers - SCI	364,470	42	415,624	47	415,624	47	1,195,718	136
		Custom - SCI	8,217,558	966	8,989,923	1,054	9,087,882	1,068	26,295,363	3,088
		Retro - Commissioning - SCI	2,078,033	237	2,237,881	255	2,717,427	310	7,033,341	803
		Custom Buildings - SCI	3,687,660	421	4,058,726	463	4,058,726	463	11,805,113	1,348
		Audits & Education - SCI	5,562,451	636	13,275,288	1,511	13,275,288	1,511	32,113,026	3,657
	Sub-Total	37,114,260	6,135	46,500,207	7,215	46,640,220	7,192	130,254,687	20,542	
	Customer Action Program - SCI	Customer Action Program - SCI	1,441,972	165	1,441,972	165	1,441,972	165	4,325,917	494
		Sub-Total	1,441,972	165	1,441,972	165	1,441,972	165	4,325,917	494
Small C&I Total		38,556,233	6,300	47,942,179	7,380	48,082,192	7,356	134,580,604	21,036	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	1,094,500	557	1,098,269	561	1,173,229	626	3,365,998	1,744
		Lighting - LCI	3,888,646	763	4,268,416	838	4,436,576	868	12,593,638	2,469
		Data Centers - LCI	755,421	86	755,421	86	1,118,986	128	2,629,827	300
		Custom - LCI	14,974,598	1,714	14,974,598	1,714	16,105,335	1,846	46,054,531	5,274
		Retro - Commissioning - LCI	601,903	69	601,903	69	752,379	86	1,956,186	223
		Custom Buildings - LCI	3,620,932	413	3,620,932	413	3,620,932	413	10,862,795	1,240
		Audits & Education - LCI	988,061	113	1,185,673	135	1,185,673	135	3,359,407	383
	Sub-Total	25,924,060	3,715	26,505,212	3,816	28,393,110	4,102	80,822,382	11,633	
	C&I Demand Response Program - Large	Demand Response - LCI	0	201,301	0	201,301	0	201,301	0	201,301
		Sub-Total	0	201,301	0	201,301	0	201,301	0	201,301
Customer Action Program - LCI	Customer Action Program - LCI	703,864	80	454,898	52	357,548	41	1,516,310	173	
	Sub-Total	703,864	80	454,898	52	357,548	41	1,516,310	173	
	Large C&I Total		26,627,924	205,097	26,960,110	205,169	28,750,658	205,443	82,338,692	213,107
Government	Government Tariff Lighting Program	Government Tariff Lighting	17,782	2	17,782	2	17,782	2	53,346	7
		Sub-Total	17,782	2	17,782	2	17,782	2	53,346	7
Non - Residential Total			65,201,939	211,398	74,920,071	212,551	76,850,632	212,802	216,972,642	234,149
Mercantile	Mercantile Customer Program	Mercantile	20,359,749	2,477	20,359,749	2,477	20,359,749	2,477	61,079,246	7,432
		Sub-Total	20,359,749	2,477	20,359,749	2,477	20,359,749	2,477	61,079,246	7,432
Mercantile Total			20,359,749	2,477	20,359,749	2,477	20,359,749	2,477	61,079,246	7,432
Other	Transmission & Distribution Upgrades	T&D Upgrades	70,000	8	1,450,000	166	1,450,000	166	2,970,000	339
		Sub-Total	70,000	8	1,450,000	166	1,450,000	166	2,970,000	339
	Smart Grid Modernization Initiative	Smart Grid	0	0	0	0	0	0	0	0
		Sub-Total	0	0	0	0	0	0	0	0
	Energy Special Improvement District	Energy Special Improvement District	0	0	0	0	0	0	0	0
Sub-Total		0	0	0	0	0	0	0	0	
Other Total			70,000	8	1,450,000	166	1,450,000	166	2,970,000	339
Total			138,316,453	221,555	144,373,720	222,281	143,948,113	222,355	426,638,286	262,235

1. kWh savings represents incremental annual savings achieved per year and in total for 2017-2019

2. kW savings represents incremental annual coincident peak demand savings from EEC measures and average annual demand savings from DR measures, per year and in total for 2017 - 2019

### Appendix B-3: Costs Elements

Toledo Edison - Cost Assumptions		
<p>The model used for developing the programs involves a build-up of direct costs based on program or subprogram fixed costs and variable costs based on participation at the measure level. Common costs are estimated at the State or Company level and allocated to each program. Program cost elements of this plan include Operations costs and Incentive costs. Operations costs include Utility Administration costs associated with portfolio management and plan development, Program Administration costs associated with program management and implementation, Marketing, Evaluation, Measurement and Verification (EMV) costs associated with EMV of the programs, Tracking and Reporting costs for tracking and reporting of the program results, and Other costs associated with the development and implementation of the Plan. The following details the assumptions for the program cost elements included in this plan:</p>		
Cost Elements	Component Detail	Description
Operations	Utility Administration	Includes costs incurred by the utility for dedicated employee labor for plan development, to oversee and manage the portfolio, and to perform duties associated with activities such as regulatory reporting or meetings to support the plan. Utility administration costs were based on Company estimated EE&C portfolio administration costs, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Program Administration	Includes utility and program implementation provider costs associated with the implementation and ongoing management of the programs including staffing, contractors, website(s), call centers, quality assurance and control processes, vendor tracking systems and other program specific activities supporting successful program implementation. Program administration costs were informed by experience for similar programs operated by FirstEnergy. Program Administration costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	Marketing	Includes costs associated with developing and providing marketing for plan and program messaging and education of the plan and programs. Marketing costs were identified by two components, (1) fixed sub-program costs, and (2) variable measure unit costs. These costs were estimated for each subprogram, based on measure participation where applicable, and summed to the subprogram and program level.
	EM&V	Includes costs for evaluation, measurement and verification activities performed by the Companies and the Companies' independent evaluator, such as surveys, M&V processes, data transfer and evaluation meetings. The EMV costs were based on 4% of the subprogram cost, and summed to the program level.
	Tracking and Reporting	Includes the costs to develop and maintain a data collection, tracking and reporting system, to develop and generate standard reports, and provide the functionality for program management ad hoc reporting. These costs were informed by existing contracts and Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
	Other	Other costs includes other common costs associated with the development and implementation of the plan, including research and development such as participation in research projects, pilots or demonstrations, completing market potential or other studies, consulting and legal fees, modeling software fees, and employee expenses. Other costs were informed by existing contracts or Company estimates, allocated to each subprogram based on subprogram administration and marketing costs, and summed to the program level.
Incentives	Incentives	Incentives include rebates paid to customers as well as costs associated with providing services or measures directly to customers, or mid-stream or upstream payments to program allies where applicable. Incentives were calculated based on measure level incentive and participation assumptions, and summed to the subprogram and program level.



**Toledo Edison - Appendix C:  
Program Assumptions & PUCO Tables**

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	8	1,376	0.22	0	50	0	Ohio TRM	DEER
			Freezer Recycling	8	1,244	0.20	0	50	0	Ohio TRM	DEER
			Room Air Conditioner Recycling	3	122	1.07	0	30	0	Ohio TRM - Adjusted	DEER
			Dehumidifier Recycling	3	1,075	0.17	0	30	0	Co Assumption	Co Assumption
	Energy Efficient Homes Program	School Education	School Education	7	318	0.04	39	45	0	PA TRM	Co Assumption
		EE Kits	Energy Efficiency Measures	7	324	0.04	40	46	0	PA TRM	Co Assumption
		Audits & Education	Comprehensive Audit	12	511	0.12	537	550	0	Co Assumption	Co Assumption
			On-Line Audit	3	160	0.02	0	0	0	Co Assumption	N/A
		Behavioral	Behavioral	1	139	0.02	0	0	0	Co Assumption	N/A
		New Homes	New Construction -Townhouse and Duplexs	15	1,284	0.35	1,083	425	0	Co Assumption	Co Assumption
			New Construction - Two-on-Two Condos	15	1,284	0.35	1,083	1,000	0	Co Assumption	Co Assumption
			New Construction - Single Family Detached	15	2,141	0.58	1,805	1,000	0	Co Assumption	Co Assumption
			New Construction - Multi Family Low Rise	15	1,284	0.35	1,083	400	0	Co Assumption	Co Assumption
			New Manufactured Housing	15	900	0.44	759	350	0	Co Assumption	Co Assumption
		Smart Thermostat	Smart Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption
	Energy Efficient Products Program	Appliances	Clothes Washer	11	233	0.02	50	50	0	Ohio TRM	PA Incremental Cost DB
			Clothes Dryer - (Elec w Moisture Sensor)	16	152	0.02	112	50	0	Co Assumption	PA Incremental Cost DB
			Freezers	14	133	0.02	7	10	0	Co Assumption	PA Incremental Cost DB
			Refrigerators	14	150	0.03	25	25	0	Ohio TRM	PA Incremental Cost DB
			Dehumidifiers	12	182	0.03	20	20	0	Ohio TRM	PA Incremental Cost DB
			Water Heater - Heat Pump	10	1,688	0.23	605	375	0	Ohio TRM	DEER
		Consumer Electronics	Home Technology & Automation	8	420	0.20	200	100	0	Co Assumption	Co Assumption
			Monitors	4	15	0.00	20	1	0	PA TRM	Co Assumption
			Computers	4	133	0.02	30	3	0	PA TRM	Co Assumption
			Imaging	5	73	0.01	25	2	0	PA TRM	Co Assumption
			TVs	6	74	0.01	20	4	0	PA TRM	Co Assumption

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	7	34	0.00	2	1	0	Ohio TRM	PA Incremental Cost DB
			CFL Fixtures	10	68	0.01	32	5	0	Co Assumption	PA Incremental Cost DB
			LED Fixtures	15	74	0.01	36	7	0	Co Assumption	DEER
			LED Lamps	15	37	0.00	7	3	0	Ohio TRM - Adjusted	Co Assumption
			Residential Lighting Controls	10	38	0.00	40	5	0	Co Assumption	PA Incremental Cost DB
		HVAC	Heat Pump	18	910	0.14	471	313	0	Ohio TRM	DEER
			Central Air Conditioner	18	160	0.14	880	125	0	Ohio TRM	DEER
			Room Air Conditioner	12	27	0.03	50	36	0	Ohio TRM	PA Incremental Cost DB
			Ductless Mini-Split Heat Pump	15	939	0.16	448	125	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTAC - Multi Family	15	93	0.12	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTHP - Multi Family	15	310	0.05	255	125	0	Ohio TRM - Adjusted	Co Assumption
			Heat Pump - Water & GeoT	18	3,667	0.28	10,897	300	0	Ohio TRM	PA Incremental Cost DB
			HVAC - Maintenance	5	78	0.04	100	50	0	Ohio TRM	PA Incremental Cost DB
			Furnace Fans	14	446	0.11	360	180	0	PA TRM	PA Incremental Cost DB
			Circulation Pumps	10	163	0.02	62	40	0	Co Assumption	Co Assumption
			Programmable / SMART Thermostat	11	150	0.02	200	100	0	PA TRM - Adjusted	Co Assumption
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	9	1	0.0001	0.05	0	0	Co Assumption	Co Assumption
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	1	0	0.36	0	0	0	Co Assumption	Co Assumption
	Low Income Energy Efficiency Program	Community Connections	Community Connections	8	1,619	0.18	0	0	0	Co Assumption	N/A
		LI - New Homes	LI New Construction	15	900	0.44	759	314	0	Co Assumption	Co Assumption

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	12	300	0.20	50	21	0	Ohio TRM	PA Incremental Cost DB
			Air Conditioning - <=5.4 Tn - SCI	15	954	0.93	1,960	197	0	Ohio TRM	PA Incremental Cost DB
			Air Conditioning - >5.4 < 20 Tn - SCI	15	3,298	3.00	1,680	328	0	Ohio TRM	PA Incremental Cost DB
			Air Conditioning - >=20 Tn - SCI	15	7,082	6.45	2,500	394	0	Ohio TRM	PA Incremental Cost DB
			Chiller - Water Cld w Full Load - SCI	20	14,309	3.26	6,500	2,625	0	PA TRM - Adjusted	PA Incremental Cost DB
			Heat Pump - <=5.4 Tn - SCI	15	2,543	1.44	1,285	197	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - >5.4 Tn - SCI	15	3,306	3.00	1,935	328	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - Water & GeoT - SCI	15	1,774	1.61	5,870	328	0	Ohio TRM	PA Incremental Cost DB
			HVAC - Maintenance - SCI	5	48	0.05	150	53	0	Ohio TRM	Co Assumption
			Circulation Pumps - SCI	10	174	0.02	62	42	0	Co Assumption	Co Assumption
			Ductless Mini-Split HP - SCI	15	867	0.42	448	492	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTAC - SCI	15	175	0.29	84	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTHP - SCI	15	614	0.29	255	53	0	Ohio TRM - Adjusted	PA Incremental Cost DB
		Lighting - SCI	CFL Fixtures - SCI	15	174	0.04	30	14	4	Co Assumption	PA Incremental Cost DB
			CFL Lamps - SCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB
			Lighting Controls (Daylight & Occupancy) - SCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB
			Linear Fluorscent T8 / T5 - SCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB
			LED Linear - SCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption
			LED Channel Signage - SCI	15	506	0.10	22	41	0	Co Assumption	Co Assumption
			Exit Signs - SCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB
			LED Fixtures External - SCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB
			LED Fixtures Internal - SCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption
			LED Lamps - SCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption
			LED Reach in Refrigerator / Freezer Lights - SCI	8	345	0.04	266	28	4	Ohio TRM	PA Incremental Cost DB
			Street & Area Lighting (Customer Owned) - SCI	10	430	0.05	337	34	13	PA TRM	PA Incremental Cost DB

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	12	883	0.10	430	158	0	Energy Star / Ohio TRM	PA Incremental Cost DB
			Freezers - Reach In - SCI	12	4,709	0.54	430	368	0	Energy Star / Ohio TRM	PA Incremental Cost DB
			Ice Machines - SCI	9	1,218	0.21	981	263	0	Energy Star / Ohio TRM	PA Incremental Cost DB
			Refrigerated Case Cover - SCI	5	44	0.00	38	12	0	PA TRM	PA Incremental Cost DB
			Strip Curtains - SCI	6	129	0.01	4	1	0	PA TRM	PA Incremental Cost DB
			Anti Sweat Heater Controls - SCI	12	1,298	0.03	70	37	0	PA TRM	PA Incremental Cost DB
			Beverage Vending Machine - Controls - SCI	5	1,633	0.00	180	95	0	PA TRM	PA Incremental Cost DB
			Beverage Vending Machine - New EE- SCI	14	125	0.00	180	95	0	PA TRM	PA Incremental Cost DB
			Combination Oven - SCI	12	6,368	1.22	1,584	788	0	Energy Star / Ohio TRM	DEER
			Convection Oven - SCI	12	1,937	0.37	1,007	525	0	Energy Star / Ohio TRM	DEER
			Steam Cookers - SCI	12	9,967	1.91	630	368	0	Energy Star / Ohio TRM	Energy Star
			Fryers - SCI	12	1,744	0.33	105	105	0	Energy Star / Ohio TRM	Energy Star
			Griddles - SCI	12	1,909	0.37	774	368	0	Energy Star / Ohio TRM	DEER
			Hot Food Holding Cabinet - SCI	12	1,730	0.33	1,110	525	0	Energy Star / Ohio TRM	Ohio TRM
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	8	1,376	0.22	0	53	0	Ohio TRM	DEER
			Freezer Recycling - SCI	8	1,244	0.20	0	53	0	Ohio TRM	DEER
			Room Air Conditioner Recycling - SCI	3	121	0.26	0	32	0	Ohio TRM	DEER
			Dehumidifiers Recycling - SCI	3	1,075	0.17	0	32	0	Co Assumption	Co Assumption
		Appliances - SCI	Clothes Washer - SCI	10	542	0.00	150	79	0	Ohio TRM	PA Incremental Cost DB
			Clothes Dryer (Elec w Moisture Sensor) - SCI	10	352	0.00	112	58	0	Co Assumption	PA Incremental Cost DB
			Refrigerators - SCI	12	818	0.09	25	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB
			Water Heater - Heat Pump - SCI	10	3,377	0.46	945	394	0	Ohio TRM	PA Incremental Cost DB
			Freezers - SCI	12	2,128	0.24	6	26	0	Energy Star / Ohio TRM	PA Incremental Cost DB
			Pre-Rinse Sprayers - SCI	5	25	0.00	23	53	0	Ohio TRM	DEER

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	4	3,488	0.40	3,926	525	0	Co Assumption	Co Assumption
			Monitors - SCI	4	15	0.00	10	7	0	PA TRM	PA Incremental Cost DB
			Computers - SCI	4	133	0.00	12	7	0	PA TRM	PA Incremental Cost DB
			Imaging - SCI	5	104	0.00	20	13	0	PA TRM	PA Incremental Cost DB
			Small Network - SCI	4	20	0.00	15	13	0	Co Assumption	Co Assumption
		Agricultural	Efficient Dairy Equipment - SCI	15	2,053	0.29	1,000	656	0	Co Assumption	Co Assumption
			High Efficiency Fans - SCI	10	896	0.18	500	525	0	Co Assumption	Co Assumption
		Data Centers - SCI	DC - Custom Servers- SCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption
			DC - Custom HVAC - SCI	15	43,800	5.00	13,140	3,504	0	Co Assumption	Co Assumption
			DC - Audit - SCI	0	0	0.00	0	5,250	0	N/A	N/A
		Custom - SCI	Custom - Process Improvement - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption
			Custom - HVAC & Chillers - SCI	20	28,618	6.51	13,000	2,289	0	PA TRM - Adjusted	PA Incremental Cost DB
			Custom - Compressed Air - SCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption
			Custom - VFDs < 10HP - SCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB
			Custom - VFDs > 10 HP - SCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB
			Custom-Motors - Three Phase - SCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB
			Custom - Refrigeration - SCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption
		Custom Buildings - SCI	Custom - Building Improvements - SCI	15	56,484	6.45	16,945	4,519	0	Co Assumption	Co Assumption
			Custom - Energy Management - SCI	10	35,478	4.05	10,643	2,838	0	Co Assumption	Co Assumption
		Audits & Education SCI	Energy Manager - SCI	1	16,453	1.88	0	0	0	Co Assumption	N/A
			Energy Efficiency Measures - SCI	5	302	0.04	39	39	0	PA TRM	Co Assumption
			Multi Family Audit - SCI	7	324	0.04	40	46	0	Co Assumption	Co Assumption
			Benchmarking - SCI	0	0	0.00	0	0	0	Co Assumption	N/A
			Audit - SCI	0	0	0.00	0	7,875	0	N/A	N/A
			Audits w Direct Install - SCI	12	10,291	1.17	4,116	3,293	0	Co Assumption	Co Assumption
			Behavioral - SCI	1	353	0.04	0	0	0	Co Assumption	Co Assumption
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	15	954	0.93	1,960	188	0	Ohio TRM	PA Incremental Cost DB
			Chiller - Water Cld w Full Load - LCI	20	42,926	9.77	19,500	7,500	0	PA TRM - Adjusted	PA Incremental Cost DB
			Air Conditioning - >5.4 < 20 Tn - LCI	15	3,298	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB
			Air Conditioning - >=20 Tn - LCI	15	7,082	6.45	2,500	375	0	Ohio TRM	PA Incremental Cost DB
			Heat Pump - <=5.4 Tn - LCI	15	2,543	1.44	1,285	188	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - >5.4 Tn - LCI	15	3,306	3.00	1,680	313	0	Ohio TRM	PA Incremental Cost DB
			Heat Pumps - Water & GeoT - LCI	15	1,774	1.61	5,870	313	0	Ohio TRM	PA Incremental Cost DB
			Ductless Mini-Split HP - LCI	15	867	0.42	448	300	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTAC - LCI	15	175	0.29	84	50	0	Ohio TRM - Adjusted	PA Incremental Cost DB
			PTHP - LCI	15	614	0.29	255	80	0	Ohio TRM - Adjusted	PA Incremental Cost DB
		Lighting - LCI	CFL Fixtures - LCI	15	174	0.04	30	10	4	Co Assumption	PA Incremental Cost DB
			CFL Lamps - LCI	3	116	0.02	2	7	0	Ohio TRM	PA Incremental Cost DB
			Lighting Controls (Daylight & Occupancy) - LCI	8	200	0.04	58	16	0	Co Assumption	PA Incremental Cost DB
			Linear Fluorscent T8 / T5 - LCI	15	66	0.01	8	4	0	Co Assumption	PA Incremental Cost DB
			LED Linear - LCI	15	142	0.03	75	11	0	Co Assumption	Co Assumption
			LED Channel Signage - LCI	15	506	0.10	35	41	0	Co Assumption	PA Incremental Cost DB
			Exit Signs - LCI	16	83	0.01	30	5	13	Ohio TRM	PA Incremental Cost DB
			LED Fixtures External - LCI	15	191	0.04	343	15	11	Co Assumption	PA Incremental Cost DB
			LED Fixtures Internal - LCI	15	191	0.04	129	15	11	Co Assumption	Co Assumption
			LED Lamps - LCI	15	127	0.03	7	10	11	Ohio TRM - Adjusted	Co Assumption
			Street & Area Lighting (Customer Owned) - LCI	10	430	0.00	337	34	13	PA TRM	PA Incremental Cost DB
		Data Centers - LCI	DC - Custom HVAC - LCI	15	350,400	40.00	105,120	28,032	0	Co Assumption	Co Assumption
			DC - Custom Servers - LCI	8	584	0.07	80	47	0	Co Assumption	Co Assumption
			DC - Audit - LCI	0	0	0.00	0	7,500	0	N/A	N/A

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - HVAC & Chillers - LCI	20	28,618	6.51	13,000	2,289	0	PA TRM - Adjusted	PA Incremental Cost DB
			Custom - Compressed Air - LCI	10	55,000	6.00	6,651	4,400	0	Co Assumption	Co Assumption
			Custom - VFDs < 10HP - LCI	15	11,623	1.33	2,150	930	0	PA TRM	PA Incremental Cost DB
			Custom - VFDs > 10 HP - LCI	15	56,240	6.42	10,748	4,499	0	PA TRM	PA Incremental Cost DB
			Custom-Motors - Three Phase - LCI	16	3,851	0.33	233	308	0	PA TRM	PA Incremental Cost DB
			Custom - Refrigeration - LCI	15	2,000	0.20	250	160	0	Co Assumption	PA Incremental Cost DB
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	5	145,994	16.67	15,000	11,680	0	Co Assumption	Co Assumption
		Custom Buildings - LCI	Custom - Building Improvements - LCI	15	403,000	46.00	120,900	32,240	0	Co Assumption	Co Assumption
			Custom - Energy Management - LCI	10	289,080	33.00	100,000	23,126	0	Co Assumption	Co Assumption
		Audits & Education LCI	Audit - LCI	0	0	0.00	0	12,000	0	N/A	N/A
			Continuous Improvement - LCI	1	158,820	18.13	0	0	0	Co Assumption	Co Assumption
			Energy Manager - LCI	1	32,906	3.76	0	0	0	Co Assumption	Co Assumption
			Benchmarking - LCI	0	0	0.00	0	0	0	Co Assumption	Co Assumption
	C&I Demand Response Program - Large	Demand Response LCI	LC&I Contracted DR - PJM	1	0	1,000.00	N/A	N/A	N/A	Co Assumption	Co Assumption
			ELR Interruptible Tariff	1	0	1.00	N/A	N/A	N/A	Co Assumption	Co Assumption
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	13	1	0.0001	0	0	0	Co Assumption	Co Assumption



Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	10	400	0.05	170	90	189	Ohio TRM	PA Incremental Cost DB
			Street & Area Lighting (Tariff / Utility Owned) - G	10	241	0.00	0	0	15	Ohio TRM	Co Assumption
			Street & Area Lighting (Tariff / Customer Owned) -	10	430	0.00	337	138	15	PA TRM	PA Incremental Cost DB

Appendix C-1: Measure Assumptions

Toledo Edison											
Sector	Program	Sub-Program	Measure	Msre Life	kWh	kW	Incremental Cost	Modeled Rebate	O&M Benefit (\$/Yr)	Savings Source	Incremental Cost Source
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	10	19,254,538	2,342.79	0	0	0	Co Assumption	Co Assumption
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	15	1	0.00	N/A	N/A	N/A	Co Assumption	Co Assumption
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	N/A	N/A	N/A	N/A	N/A	N/A	Co Assumption	Co Assumption

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	3,307	3,307	3,577
			Freezer Recycling	770	770	833
			Room Air Conditioner Recycling	269	269	291
			Dehumidifier Recycling	49	49	53
	Energy Efficient Homes Program	School Education	School Education	3,835	3,835	3,835
		EE Kits	Energy Efficiency Measures	22,963	22,963	24,956
		Audits & Education	Comprehensive Audit	300	300	330
			On-Line Audit	3,748	3,748	4,123
		Behavioral	Behavioral	59,800	59,800	59,800
		New Homes	New Construction -Townhouse and Duplexs	121	121	133
			New Construction - Two-on-Two Condos	14	14	16
			New Construction - Single Family Detached	179	179	197
			New Construction - Multi Family Low Rise	11	11	12
			New Manufactured Housing	11	11	12
		Smart Thermostat	Smart Thermostat	1,462	1,462	1,462
	Energy Efficient Products Program	Appliances	Clothes Washer	1,138	1,138	1,252
			Clothes Dryer - (Elec w Moisture Sensor)	300	300	300
			Freezers	458	458	458
			Refrigerators	1,820	1,820	1,820
			Dehumidifiers	452	452	452
			Water Heater - Heat Pump	240	240	250
		Consumer Electronics	Home Technology & Automation	1	1	1
			Monitors	1,343	1,343	1,477
			Computers	343	343	378
			Imaging	29	29	32
			TVs	13,619	13,619	14,981

Appendix C-2: Number of Units

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Residential	Energy Efficient Products Program	Lighting	CFL Lamps	124,543	83,511	62,977
			CFL Fixtures	39	39	18
			LED Fixtures	34	34	37
			LED Lamps	124,543	167,273	157,383
			Residential Lighting Controls	170	170	187
		HVAC	Heat Pump	437	437	480
			Central Air Conditioner	600	600	660
			Room Air Conditioner	1,046	1,046	1,151
			Ductless Mini-Split Heat Pump	313	313	344
			PTAC - Multi Family	22	22	24
			PTHP - Multi Family	26	26	29
			Heat Pump - Water & GeoT	76	76	84
			HVAC - Maintenance	988	988	1,087
			Furnace Fans	11	11	12
			Circulation Pumps	5	5	5
			Programmable / SMART Thermostat	52	52	52
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	10,793,645	5,987,961	3,389,925
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	1,750	1,733	1,715
	Low Income Energy Efficiency Program	Community Connections	Community Connections	588	588	588
		LI - New Homes	LI New Construction	8	8	8

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	130	133	135
			Air Conditioning - <=5.4 Tn - SCI	183	183	183
			Air Conditioning - >5.4 < 20 Tn - SCI	54	54	54
			Air Conditioning - >=20 Tn - SCI	17	18	18
			Chiller - Water Cld w Full Load - SCI	6	6	6
			Heat Pump - <=5.4 Tn - SCI	48	48	48
			Heat Pumps - >5.4 Tn - SCI	20	20	20
			Heat Pumps - Water & GeoT - SCI	14	15	15
			HVAC - Maintenance - SCI	6	6	6
			Circulation Pumps - SCI	208	208	208
			Ductless Mini-Split HP - SCI	79	80	82
			PTAC - SCI	147	150	153
			PTHP - SCI	168	171	174
		Lighting - SCI	CFL Fixtures - SCI	125	131	100
			CFL Lamps - SCI	15,486	6,813	4,227
			Lighting Controls (Daylight & Occupancy) - SCI	10,487	10,931	10,931
			Linear Fluorscent T8 / T5 - SCI	22,798	22,433	19,560
			LED Linear - SCI	20,977	24,874	26,454
			LED Channel Signage - SCI	136	142	142
			Exit Signs - SCI	945	985	985
			LED Fixtures External - SCI	5,273	5,491	5,751
			LED Fixtures Internal - SCI	464	483	504
			LED Lamps - SCI	20,849	24,236	22,349
			LED Reach in Refrigerator / Freezer Lights - SCI	2,510	2,615	2,679
			Street & Area Lighting (Customer Owned) - SCI	1,414	1,473	1,473

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Refrigerators - Reach In - SCI	8	10	10
			Freezers - Reach In - SCI	34	38	38
			Ice Machines - SCI	16	16	16
			Refrigerated Case Cover - SCI	374	414	414
			Strip Curtains - SCI	514	566	566
			Anti Sweat Heater Controls - SCI	48	54	54
			Beverage Vending Machine - Controls - SCI	16	16	16
			Beverage Vending Machine - New EE- SCI	54	60	60
			Combination Oven - SCI	8	10	10
			Convection Oven - SCI	6	8	8
			Steam Cookers - SCI	10	12	12
			Fryers - SCI	12	14	14
			Griddles - SCI	8	8	8
			Hot Food Holding Cabinet - SCI	14	16	16
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	63	70	76
			Freezer Recycling - SCI	13	14	16
			Room Air Conditioner Recycling - SCI	6	7	8
			Dehumidifiers Recycling - SCI	1	1	1
		Appliances - SCI	Clothes Washer - SCI	14	14	16
			Clothes Dryer (Elec w Moisture Sensor) - SCI	26	28	32
			Refrigerators - SCI	92	102	112
			Water Heater - Heat Pump - SCI	10	12	12
			Freezers - SCI	12	14	16
			Pre-Rinse Sprayers - SCI	15	15	15

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	6	7	7
			Monitors - SCI	43	47	52
			Computers - SCI	16	18	19
			Imaging - SCI	16	18	19
			Small Network - SCI	43	47	52
		Agricultural	Efficient Dairy Equipment - SCI	9	9	9
			High Efficiency Fans - SCI	13	14	17
		Data Centers - SCI	DC - Custom Servers- SCI	45	50	50
			DC - Custom HVAC - SCI	7	8	8
			DC - Audit - SCI	7	8	8
		Custom - SCI	Custom - Process Improvement - SCI	107	118	118
			Custom - HVAC & Chillers - SCI	9	9	10
			Custom - Compressed Air - SCI	8	9	10
			Custom - VFDs < 10HP - SCI	17	19	19
			Custom - VFDs > 10 HP - SCI	9	9	9
			Custom-Motors - Three Phase - SCI	12	13	14
			Custom - Refrigeration - SCI	7	8	9
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	13	14	17
		Custom Buildings - SCI	Custom - Building Improvements - SCI	59	65	65
			Custom - Energy Management - SCI	1	1	1
		Audits & Education - SCI	Energy Manager - SCI	16	18	18
			Energy Efficiency Measures - SCI	385	425	425
			Multi Family Audit - SCI	25	25	25
			Benchmarking - SCI	16	18	18
			Audit - SCI	65	75	75
			Audits w Direct Install - SCI	456	529	529
			Behavioral - SCI	0	17,700	17,700
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	1,316,990	1,316,990	1,316,990

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large Utility)	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	14	14	17
			Chiller - Water Cld w Full Load - LCI	14	14	14
			Air Conditioning - >5.4 < 20 Tn - LCI	13	13	15
			Air Conditioning - >=20 Tn - LCI	29	29	34
			Heat Pump - <=5.4 Tn - LCI	34	34	40
			Heat Pumps - >5.4 Tn - LCI	4	5	5
			Heat Pumps - Water & GeoT - LCI	19	19	19
			Ductless Mini-Split HP - LCI	7	7	9
			PTAC - LCI	198	200	234
			PTHP - LCI	41	41	49
		Lighting - LCI	CFL Fixtures - LCI	1	1	1
			CFL Lamps - LCI	3,565	2,073	1,172
			Lighting Controls (Daylight & Occupancy) - LCI	3,872	3,920	4,590
			Linear Fluorscent T8 / T5 - LCI	8,145	7,217	5,487
			LED Linear - LCI	5,091	7,217	8,779
			LED Channel Signage - LCI	20	20	21
			Exit Signs - LCI	380	384	450
			LED Fixtures External - LCI	3,525	3,569	4,179
			LED Fixtures Internal - LCI	22	22	26
			LED Lamps - LCI	4,357	6,565	5,724
			Street & Area Lighting (Customer Owned) - LCI	120	120	140
		Data Centers - LCI	DC - Custom HVAC - LCI	2	2	3
			DC - Custom Servers - LCI	55	55	59
			DC - Audit - LCI	2	2	3

**Appendix C-2: Number of Units**

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom - LCI	Custom - Process Improvement - LCI	33	33	35
			Custom - HVAC & Chillers - LCI	2	2	3
			Custom - Compressed Air - LCI	7	7	8
			Custom - VFDs < 10HP - LCI	9	9	12
			Custom - VFDs > 10 HP - LCI	12	12	15
			Custom-Motors - Three Phase - LCI	1	1	2
			Custom - Refrigeration - LCI	2	2	2
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	4	4	5
		Custom Buildings - LCI	Custom - Building Improvements - LCI	8	8	8
			Custom - Energy Management - LCI	1	1	1
		Audits & Education - LCI	Audit - LCI	9	9	9
			Continuous Improvement - LCI	5	6	6
			Energy Manager - LCI	5	6	6
			Benchmarking - LCI	5	6	6
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	1	1	1
			ELR Interruptible Tariff	201,301	201,301	201,301
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	682,899	441,349	346,898



## Appendix C-2: Number of Units

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	40	40	40
			Street & Area Lighting (Tariff / Utility Owned) - Gov	1	1	1
			Street & Area Lighting (Tariff / Customer Owned) - Gov	0	0	0

## Appendix C-2: Number of Units

Toledo Edison						
Sector	Program	Sub-Program	Measure	2017 Units	2018 Units	2019 Units
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	1	1	1
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	70,000	1,450,000	1,450,000
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	1	1	1
Other	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	1	1	1

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Appliance Turn In Program	Appliance Turn In	Refrigerator Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Freezer Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$75	per unit
			Room Air Conditioner Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
			Dehumidifier Recycling	Removal of an existing inefficient unit prior to end of useful life via recycling	\$38	per unit
	Energy Efficient Homes Program	School Education	School Education	Adoption of an energy efficiency school curriculum or other engagement which encourages efficient practices & installation of energy efficiency measures at home. Student families are offered an energy efficiency kit to introduce simple retrofit measures.	NA	
		EE Kits	Energy Efficiency Measures	Opt In Kit with low cost energy efficiency measures mailed at the customers request.	NA	
		Audits & Education	Comprehensive Audit	Provides a Customized Home Energy Report for single or multi-family residence. Comprehensive measures that are eligible for incentives, as a result of diagnostics and testing include, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc. Manufactured homes are also eligible.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			On-Line Audit	Energy education and awareness supporting installation of measures and behaviors that reduce consumption of energy and demand.	NA	
		Behavioral	Behavioral	Reports containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of measures and efficiencies behaviors that reduces consumption of energy and demand.	NA	
		New Homes	New Construction -Townhouse and Duplexs	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,125	per unit
			New Construction - Two-on-Two Condos	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$825	per unit
			New Construction - Single Family Detached	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$1,875	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Homes Program	New Homes	New Construction - Multi Family Low Rise	New residential homes to be constructed in accordance with the applicable Energy Star standard, or built at a higher efficiency level than the current adopted building code.	\$600	per unit
			New Manufactured Housing	New residential modular or manufactured home. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
		Smart Thermostat	Smart Thermostat	Deployment of a program specific smart thermostat to residential customers with either of the following HVAC systems: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump.	\$100	per unit
	Energy Efficient Products Program	Appliances	Clothes Washer	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer, including appliances that can be interconnected to home energy management systems.	\$100	per unit
			Clothes Dryer - (Elec w Moisture Sensor)	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer	\$600	per unit
			Freezers	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Refrigerators	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Dehumidifiers	Purchase and installation of a new Energy Star rated unit	\$25	per unit
			Water Heater - Heat Pump	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
		Consumer Electronics	Home Technology & Automation	Purchase and installation of emerging technologies related to the control of in-home appliances, lighting, HVAC equipment, etc.	75% of equipment cost	per unit
			Monitors	Purchase and installation of an Energy Star rated unit	\$8	per unit
			Computers	Purchase and installation of an Energy Star rated unit	\$8	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	Consumer Electronics	Imaging	Purchase and installation of an Energy Star rated unit	\$8	per unit
			TVs	Purchase and installation of an Energy Star V7.0 rated Television	\$8	per unit
		Lighting	CFL Lamps	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL) at participating retailers.	\$3	NTE Cost of Lamp
			CFL Fixtures	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture
			LED Fixtures	Purchase and installation of an energy efficient luminaire with integral LED lamp.	\$50	per fixture
			LED Lamps	Purchase and installation of an energy efficient LED lamp at participating retailers.	\$5	NTE Cost of Lamp
			Residential Lighting Controls	The purchase and installation of an occupancy sensor, dimmers or other energy saving controllers inside the home	\$25	per unit
		HVAC	Heat Pump	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER or 8.5 HSPF. Includes variable refrigerant flow (VRF) systems.	\$1,000	per unit
			Central Air Conditioner	Replacement of ducted split central units prior to end of life or installation of a new energy efficient unit w/ SEER ratings > or = 14.5 or 12 EER. Includes variable flow (VRF) systems.	\$800	per unit
			Room Air Conditioner	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Ductless Mini-Split Heat Pump	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5	\$400	per unit
			PTAC - Multi Family	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Residential	Energy Efficient Products Program	HVAC	PTHP - Multi Family	Replacement of a packaged terminal unit prior to end of life or a installation of a new energy efficient unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$200	per unit
			Heat Pump - Water & GeoT	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$1,500	per unit
			HVAC - Maintenance	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: • Check refrigerant charge level and correct as necessary. • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil and Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement.	\$85	per unit
			Furnace Fans	Replacement of an existing fan with a brushless permanent magnet (BPM) or electrically commutated motor (ECM) at the time of an HVAC tune-up or installation of a new CAC or HP. Purchase of a new gas furnace with a BPM or ECM motor is also eligible.	\$150	per unit
			Circulation Pumps	Replacement of existing single speed circulation pump or new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	
			Programmable / SMART Thermostat	New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control HVAC systems with either of the following: central air conditioning, heat pumps, electric resistance furnace or geothermal heat pump.	Up to 75% of thermostat cost	per unit
	Customer Action Program - Res	Customer Action Program - Res	Customer Action Program - Res	NA	NA	
	Residential Demand Response Program	Direct Load Control	Res Direct Load Control	Residential customers that have split system Central Air Conditioning.	\$50	per year (participation)
	Low Income Energy Efficiency Program	Community Connections	Community Connections	Residential customers and landlords of residents eligible for one of the following programs: (i) the Ohio Home Weatherization Assistance Program (HWAP); (ii) Percent of Income Payment Plan (PIPP); or (iii) Home Energy Assistance Program (HEAP).	NA	
		LI - New Homes	LI New Construction	New construction of low-income housing to be constructed in accordance applicable Energy Star standard or built at a higher efficiency level than the current adopted building code. Modular homes to be designed, manufactured and installed meet the applicable Energy Star standard for Modular Homes, or built at a higher efficiency level than the current adopted building code. Manufactured homes to be designed and built by certified Energy Star manufacturing plant.	\$1,875	per unit
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Room Air Conditioner - SCI	Purchase and installation of new unit meeting Energy Star standard V4.0.	\$100	per unit
			Air Conditioning - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	HVAC - SCI	Air Conditioning - >5.4 < 20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Air Conditioning - >=20 Tn - SCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
			Chiller - Water Cld w Full Load - SCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is not included in this measure.	\$45 / Ton	NTE 50% of PC
			Heat Pump - <=5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - SCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - SCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			HVAC - Maintenance - SCI	Eligibility items covered during maintenance on existing central air conditioner or air source heat pumps: • Check refrigerant charge level and correct as necessary. • Clean filters as needed • Inspect and lubricate bearings • Inspect and clean condenser and, if accessible, evaporator coil. • Check refrigerant levels and air flow across coils for CAC and HP units using standard industry tools with correction of any problems found and post-treatment re-measurement, and installation of smart thermostat or smart thermostat with advanced features.	\$50	per ton
			Circulation Pumps - SCI	Replacement of existing single speed circulation pump or installation of a new circulation pump with variable speed motor and/or controls to automatically change pump speed to produce flow rates that match system heating requirements.	\$100	per unit
			Ductless Mini-Split HP - SCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient unit w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - SCI	Replacement of a packaged terminal unit prior to end of life or a new unit exceeding efficiency ratings exceeding efficiency ratings of IECC 2012 by 10%. Includes variable flow (VRF) systems.	\$150	per ton
		Lighting - SCI	CFL Fixtures - SCI	Purchase and installation of a new energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s) that is installed in an interior or exterior residential setting.	\$20	per fixture

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

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**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Lighting - SCI	CFL Lamps - SCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - SCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - SCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - SCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - SCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - SCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED type exit sign or photoluminescent sign.	\$23	per sign
			LED Fixtures External - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - SCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - SCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			LED Reach in Refrigerator / Freezer Lights - SCI	Replacement of linear fluorescent refrigerator, cooler or freezer lights lighting with LED lighting.	\$75	per door
			Street & Area Lighting (Customer Owned) - SCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
		Food Service	Refrigerators - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in refrigerator.	\$165	per unit

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Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Freezers - Reach In - SCI	Purchase and installation of new ENERGY STAR, commercial, solid or glass door reach-in freezer.	\$165	per unit
			Ice Machines - SCI	Replacement of inefficient ice machine prior to end of life or new unit that is Energy Star rated.	\$590 0-500 lbs \$980 501-1000 lbs \$1100 over 1000 lbs	per unit
			Refrigerated Case Cover - SCI	Replacement or new installation of refrigerated case covers.	\$32	per linear foot
			Strip Curtains - SCI	Replacement or new installation of polyethylene strip curtains on walk in freezers and coolers covering the entire door frame. Eligible units must be open a least 2.5 hrs/day.	\$3	per square-ft
			Anti Sweat Heater Controls - SCI	New installation of door heater controls on glass doors for refrigerators, coolers or freezers.	\$60	per door
			Beverage Vending Machine - Controls - SCI	Retrofit controls for a non Energy Star rated vending machine.	\$115	per unit
			Beverage Vending Machine - New EE-SCI	Purchase and installation of new Energy Star rated vending machine.	\$130	per unit
			Combination Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$1,380	per unit
			Convection Oven - SCI	Replacement or new installation of Energy Star qualified electric units.	\$700	per unit
			Steam Cookers - SCI	Replacement or new installation of Energy Star qualified electric units with 3-6 pans. A qualifying steam cooker must meet a minimum cooking efficiency of 50 percent and meet idle energy rates specified by pan capacity.	\$250 - 3 pan \$375 - 4 pan \$500 - 5 pan \$600 - 6 pan	per unit
			Fryers - SCI	Replacement or new installation of Energy Star qualified electric units.	\$325	per unit
			Griddles - SCI	Replacement or new installation of Energy Star qualified electric units.	\$500	per unit

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Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Food Service	Hot Food Holding Cabinet - SCI	Replacement or new installation of full, three quarter and half sized ENERGY STAR qualified units with idle energy rate of 0.04 kW/CF.	\$500 - full size \$375 - 3/4 size \$225 - 1/2 size	per unit
		Appliance Turn In - SCI	Refrigerator Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Freezer Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$75	per unit
			Room Air Conditioner Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
			Dehumidifiers Recycling - SCI	Removal of an existing inefficient unit from service prior to end of useful life thru recycling.	\$38	per unit
		Appliances - SCI	Clothes Washer - SCI	Purchase and installation of an Energy Star or CEE Tier 1 (or higher) clothes washer. Commercial clothes washers and "coin op" units are also eligible.	\$100	per unit
			Clothes Dryer (Elec w Moisture Sensor) - SCI	Purchase and installation of an Energy Star rated Clothes Dryer with moisture sensor or Heat Pump Clothes Dryer. Commercial and "coin op" unit are also eligible.	\$600	per unit
			Refrigerators - SCI	Purchase and installation of a new unit meeting Energy Star or CEE Tier 1 (or higher).	\$150	per unit
			Water Heater - Heat Pump - SCI	Purchase and installation of a heat pump water heater with EF>2.0 or a solar water heater with SEF >= 1.8 for electric backup.	\$700	per unit
			Freezers - SCI	Purchase and installation of a new unit meeting either Energy Star or greater efficiency level.	\$40	per unit
			Pre-Rinse Sprayers - SCI	Replacement of existing sprayer with new unit that use 1.6 GPM or less, on/off squeeze lever, and cleaning of performance of at least 26 seconds. Electric water heating only.	\$55	per unit
		Consumer Electronics - SCI	Uninterruptible Power Supply - SCI	Replacement or new installation of a UPS (less than 12 kW) that exceeds the minimum average efficiency standard as determined by Table 1 of the Energy Star UPS standard. Table 2 of the standard shall be used in calculating the loading of the UPS.	\$220	per kW

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Toledo Edison						
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Small Enterprise	C&I Energy Solutions for Business Program - Small	Consumer Electronics - SCI	Monitors - SCI	Purchase and installation of Energy Star rated unit.	\$15	per unit
			Computers - SCI	Purchase and installation of an Energy Star rated unit.	\$15	per unit
			Imaging - SCI	Purchase and installation of Energy Star rated imaging equipment including but not limited to: scanners, copier, printers, fax machines and multi-function machines.	\$30	per unit
			Small Network - SCI	Purchase and installation of network level software that controls desktop computers and monitors power settings with the network. Software must be capable of measuring and managing power consumption of each individual PC. Laptops are not eligible.	\$15	per PC
		Agricultural	Efficient Dairy Equipment - SCI	Purchase and installation of more efficient electric driven equipment in retrofit applications.	\$0.10 per kWh saved	
			High Efficiency Fans - SCI	Purchase and installation of a new high efficiency ventilation fans in retrofit applications.	\$0.10 per kWh saved	
		Data Centers - SCI	DC - Custom Servers- SCI	Replacement of existing server equipment or installation of new energy efficient server equipment meeting Energy Star or other energy efficiency requirements.	\$40	
			DC - Custom HVAC - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Audit - SCI	Comprehensive Energy Audit for data center facility recommending installation of efficient equipment, such as: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment, server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - SCI	Custom - Process Improvement - SCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - SCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%, and includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - SCI	Replacement or retrofit of existing air compressor systems, including but no limited to: new compressors, air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC

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Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Custom - SCI	Custom - VFDs < 10HP - SCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - SCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - SCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - SCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - SCI	Custom Retrocommissioning - SCI	Adjustment of Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - SCI	Custom - Building Improvements - SCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with the square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Energy Management - SCI	Installation of new energy management system to control lighting, hvac and other building systems. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	\$0.10 per kWh saved. Up to 75% of thermostat cost.	
		Audits & Education SCI	Energy Manager - SCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Energy Efficiency Measures - SCI	Opt In Kit with energy efficiency measures mailed at the customers request.	NA	
			Multi Family Audit - SCI	Provides a Customized Home Energy Report to multi-family residences served under a commercial rate tariff. Comprehensive measures eligible for incentive based on applicable diagnostics and testing includes, but are not limited to: Windows, Duct Sealing, and Wall & Attic Insulation, etc.	Audit - Up to \$500 for the cost of the audit direct install measures, plus up to \$500 for audit recommended measures and additional incentives	
			Benchmarking - SCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
			Audit - SCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of the audit cost or \$5000 (whichever is less) plus upto remaining 50% of audit cost if audit recommended measures are installed. Up to 50% of the cost of comprehensive measures installed.	

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Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Small Enterprise	C&I Energy Solutions for Business Program - Small	Audits & Education - SCI	Audits w Direct Install - SCI	Provides an audit with the direct installation (DI) of qualified energy efficiency measures. New installation of smart thermostat or smart thermostat with advanced features. Advanced features on a smart thermostat must consist of three of the following: fan delays, free cooling, occupancy sensing, heat pump resistance element lock-out, humidity control, compressor optimization or behavioral "coaching" features. Thermostat must control electric heating and/or cooling systems.	80% of the cost of the DI measures NTE \$6,000	
			Behavioral - SCI	Energy Intelligence Software tool that provides reporting containing energy usage comparisons, recommendations and education emphasizing key points, general conservation tips and information on tools and resources supporting implementation of energy efficiency measures and behaviors that reduces consumption of energy and demand.	NA	
	Customer Action Program - SCI	Customer Action Program - SCI	Customer Action Program - SCI	NA	NA	
Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Chiller - Water Cld w Full Load - LCI	Replacement or new installation of electric chiller w/efficiency exceeding baselines in IECC, 2012, Table 503.2.3(7) by at least 10%. VFD retrofits of existing existing chiller is NOT included in this measure.	\$45 / Ton	NTE 50% of PC
			Air Conditioning - >5.4 < 20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pump - <=5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$200	per ton
			Heat Pumps - >5.4 Tn - LCI	Replacement of a Single Package or Split System central unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			Heat Pumps - Water & GeoT - LCI	New installation of Ground & Water Source Heat Pumps: The following retrofit scenarios are eligible: • Ground source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >13.1, COP> 3.1 • Groundwater source heat pumps for existing or new HVAC applications <135,000 BTU/hr, EER >16.2, COP> 3.6 • Water source heat pumps for existing or new HVAC applications <65,000 BTU/hr, EER >12.0, COP> 4.2	\$300	per ton
			Ductless Mini-Split HP - LCI	Replacement of ductless mini-split unit prior to end of life or installation of a new energy efficient w/ SEER >= 15, EER >=12.5 or HSPF >= 8.5.	\$300	per ton
			PTAC - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton
			PTHP - LCI	Replacement of a packaged terminal unit prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$150	per ton

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Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	HVAC - LCI	Air Conditioning - >=20 Tn - LCI	Replacement of a Single Package or Split System central units prior to end of life or installation of a new energy efficient unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) systems.	\$120	per ton
		Lighting - LCI	CFL Fixtures - LCI	Purchase and installation of an energy efficient lighting fixture wired for exclusive use with pin-based (including the GU-24 base) compact fluorescent lamp(s).	\$20	per fixture
			CFL Lamps - LCI	Purchase and installation of an energy efficient compact fluorescent light bulb (CFL).	\$3	NTE Cost of Lamp
			Lighting Controls (Daylight & Occupancy) - LCI	Purchase and installation of new lighting controls, including but not limited to: daylight On/Off & dimming, occupancy sensors (wall plate, remote & fixture mounted), time clocks and switching controls.	\$0.10 per kWh saved	
			Linear Fluorescent T8 / T5 - LCI	Replacement of existing linear fluorescent lamps or new installations with high performance T8 or T5 lamps.	\$0.10 per kWh saved	
			LED Linear - LCI	Replacement or new installation of linear LED lighting equipment to a higher efficiency than existing or designed.	\$0.10 per kWh saved	
			LED Channel Signage - LCI	Replacement, retrofit or new installation of channel letter signs w/ LED technology.	\$3	per linear foot
			Exit Signs - LCI	Replacement or retrofit of incandescent or fluorescent exit signs w/ LED or photoluminescent exit sign.	\$23	per sign
			LED Fixtures External - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an exterior setting.	\$55	per fixture
			LED Fixtures Internal - LCI	Replacement or new installation of a lighting fixture wired for exclusive use with LED lamps that is installed in an interior setting.	\$55	per fixture
			LED Lamps - LCI	Purchase and installation of an energy efficient LED lamp.	\$20	NTE Cost of Lamp
			Street & Area Lighting (Customer Owned) - LCI	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture

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Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Data Centers - LCI	DC - Custom HVAC - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			DC - Custom Servers - LCI	Replacement or retrofit of existing data center equipment including, but not limited to: high efficiency server and storage devices, high efficiency computer room air conditioning (CRAC) and HVAC equipment, server virtualization, high efficiency power supplies, high efficiency dehumidification systems, economizers, airflow management and controls that improve systems cooling, and UPS efficiency upgrades.	\$0.10 per kWh saved.	
			DC - Audit - LCI	Comprehensive Energy Audit for data center facilities recommending installation of efficient equipment, building shell/envelop improvements, building operating changes, or other energy efficiency improvements.	Up to 50% of the audit cost plus up to remaining 50% of audit cost if audit recommended measures are installed.	
		Custom - LCI	Custom - Process Improvement - LCI	Replacement or retrofit of existing equipment or process changes or enhancements that results in electric energy savings.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - HVAC & Chillers - LCI	Replacement of a HVAC or electric water chilling units prior to end of life or installation of a new unit exceeding IECC 2012 efficiency ratings by at least 10%. Includes variable flow (VRF) units.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - Compressed Air - LCI	Replacement or retrofit of existing air compressor systems, including but not limited to: new compressors, air dryers, or increased storage capacity. Other efficiency measures such as: leak repair, controls, high efficiency nozzles, piping enhancements, and no loss drains are also eligible.	\$0.10 per kWh saved.	NTE 50% of PC
			Custom - VFDs < 10HP - LCI	Purchase and installation of a new VFD for an existing motor (less than 10 hp) driving fans, pumps and other suitable applications.	\$130	per hp
			Custom - VFDs > 10 HP - LCI	Purchase and installation of a new VFD for an existing motor (greater than 10 hp) driving fans, pumps and other suitable applications.	\$100	per hp
			Custom-Motors - Three Phase - LCI	Purchase and installation of a new premium efficiency motor in lieu of rewinding an existing motor.	\$35	per hp
			Custom - Refrigeration - LCI	Retrofit of small commercial walk-in refrigeration and coolers, including, but not limited to: high efficiency fan motors, evaporator fan controllers, floating head pressure controls, evaporator coil defrost controls and variable speed compressor motors.	\$0.10 per kWh saved.	
		Retro - Commissioning - LCI	Custom Retrocommissioning - LCI	Adjust Electrical, Electric Mechanical, & Control System set points to improve system performance to existing building conditions and use, including the implementation of energy savings measures identified through building operations training.	\$0.10 per kWh saved.	NTE 50% of PC
		Custom Buildings - LCI	Custom - Building Improvements - LCI	Retrofit of existing building shell, electrical & electric mechanical retrofits to greater efficiency components and processes, including but not limited to wall and ceiling insulation, windows, reduction of conditioned cubic feet (CF) with square feet (SF) of floor space remaining the same, reduction in window size w/ improved R value.	\$0.10 per kWh saved.	NTE 50% of PC

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Large Enterprise (Mercantile Utility)	C&I Energy Solutions for Business Program - Large	Custom Buildings - LCI	Custom - Energy Management - LCI	Installation of new energy management system in buildings to control lighting, hvac and other building systems.	\$0.10 per kWh saved.	
		Audits & Education - LCI	Audit - LCI	Comprehensive Energy Audit for commercial/industrial facilities or manufacturing processes recommending installation of efficient equipment, building shell/envelop improvements, manufacturing process changes, building operating changes, or other energy efficiency improvements. Audit must meet minimum audit requirements for buildings or for process equipment.	Up to 50% of Audit Cost plus up to remaining 50% of Audit Cost if audit recommended measures are installed	
			Continuous Improvement - LCI	Shared resource for the largest commercial/industrial customers that provides consulting services to integrate energy efficiency as a core business practice.	NA	
			Energy Manager - LCI	Shared resource to provide energy consultative services to assess energy usage and to identify and promote low cost/no cost energy saving improvements and program opportunities.	NA	
			Benchmarking - LCI	Provides building owners and property managers with a quantitative analysis of their building's energy performance.	NA	
	C&I Demand Response Program - Large	Demand Response - LCI	LC&I Contracted DR - PJM	Large commercial, industrial and government customers participating in PJM programs and/or contracted curtailment attributes w/ curtailment providers and/or individual customers.	NA	
			ELR Interruptible Tariff	Large commercial, industrial and governmental customers on the Companies ELR tariff.	NA	
	Customer Action Program - LCI	Customer Action Program - LCI	Customer Action Program - LCI	NA	NA	
Government	Government Tariff Lighting Program	Government Tariff Lighting	LED - Traffic Signals - Gov	Replacement of incandescent traffic & pedestrian signals with LED signals.	\$90	per signal
			Street & Area Lighting (Tariff / Utility Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	NA	
			Street & Area Lighting (Tariff / Customer Owned) - Gov	Replacement or new installation of Street and Area lighting equipment to a greater efficiency than existing or designed.	\$220	per fixture
Mercantile	Mercantile Customer Program	Mercantile	Mercantile Customer Projects	Self directed projects completed by large commercial and industrial mercantile customers.	NA	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).

2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.

3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc).

4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.

**Appendix C-3: Calculation Methods and Assumptions - Rebate Strategy**

Toledo Edison						
Sector	Program	Sub-Program	Measure	Eligibility / Description	Rebate Strategy (All values are "up to" values) <sup>1,2,3,4</sup>	Qualifiers
Other	Transmission & Distribution Upgrades	T&D Upgrades	Transmission & Distribution Upgrades	Transmission and distribution system improvements that results in electric energy savings.	NA	
	Smart Grid Modernization Initiative	Smart Grid	Smart Grid Modernization Initiative	Smart Grid Modernization initiatives that results in electric energy savings.	NA	
	Energy Special Improvement District	Energy Special Improvement District	Energy Special Improvement District	Electric energy savings resulting from projects completed as part of an Energy Special Improvement District.	NA	

1. The Company may provide tiered rebate amounts within the incentive ranges listed above for qualifying products that have varying characteristics (e.g. size, features, etc.).
2. The Company may provide prescriptive rebates in lieu of the performance incentives listed above for certain measures and/or applications where the prescriptive value is within the equivalent performance incentive range.
3. The Company may establish incentive tiers and/or incentive block structures within the performance incentives listed above for different end use technology or sub-measures (lighting, HVAC, etc.).
4. Unless otherwise stated, rebates will be limited by the project or equipment cost, where applicable.



## Appendix C-4

### PUCO 1: Portfolio Summary of Lifetime Costs and Benefits

<b>Toledo Edison</b> <b>Portfolio Summary of Lifetime Costs and Benefits</b> <b>Net Lifetime Benefits, and TRC per the California Standard Practice Manual</b>					
<b>Portfolio</b>	<b>Discount Rate</b>	<b>Total Discounted Lifetime Costs (\$000) <sup>1</sup></b>	<b>Total Discounted Lifetime Benefits (\$000)</b>	<b>Total Discounted Net Lifetime Benefits (\$000)</b>	<b>Cost- Benefit Ratio (TRC)</b>
<b>Residential (inclusive of Low- Income)</b>	8.48%	29,283	44,253	14,970	1.5
<b>Small Enterprise</b>	8.48%	43,888	67,959	24,071	1.5
<b>Mercantile</b>	8.48%	243	23,073	22,830	94.8
<b>Mercantile-Utility (Large Enterprise)</b>	8.48%	30,874	42,974	12,100	1.4
<b>Governmental</b>	8.48%	62	169	107	2.7
<b>Other</b>	8.48%	14	-	(14)	N/A
<b>Total</b>	<b>8.48%</b>	<b>104,364</b>	<b>178,428</b>	<b>74,064</b>	<b>1.7</b>

1. Includes certain costs outside of Plan budgets according to the Stipulated ESPIV.

## Appendix C-4

### PUCO 2: Summary of Portfolio Energy and Demand Savings

Toledo Edison Summary of Portfolio Energy and Demand Savings						
MWh Saved for Consumption Reductions kW Saved for Peak Load Reductions	Program Year 2017		Program Year 2018		Program Year 2019	
	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>	MWh Saved	KW Saved <sup>1</sup>
Residential Sector (inclusive of Low- Income) - Cumulative Projected Portfolio Savings	52,685	7,671	100,329	14,075	145,616	20,307
Small Enterprise - Cumulative Projected Portfolio Savings	38,556	6,300	86,498	13,679	134,581	21,036
Mercantile - Cumulative Projected Portfolio Savings	20,360	2,477	40,719	4,955	61,079	7,432
Mercantile-Utility (Large Enterprise) - Cumulative Projected Portfolio Savings	26,628	205,097	53,588	208,965	82,339	213,107
Government Sector - Cumulative Projected Portfolio Savings	18	2	36	4	53	7
Other - Cumulative Projected Portfolio Savings	70	8	1,520	174	2,970	339
<b>Portfolio Plan Total - Cumulative Projected Savings</b>	<b>138,316</b>	<b>221,555</b>	<b>282,690</b>	<b>241,851</b>	<b>426,638</b>	<b>262,228</b>
Cumulative Results projected through 2016 (Appendix A-2)	747,057	125,935	747,057	125,935	747,057	125,935
<b>Total Cumulative Projected Savings</b>	<b>885,373</b>	<b>347,490</b>	<b>1,029,747</b>	<b>367,786</b>	<b>1,173,695</b>	<b>388,163</b>
SB 310 Target (Table 3)	545,215	115,500	650,169	130,200	759,146	145,000
% (Over / Under)	162%	301%		282%	155%	268%

1. Includes coincident peak demand reductions for energy efficiency and excludes interruptible demand reductions achieved in previous years.

## Appendix C-4

### PUCO 3: Summary of Portfolio Costs

Toledo Edison Summary of Portfolio Costs			
	Program Year 2013	Program Year 2014	Program Year 2015
	Portfolio Budget (\$)	Portfolio Budget (\$)	Portfolio Budget (\$)
Residential Portfolio (inclusive of Low-Income) Annual Budget	6,475,144	6,125,099	6,363,657
Small Enterprise Portfolio Annual Budget	7,363,638	8,092,193	8,154,663
Mercantile Portfolio Annual Budget	95,642	83,235	83,457
Mercantile-Utility (Large Enterprise) Portfolio Annual Budget	5,020,897	4,408,404	4,667,017
Government Portfolio Annual Budget	23,280	16,893	17,122
Other Portfolio Annual Budget	5,000	5,000	5,000
<b>Total Portfolio Annual Budget</b>	<b>18,983,600</b>	<b>18,730,824</b>	<b>19,290,916</b>

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PUCO 4: Program Summaries

Toledo Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Residential Portfolio Programs (inclusive of Low Income)		X	Residential Demand Response Program	Res	The program consists of a customer having their central air conditioning compressor cycled during summer peak load periods.	-	2,032	0.0%
	X		Appliance Turn In Program	Res	This program provides rebates and removal and recycle services to consumers for turning in working appliances.	149,551	26,784	13.3%
	X		Energy Efficient Products Program	Res	This program promotes the purchase of energy efficient products, such as HVAC equipment, appliances, lighting, home electronics and other energy saving home products, through consumer rebates or incentives and support to retailers and manufacturers.	474,373	60,696	42.2%
	X		Energy Efficient Homes Program	Res	This program provides customers with energy efficiency education and awareness along with measures and incentives to improve energy efficiency of homes.	275,353	38,831	24.5%
	X		Low Income Energy Efficiency Program	LI Res	The low-income program provides weatherization services, home audits and installation of energy efficiency measures for low-income customers under the Community Connections sub program. The program also provides incentives for the construction of new energy efficient housing or major rehabilitation of existing housing for low-income customers.	25,371	3,030	2.3%
	X		Customer Action Program - Res	Res	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	198,772	22,691	17.7%
	Total for Plan					1,123,420	154,063	25.2%

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PUCO 4: Program Summaries

Toledo Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Small Enterprise	X		C&I Energy Solutions for Business Program - Small	Small C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized processes, applications or end uses to higher efficiency processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	1,484,472	247,143	96.3%
	X		Customer Action Program - SCI	Small C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	56,237	6,420	3.7%
	Total for Plan					1,540,709	253,563	34.6%

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PUCO 4: Program Summaries

Toledo Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Mercantile	X		Mercantile Customer Program	Large C&I	Captures energy efficiency and peak demand reduction projects committed to the Company by Mercantile customers as provided for by O.R.C. 4928.01 and 4928.66	610,792	74,318	100.0%
	Total for Plan					610,792	74,318	13.7%
Mercantile-Utility (Large Enterprise)		X	C&I Demand Response Program - Large	Large C&I	The program captures load curtailment and curtailable capacity from the Companies' Interruptible Load Program (Economic Load Response Rider) and from additional demand resources including resources participating in the PJM market or through contracts for demand response attributes with customers or PJM CSPs.	-	603,903	0.0%
	X		C&I Energy Solutions for Business Program - Large	Large C&I	This program provides measures and financial incentives (prescriptive & performance) to small commercial and industrial customers, including small government and institutional customers, to purchase qualifying high efficiency measures, recycle inefficient appliances, retrofit specialized equipment, processes, applications or end uses to higher efficiency equipment, processes, applications and end-uses, complete qualifying high efficiency building shell or system improvements, to complete an audit with qualifying audit installations or recommendations and to achieve energy savings by adapting energy saving behaviors through energy management strategies.	1,116,542	162,456	98.3%
	X		Customer Action Program - LCI	Large C&I	The program captures energy savings and peak demand reductions achieved through actions taken by customers outside of utility-administered programs pursuant to R.C. 4928.662	19,712	2,250	1.7%
	Total for Plan					1,136,254	768,609	25.5%

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PUCO 4: Program Summaries

Toledo Edison Program Summaries								
	EE Program (check box)	PDR Program (check box)	Program Name	Program Market	Program Two Sentence Summary	Net Lifetime MWh Savings	Net Peak Demand kW Savings	Percentage of Portfolio and Total Lifetime MWh savings %
Government Portfolio Programs	X		Government Tariff Lighting Program	Gov't	The program provides financial incentives and support to customers for implementing energy efficient street lighting or traffic lighting technologies on customer owned and maintained installations.	533	67	100.0%
	Total for Plan					533	67	0.0%
Other	X		Transmission & Distribution Upgrades	T&D	Capture savings achieved through various T&D projects that reduce line losses, which in turn results in a more efficient delivery system.	44,550	5,086	100.0%
	X		Smart Grid Modernization Initiative	T&D	Captures energy savings from the project to produce an integrated system of protection, performance, efficiency and economy that extends across the energy delivery system.	-	-	0.0%
	X		Energy Special Improvement District	T&D	Incorporation of State Legislation that permits Ohio townships and municipalities to create Energy Special Improvement Districts offering constituents Property Assessed Clean Energy (PACE) financing for qualifying energy efficiency	-	-	0.0%
	Total for Plan					44,550	5,086	1.0%

## Appendix C-4

### PUCO 5: Budget and Parity Analysis Summary

Toledo Edison						
Customer Class	3 Year Budget	% of Total EDC Budget	% of Total Budget of Customer Programs	2015 Revenue by Customer Class	% of Total Customer Revenue	Difference
Residential <i>(inclusive of Low-Income)</i>	18,963,900					
<b>Residential Subtotal</b>	18,963,900	33.3%	33.3%	209,191,299	46.6%	-13%
Small Enterprise	23,610,494					
<b>Small Enterprise Total</b>	23,610,494	41.4%	41.4%	118,719,096	26.4%	15%
Mercantile-Utility (Large Enterprise)	14,096,318					
Mercantile	262,334					
<b>Mercantile Subtotal</b>	14,358,652	25.2%	25.2%	112,943,625	25.2%	0%
Government	57,294	0.1%	0.1%	8,031,295	1.8%	-2%
Other	15,000	0.0%	0.0%			
<b>EDC TOTAL</b>	<b>57,005,340</b>	<b>100%</b>	<b>100%</b>	<b>448,885,315</b>	<b>100%</b>	



## Appendix C-4

### PUCO 5A: Energy Savings and Parity Analysis Summary

Toledo Edison						
Customer Class	3 Year Cumulative Energy Savings (MWh)	% of Total EDC Energy Savings	% of Total Energy Savings of Customer Programs	2011 Sales by Customer Class (MWh)	% of Total Customer Sales	Difference
Residential	145,616	34.1%				
<b>Residential Subtotal</b>	145,616	34.1%	34.1%	2,468,896	23.6%	11%
Small Enterprise	134,581	31.5%				
<b>Small Enterprise Total</b>	134,581	31.5%	31.5%	1,975,314	18.9%	13%
Mercantile-Utility (Large Enterprise)	82,339	19.3%				
Mercantile	61,079	14.3%				
<b>Mercantile Subtotal</b>	143,418	33.6%	33.6%	5,958,835	57.0%	-23%
Government	53	0.0%	0.0%	51,466	0.5%	0%
Other	2,970	0.7%	0.7%			
<b>EDC TOTAL</b>	<b>426,638</b>	<b>100%</b>	<b>100%</b>	<b>10,454,511</b>	<b>100%</b>	

## Appendix C-4

### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Toledo Edison			
Residential Portfolio (including Low-Income)			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
<b>Peak Demand Reduction Programs</b>			
Residential Demand Response Program	0	147,635	147,635
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>147,635</b>	<b>147,635</b>
<b>Energy Efficiency Programs</b>			
Appliance Turn In Program	660,741	2,210,981	2,871,722
Energy Efficient Products Program	3,738,228	1,370,342	5,108,570
Energy Efficient Homes Program	5,539,125	3,852,923	9,392,048
Low Income Energy Efficiency Program	7,526	274,586	282,112
Customer Action Program - Res	0	215,452	215,452
<b>EE Program Subtotal</b>	<b>9,945,620</b>	<b>7,924,285</b>	<b>17,869,904</b>
<b>Totals</b>	<b>9,945,620</b>		<b>9,945,620</b>

Toledo Edison			
Small Enterprise			
EE&C Program	Cost Elements (\$)		
	Total Incentives	Operations Costs	Total Budget (2017-2019)
C&I Energy Solutions for Business Program - Small	14,163,238	8,623,058	22,786,296
Customer Action Program - SCI	0	227,427	227,427
<b>Totals</b>	<b>14,163,238</b>	<b>8,850,485</b>	<b>23,013,723</b>

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### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Toledo Edison Mercantile			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Mercantile Customer Program	0	178,840	178,840
<b>Totals</b>	<b>0</b>	<b>178,840</b>	<b>178,840</b>

Toledo Edison Mercantile Utility (Large Enterprise)			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
<b>Peak Demand Reduction Programs</b>			
C&I Demand Response Program - Large	0	600	600
<b>Peak Demand Reduction Program Subtotal</b>	<b>0</b>	<b>600</b>	<b>600</b>
<b>Energy Efficiency Programs</b>			
C&I Energy Solutions for Business Program - Large	6,544,675	5,807,352	12,352,026
Customer Action Program - LCI	0	125,434	125,434
<b>EE Program Subtotal</b>	<b>6,544,675</b>	<b>5,932,786</b>	<b>12,477,461</b>
<b>Totals</b>	<b>6,544,675</b>	<b>5,933,386</b>	<b>12,478,061</b>

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### PUCO 6A: Portfolio-Specific Assignment of EE&C Costs

Toledo Edison Government			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Government Tariff Lighting Program	10,800	31,255	42,055
<b>Totals</b>	<b>10,800</b>	<b>31,255</b>	<b>42,055</b>

Toledo Edison Other			
EE&C Program	Cost Elements (\$)		
	<i>Total Incentives</i>	<i>Operations Costs</i>	<i>Total Budget (2017-2019)</i>
Transmission & Distribution Upgrades	0	0	0
Smart Grid Modernization Initiative	0	0	0
Energy Special Improvement District	0	0	0
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>0</b>

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PUCO 6B: Allocation of Common Costs to Applicable Customer Sector

Toledo Edison										
Common Cost Element	EE Program (check box)	PDR Program (check box)	Total Cost (\$)	Basis for Cost Allocation	Class Cost Allocaton (\$)					
					Residential (Including Low-Income)	Small Enterprise (Small C&I)	Mercantile	Mercantile-Utility (Large C&I)	Other	Government
Utility Administration	X	X	\$1,637,412	FERC Form 1 Sales	\$513,343	\$284,026	\$39,738	\$778,051	\$15,000	\$7,253
Tracking and Reporting	X	X	\$721,031	FERC Form 1 Sales	\$194,275	\$136,749	\$19,133	\$367,383	\$0	\$3,492
Other	X	X	\$916,680	FERC Form 1 Sales	\$238,743	\$175,996	\$24,624	\$472,823	\$0	\$4,494
Totals			\$3,275,123		\$946,361	\$596,771	\$83,494	\$1,618,257	\$15,000	\$15,240

## Appendix C-4

### PUCO 6C: Summary of Portfolio EE&C Costs

Toledo Edison	Total Sector Portfolio-specific Costs	Total Common Costs	Total of All Costs
Residential (Including Low-Income)	\$9,945,620	\$946,361	\$10,891,980
Small Enterprise	\$23,013,723	\$596,771	\$23,610,494
Mercantile	\$178,840	\$83,494	\$262,334
Mercantile-Utility (Large Enterprise)	\$12,478,061	\$1,618,257	\$14,096,318
Other	\$0	\$15,000	\$15,000
Government	\$42,055	\$15,240	\$57,294
<b>Totals</b>	<b>\$45,658,298</b>	<b>\$3,275,123</b>	<b>\$48,933,421</b>

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PUCO 7A-B: TRC Benefits Table - Residential

Residential (inclusive of Low- Income)	Toledo Edison TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Residential Demand Response Program	2017		54	49			684		0	
	2018		54	62			677		0	
	2019		55	74			670		0	
	Total	1.1	150	168	168	-		2,032		0
Appliance Turn In Program	2017		811	339			1,288		6,125	
	2018		780	734			2,577		12,249	
	2019		835	1,219			3,971		18,874	
	Total	3.0	2,240	6,781	2,230	4,551		26,784		149,551
Energy Efficient Products Program	2017		4,160	662			1,699		13,419	
	2018		4,307	1,412			3,422		27,059	
	2019		4,432	2,206			5,076		39,833	
	Total	1.4	11,896	16,889	4,373	12,516		60,696		474,373
Energy Efficient Homes Program	2017		3,623	999			2,528		20,273	
	2018		3,325	1,647			5,056		40,546	
	2019		3,503	2,422			7,700		61,673	
	Total	1.2	9,665	11,760	3,143	8,617		38,831		275,353
Low Income Energy Efficiency Program	2017		1,509	51			123		1,050	
	2018		1,484	108			246		2,100	
	2019		1,485	171			369		3,151	
	Total <sup>3</sup>	0.2	4,139	1,019	248	771		3,030		25,371
Customer Action Program - Res	2017		624	562			1,349		11,818	
	2018		383	916			2,098		18,374	
	2019		254	1,159			2,521		22,086	
	Total	6.4	1,193	7,636	1,616	6,020		22,691		198,772
Total		1.5	29,283	44,253	11,779	32,475	154,063		1,123,420	
1:     Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2:     The on and off peak energy costs are combined in a sum of avoided energy costs.										
3:     Includes cost for the OPAE Community Connections program according to the Stipulated ESPIV.										

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PUCO 7C: TRC Benefits Table - Small Enterprise

Small Enterprise	Toledo Edison TRC Benefits By Program Per Year (\$000)																	
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved									
							Annual	Lifetime	Annual	Lifetime								
C&I Energy Solutions for Business Program - Small	2017		14,702	2,298			6,135		37,114									
	2018		16,083	5,380			13,350		83,614									
	2019		16,377	8,420			20,542		130,255									
	Total	1.5	43,588	66,040	17,743	39,255	247,143	1,484,472										
Customer Action Program - SCI	2017		94	69			165		1,442									
	2018		93	145			329		2,884									
	2019		93	229			494		4,326									
	Total	7.4	259	1,919	413	1,506	6,420	56,237										
Total <sup>3</sup>							43,888		67,959		18,156		40,761		253,563		1,540,709	
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.																		
2: The on and off peak energy costs are combined in a sum of avoided energy costs.																		
3: Includes cost for the COSE Ohio Energy Efficiency Program and Administrator payments, and the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.																		



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PUCO 7D: TRC Benefits Table - Mercantile

Mercantile	Toledo Edison TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Mercantile Customer Program	2017		96	984			2,477		20,360	
	2018		83	2,079			4,955		40,719	
	2019		83	3,300			7,432		61,079	
	Total	94.8	243	23,073			5,721		17,352	
Total		94.8	243	23,073	5,721	17,352		74,318		610,792
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

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PUCO 7E: TRC Benefits Table - Mercantile Utility (Large Enterprise)

Mercantile Utility (Large Enterprise)	Toledo Edison TRC Benefits By Program Per Year (\$000)									
Program	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
C&I Demand Response Program - Large	2017		5				201,301		0	
	2018		5				201,301		0	
	2019		5				201,301		0	
	Total	N/A	14					603,903		0
C&I Energy Solutions for Business Program - Large	2017		10,924	1,407			3,715		25,924	
	2018		10,465	2,986			7,531		52,429	
	2019		11,372	4,846			11,633		80,822	
	Total	1.4	30,234	42,300	11,260	28,210		162,456		1,116,542
Customer Action Program - LCI	2017		219	33			80		704	
	2018		174	58			132		1,159	
	2019		158	79			173		1,516	
	Total	1.3	513	674	144	530		2,250		19,712
Total <sup>3</sup>							768,609		1,136,254	
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										
3: Includes cost for the AICUO Efficiency Resource Program and Administrator payments according to the Stipulated ESPIV.										

Appendix C-4

PUCO 7F: TRC Benefits Table - Government

Government	Toledo Edison TRC Benefits By Program Per Year (\$000)									
Program		TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Government Tariff Lighting Program	2017		26	8			2		18	
	2018		20	17			4		36	
	2019		20	25			7		53	
	Total	2.7	62	169	5	14		67		533
Total	2.7	62	169	5	14	67		533		
1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.										
2: The on and off peak energy costs are combined in a sum of avoided energy costs.										

Appendix C-4

PUCO 7G: TRC Benefits Table - Other

Other	Toledo Edison TRC Benefits By Program Per Year (\$000)									
	Program Year	TRC	Program Costs	Program Benefits	Capacity Benefits	Energy Benefits	Load Reductions in kW		MWh Saved	
							Annual	Lifetime	Annual	Lifetime
Transmission & Distribution Upgrades	2017		5				8		70	
	2018		5				174		1,520	
	2019		5				339		2,970	
	<i>Total</i>	<i>N/A</i>	<b>14</b>					<b>5,086</b>		<b>44,550</b>
Smart Grid Modernization Initiative	2017		-	-	-	-	0		0	
	2018		-	-	-	-	0		0	
	2019		-	-	-	-	0		0	
	<i>Total</i>	<i>N/A</i>	-	-	-	-		<b>0</b>		<b>0</b>
Energy Special Improvement District	2017		-	-	-	-	0		0	
	2018		-	-	-	-	0		0	
	2019		-	-	-	-	0		0	
	<i>Total</i>	<i>N/A</i>	-	-	-	-		<b>0</b>		<b>0</b>
<b>Total</b>		<b>0.0</b>	<b>14</b>	-	-	-		<b>5,086</b>		<b>44,550</b>
<p>1: Generation, Transmission and Distribution Capacity costs are combined in a sum of avoided capacity costs.</p> <p>2: The on and off peak energy costs are combined in a sum of avoided energy costs.</p>										

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## **Appendix D: Market Potential Study**



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# **FirstEnergy Ohio Operating Companies Market Potential Study**

APRIL 2016

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**Harbourfront Group, Inc.**  
551 North Country Road, Suite 201 | St James NY 11780  
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## 1.0 EXECUTIVE SUMMARY

The following report presents the results of an Energy Efficiency and Peak Demand Reduction Market Potential Study (hereinafter referred to as the “Market Study”) that was conducted by Harbourfront Group, Inc. (“Harbourfront”) for the three FirstEnergy Ohio operating companies, Ohio Edison Company (“OE” or “Ohio Edison”), The Cleveland Electric Illuminating Company (“CEI” or “The Illuminating Company”) and The Toledo Edison Company (“TE” or “Toledo Edison”) (hereinafter collectively referred to as the “Companies”). The Market Study is an important tool used to help inform and design the Companies’ 2017-2019 Energy Efficiency and Peak Demand Reduction Plan (hereinafter referred to as “EEPDR”) ultimately required under Ohio law.<sup>1</sup> The Harbourfront study team worked with Company staff during the development of this Market Study, the results of which were used by the Companies when developing their 2017-2019 Energy Efficiency and Peak Demand Reduction Plans (“Proposed Plans”).

Two scenarios were examined in this Market Study: 1) a Base Case that assumes a standard package of program incentives adopted by those customers who indicated through surveys that they had a high level of interest in participating in such programs; and 2) a High Case that assumes a more aggressive package of program incentives and marketing to draw in additional customers who indicated through the same surveys that they would “consider” participating in such programs. In the High Case, utility costs and incentives are increased to reflect the additional effort required to obtain the higher participation levels. Both scenarios produce cost effective portfolios based on a review of the Total Resource Cost (“TRC”) test. And, under both scenarios, sufficient market potential exists for the Companies to achieve the EEPDR levels as set forth in the Proposed Plans.

Harbourfront calculated the maximum technical potential based on a top-down approach that builds on end-use intensities (“EUIs”) and unit energy consumptions (“UECs”) presented in Sections 8.3. The total maximum technical potential was estimated to be approximately 37.5% of current kWh consumption. This represents the weighted average of the three utility customer classes: Residential; Commercial; and Industrial.

The Base Case results from the Market Study reveal an achievable potential for energy efficiency-related reductions over a base case annual energy forecast of 26.4% for OE, 21.9% for TE and 23.7% for CEI by 2031. The High Case results from the Market Study reveal an achievable potential for energy reductions of 33.0% for OE, 26.6% for TE and 28.8% for CEI during this same time period. These achievable potential estimates are the result of a careful analysis of commercially viable technologies, stated customer intentions as gathered from statistically valid surveys, and cost effectiveness testing. The percentage savings values shown above represent a best estimate, by Company, of EEPDR market potential based on currently available information. It is possible that, during the process of program design and initial implementation, some of these estimates may change as more information becomes available. Moreover, because these calculations forecast 15

<sup>1</sup> On September 12, 2014, Substitute S.B. 310 (“S.B. 310”) became effective, revising, among other things, Chapter 4928 of the Ohio Revised Code (“R.C.”). The amendment included the revision of the statutory percentage benchmark reductions in energy consumption and peak demand originally established in Am. Sub S.B. 221 (“S.B. 221”). These benchmarks are set forth in R.C. 4928.66(A)(1)(a) and (b). For the period January 1, 2017 through December 31, 2019 (“Plan Period”), the Companies are required to achieve incremental annual savings of one percent of the baseline and are required to achieve peak demand reductions based on an additional seventy-five hundredths of one percent reduction from the 2016 requirements.

years into the future, it is anticipated that technologies will evolve over time that will impact the projections. This Market Study is based upon laws currently in effect and did not anticipate or assume any potential changes to standards or other Federal or State statutory requirements. Finally, because of the difficulty in projecting with any certainty the number of customers who may elect to opt-out of participation in the programs as allowed by R.C. 4928.66, the Market Study also assumed there would be none. As opt-outs occur, they will reduce Achievable Potential, but will also have a corresponding reduction in the Companies' EEPDR statutory mandates.

The potential savings resulting from Transmission and Distribution (T&D) upgrades are not included in this Market Study.

Table 1-1 through Table 1-9 demonstrate the results of the Market Study in terms of its impact on energy and peak savings that the Achievable Cumulative Potential Energy and Peak savings (in MWh and percent and MW and percent, respectively) would have on the Companies' forecasts, in each year over the period 2017-2031. Table 1-1 through Table 1-3 are for OE, Table 1-4 through Table 1-6 are for CEI, and Table 1-7 through Table 1-9 are for TE.

The Achievable Cumulative Potential MWh and MW results are compared against the baseline forecast to arrive at the Achievable Cumulative Potential percentage savings each year.



Table 1-1: State Energy Efficiency Mandates and Achievable Potential OE-Base Case

Year	Mandates Cumulative (%)	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	24,288,362	1,262,995	1,917,441	7.9%
2018	6.2%	23,278,651	1,495,781	2,305,936	9.9%
2019	7.2%	22,437,475	1,720,156	2,703,460	12.0%
2020	8.2%	21,739,519	1,937,551	3,061,913	14.1%
2021	10.2%	21,506,883	2,367,689	3,468,677	16.1%
2022	12.2%	21,264,911	2,792,987	3,664,178	17.2%
2023	14.2%	21,057,418	3,214,135	3,859,680	18.3%
2024	16.2%	20,940,477	3,632,945	4,055,181	19.4%
2025	18.2%	20,849,207	4,049,929	4,250,683	20.4%
2026	20.2%	20,770,035	4,465,330	4,446,185	21.4%
2027	22.2%	20,698,205	4,879,294	4,641,686	22.4%
2028		20,636,761	4,879,294	4,837,188	23.4%
2029		20,590,901	4,879,294	5,032,689	24.4%
2030		20,558,284	4,879,294	5,228,191	25.4%
2031		20,529,257	4,879,294	5,423,692	26.4%

Source: Harbourfront Model

Table 1-2: State Energy Efficiency Mandates and Achievable Potential OE-High Case

Year	Mandates Cumulative (%)	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	24,288,362	1,262,995	2,026,407	8.3%
2018	6.2%	23,242,328	1,495,418	2,523,868	10.9%
2019	7.2%	22,328,509	1,718,703	3,030,359	13.6%
2020	8.2%	21,521,587	1,933,919	3,497,751	16.3%
2021	10.2%	21,179,993	2,357,519	4,013,024	18.9%
2022	12.2%	20,829,216	2,774,103	4,258,571	20.4%
2023	14.2%	20,532,558	3,184,754	4,504,118	21.9%
2024	16.2%	20,346,084	3,591,676	4,749,665	23.3%
2025	18.2%	20,204,769	3,995,771	4,995,212	24.7%
2026	20.2%	20,075,552	4,397,282	5,240,759	26.1%
2027	22.2%	19,953,676	4,796,356	5,486,306	27.5%
2028		19,842,187	4,796,356	5,731,852	28.9%
2029		19,746,281	4,796,356	5,977,399	30.3%
2030		19,663,619	4,796,356	6,222,946	31.6%
2031		19,584,547	4,796,356	6,468,493	33.0%

Source: Harbourfront Model

Table 1-3: State Peak Demand Reduction Mandates and Achievable Reductions OE-Base and High Cases

Year	Baseline Peak Forecast (MW)	State Peak Reduction Mandate (%)	Achievable Base Case Peak Reduction (MW)	Achievable High Case Peak Reduction (MW)	Achievable Base Case Peak Reduction (%)	Achievable High Case Peak Reduction (%)
2017	5,164	5.50%	289	307	5.6%	5.9%
2018	5,236	6.25%	350	386	6.7%	7.4%
2019	5,243	7.00%	411	466	7.8%	8.9%
2020	5,260	7.75%	469	542	8.9%	10.3%
2021	5,293		532	623	10.0%	11.8%
2022	5,319		561	659	10.5%	12.4%
2023	5,367		590	695	11.0%	12.9%
2024	5,430		619	731	11.4%	13.5%
2025	5,489		648	767	11.8%	14.0%
2026	5,542		677	803	12.2%	14.5%
2027	5,584		706	839	12.6%	15.0%
2028	5,619		735	875	13.1%	15.6%
2029	5,654		764	912	13.5%	16.1%
2030	5,689		794	948	13.9%	16.7%
2031	5,725		823	984	14.4%	17.2%

Source: Harbourfront Model

Table 1-4: State Energy Efficiency Mandates and Achievable Potential CEI-Base Case

Year	Mandates Cumulative (%)	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	18,534,041	963,770	1,480,965	8.0%
2018	6.2%	17,951,339	1,143,284	1,774,356	9.9%
2019	7.2%	17,367,109	1,316,955	2,073,393	11.9%
2020	8.2%	16,738,438	1,484,339	2,317,785	13.8%
2021	10.2%	16,488,777	1,814,115	2,613,581	15.9%
2022	12.2%	16,253,764	2,139,190	2,731,893	16.8%
2023	14.2%	16,087,726	2,460,944	2,850,205	17.7%
2024	16.2%	15,995,085	2,780,846	2,968,516	18.6%
2025	18.2%	15,962,866	3,100,103	3,086,828	19.3%
2026	20.2%	15,947,694	3,419,057	3,205,140	20.1%
2027	22.2%	15,942,003	3,737,897	3,323,451	20.8%
2028		15,944,576	3,737,897	3,441,763	21.6%
2029		15,960,453	3,737,897	3,560,074	22.3%
2030		15,985,325	3,737,897	3,678,386	23.0%
2031		16,011,064	3,737,897	3,796,698	23.7%

Source: Harbourfront Model

Table 1-5: State Energy Efficiency Mandates and Achievable Potential CEI-High Case

Year	Mandates Cumulative (%)	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	18,534,041	963,770	1,550,723	8.4%
2018	6.2%	17,928,086	1,143,051	1,913,873	10.7%
2019	7.2%	17,297,350	1,316,024	2,282,668	13.2%
2020	8.2%	16,598,921	1,482,014	2,596,793	15.6%
2021	10.2%	16,279,510	1,807,604	2,962,047	18.2%
2022	12.2%	15,974,847	2,127,101	3,109,791	19.5%
2023	14.2%	15,752,602	2,442,153	3,257,535	20.7%
2024	16.2%	15,617,188	2,754,497	3,405,279	21.8%
2025	18.2%	15,555,535	3,065,607	3,553,023	22.8%
2026	20.2%	15,510,931	3,375,826	3,700,767	23.9%
2027	22.2%	15,475,808	3,685,342	3,848,511	24.9%
2028		15,448,949	3,685,342	3,996,255	25.9%
2029		15,435,394	3,685,342	4,143,999	26.8%
2030		15,430,834	3,685,342	4,291,742	27.8%
2031		15,427,140	3,685,342	4,439,486	28.8%

Source: Harbourfront Model

Table 1-6: State Peak Demand Reduction Mandates and Achievable Reductions CEI-Base and High Cases

Year	Baseline Peak Forecast (MW)	State Peak Reduction Mandate (%)	Achievable Base Case Peak Reduction (MW)	Achievable High Case Peak Reduction (MW)	Achievable Base Case Peak Reduction (%)	Achievable High Case Peak Reduction (%)
2017	3,900	5.50%	224	237	5.7%	6.1%
2018	3,954	6.25%	272	297	6.9%	7.5%
2019	3,972	7.00%	320	357	8.0%	9.0%
2020	4,004	7.75%	361	411	9.0%	10.3%
2021	4,043	7.75%	409	472	10.1%	11.7%
2022	4,081	7.75%	428	495	10.5%	12.1%
2023	4,117	7.75%	447	518	10.9%	12.6%
2024	4,160	7.75%	466	542	11.2%	13.0%
2025	4,202	7.75%	485	565	11.5%	13.5%
2026	4,239	7.75%	504	589	11.9%	13.9%
2027	4,267	7.75%	523	612	12.3%	14.3%
2028	4,292		542	636	12.6%	14.8%
2029	4,317		561	659	13.0%	15.3%
2030	4,342		580	683	13.4%	15.7%
2031	4,368		599	706	13.7%	16.2%

Source: Harbourfront Model

Table 1-7: State Energy Efficiency Mandates and Achievable Potential TE-Base Case

Year	Mandates Cumulative %	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	10,526,035	547,354	755,346	7.2%
2018	6.2%	10,302,696	650,381	906,467	8.8%
2019	7.2%	10,074,334	751,124	1,060,158	10.5%
2020	8.2%	9,783,821	848,962	1,186,945	12.1%
2021	10.2%	9,701,474	1,042,992	1,340,994	13.8%
2022	12.2%	9,607,611	1,235,144	1,415,428	14.7%
2023	14.2%	9,530,145	1,425,747	1,489,863	15.6%
2024	16.2%	9,479,718	1,615,341	1,564,298	16.5%
2025	18.2%	9,476,047	1,804,862	1,638,733	17.3%
2026	20.2%	9,477,939	1,994,421	1,713,168	18.1%
2027	22.2%	9,482,703	2,184,075	1,787,603	18.9%
2028		9,491,196	2,184,075	1,862,037	19.6%
2029		9,504,279	2,184,075	1,936,472	20.4%
2030		9,521,363	2,184,075	2,010,907	21.1%
2031		9,540,746	2,184,075	2,085,342	21.9%

Source: Harbourfront Model

Table 1-8: State Energy Efficiency Mandates and Achievable Potential TE-High Case

Year	Mandates Cumulative %	Baseline Forecast (MWh)	State Mandate Cumulative Reduction (MWh)	EE Achievable Cumulative Potential (MWh)	EE Achievable Cumulative Potential (%)
2017	5.2%	10,526,035	547,354	791,492	7.5%
2018	6.2%	10,290,648	650,260	978,760	9.5%
2019	7.2%	10,038,187	750,642	1,168,596	11.6%
2020	8.2%	9,711,528	847,757	1,331,504	13.7%
2021	10.2%	9,593,044	1,039,618	1,521,530	15.9%
2022	12.2%	9,463,099	1,228,880	1,614,326	17.1%
2023	14.2%	9,355,481	1,415,990	1,707,122	18.2%
2024	16.2%	9,280,821	1,601,606	1,799,917	19.4%
2025	18.2%	9,258,789	1,786,782	1,892,713	20.4%
2026	20.2%	9,242,320	1,971,628	1,985,509	21.5%
2027	22.2%	9,228,722	2,156,203	2,078,305	22.5%
2028		9,218,855	2,156,203	2,171,101	23.6%
2029		9,213,577	2,156,203	2,263,896	24.6%
2030		9,212,300	2,156,203	2,356,692	25.6%
2031		9,213,322	2,156,203	2,449,488	26.6%

Source: Harbourfront Model



Table 1-9: State Peak Demand Reduction Mandates and Achievable Reductions TE-Base and High Cases

Year	Baseline Peak Forecast (MW)	State Peak Reduction Mandate (%)	Achievable Base Case Peak Reduction (MW)	Achievable High Case Peak Reduction (MW)	Achievable Base Case Peak Reduction (%)	Achievable High Case Peak Reduction (%)
2017	2,260	5.50%	124	129	5.5%	5.7%
2018	2,266	6.25%	147	158	6.5%	7.0%
2019	2,282	7.00%	170	188	7.5%	8.2%
2020	2,295	7.75%	191	214	8.3%	9.3%
2021	2,309	7.75%	214	243	9.3%	10.5%
2022	2,319	7.75%	225	256	9.7%	11.0%
2023	2,328	7.75%	236	270	10.1%	11.6%
2024	2,339	7.75%	247	283	10.6%	12.1%
2025	2,354	7.75%	258	297	11.0%	12.6%
2026	2,371	7.75%	269	310	11.3%	13.1%
2027	2,388	7.75%	280	323	11.7%	13.5%
2028	2,406		291	337	12.1%	14.0%
2029	2,424		302	350	12.4%	14.4%
2030	2,444		312	364	12.8%	14.9%
2031	2,464		323	377	13.1%	15.3%

Source: Harbourfront Model

Figure 1-1 EEPDR Affected Sales Forecast (Base Case–High Case) – OE

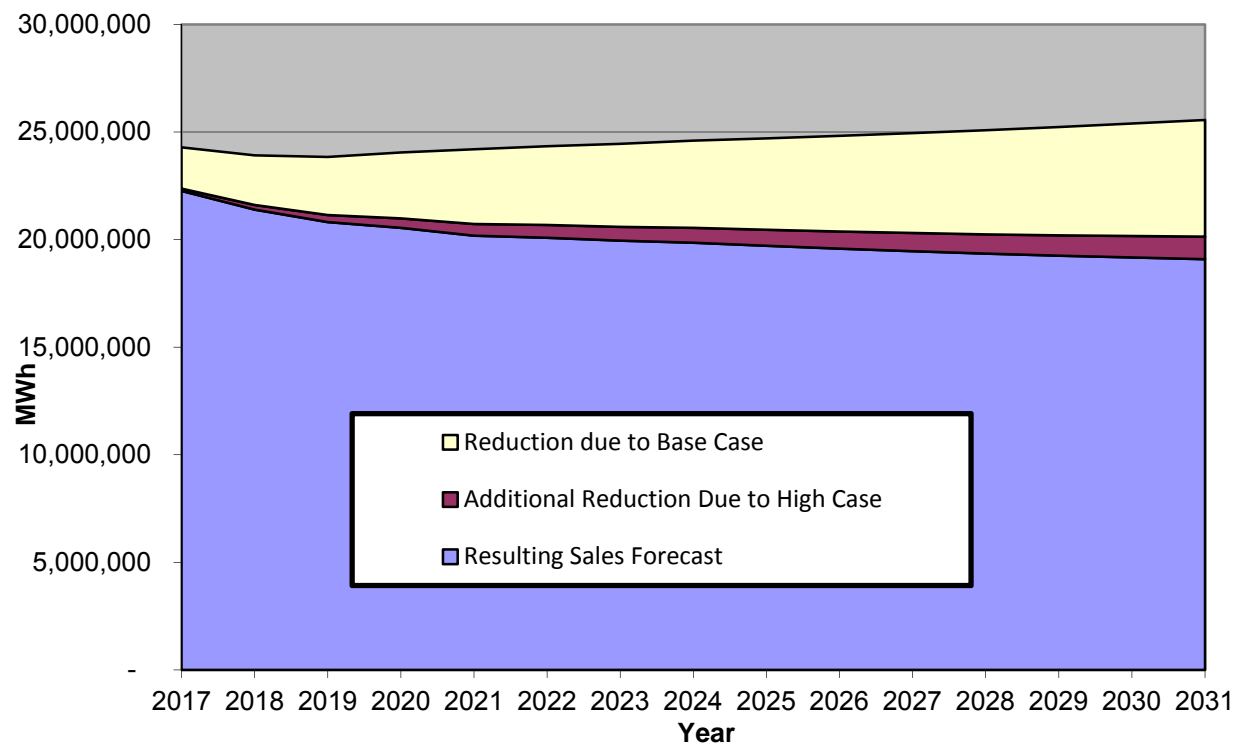


Figure 1-2 EEPDR Affected Sales Forecast (Base Case–High Case) – CEI

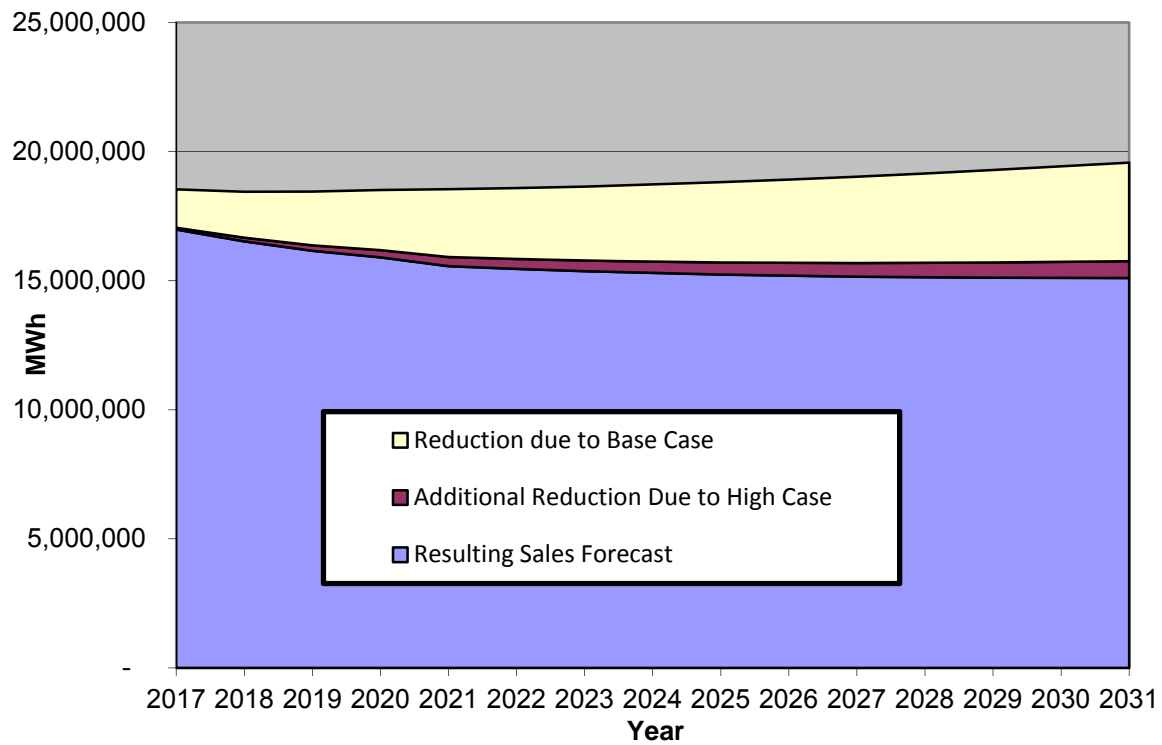


Figure 1-3 EEPDR Affected Sales Forecast (Base Case–High Case) – TE

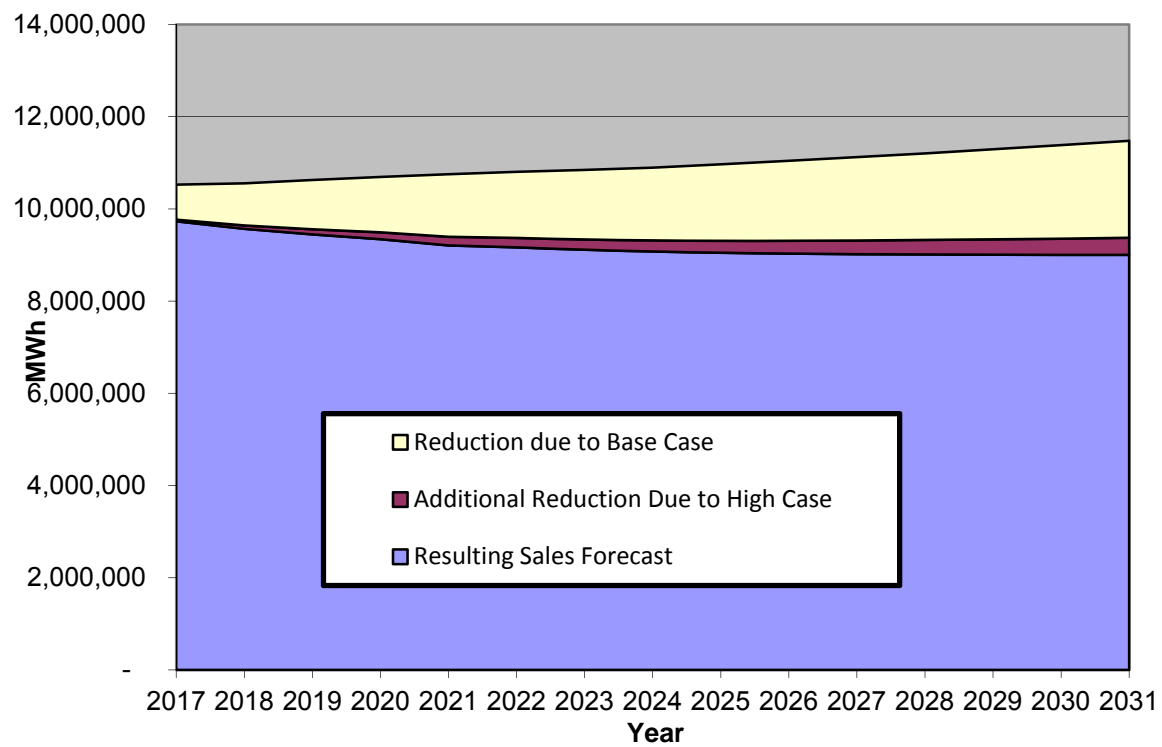


Figure 1-4 EEPDR Affected Sales Forecast with Technical Economic and Achievable Energy Savings Decrements – OE

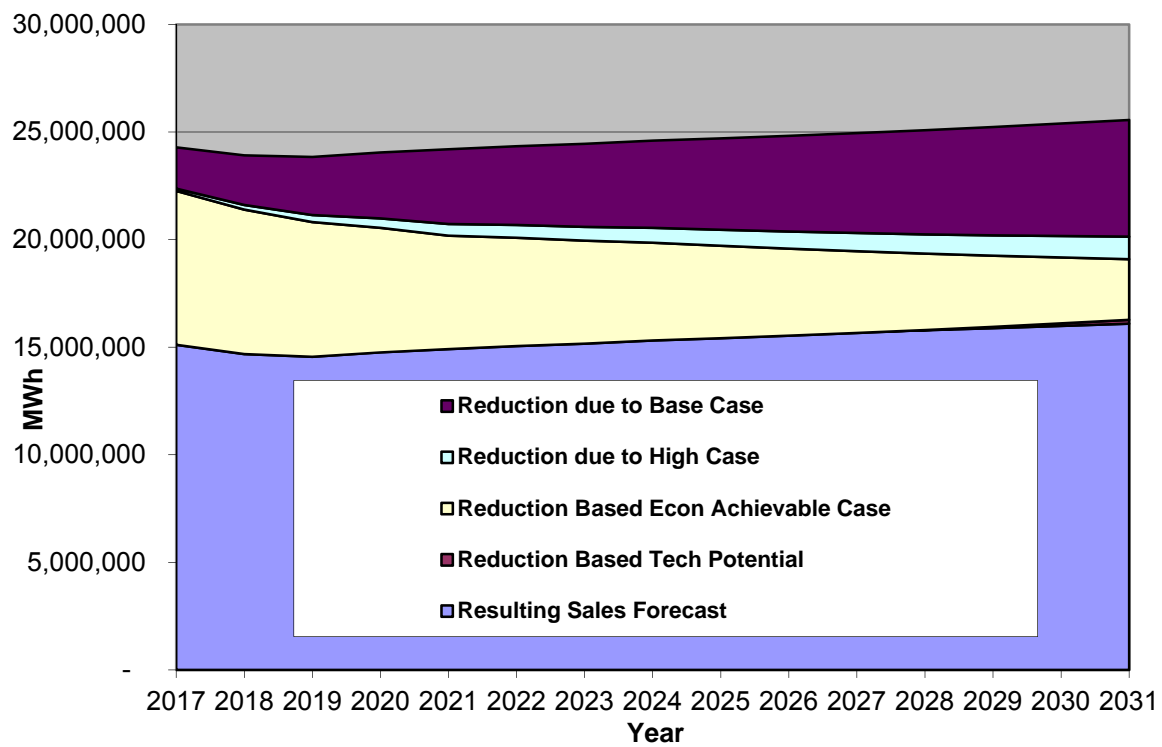


Figure 1-5 EEPDR Affected Sales Forecast with Technical Economic and Achievable Energy Savings Decrements – CEI

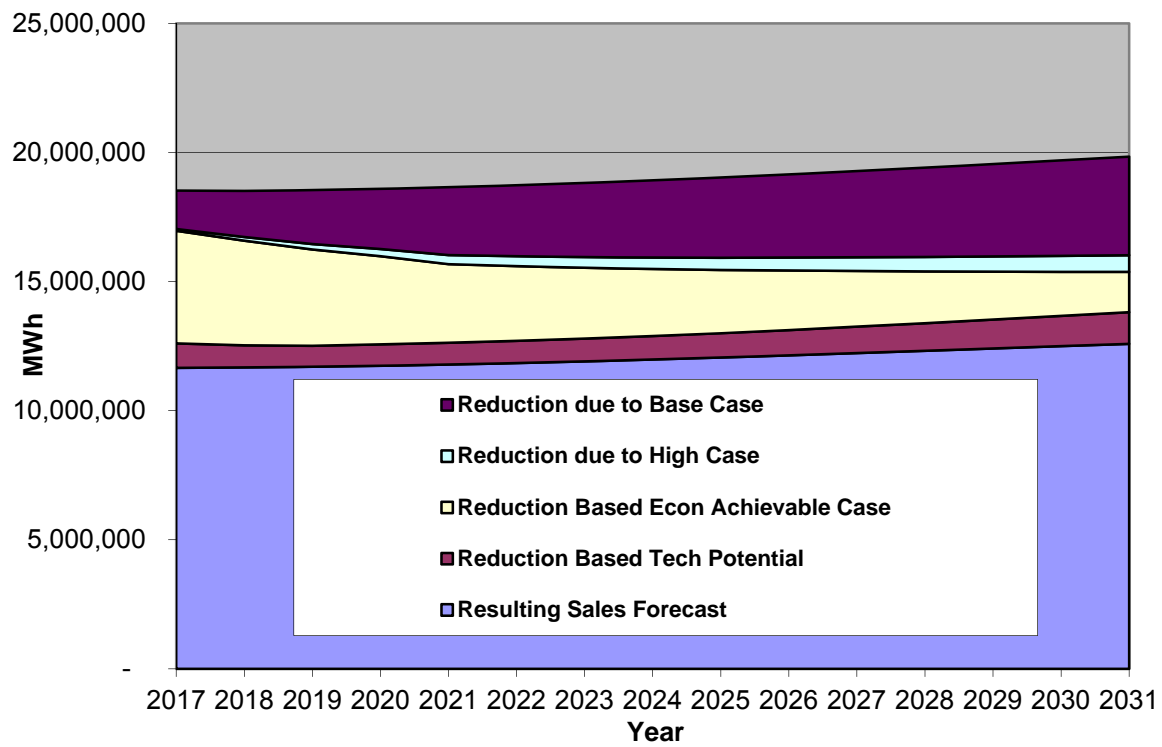
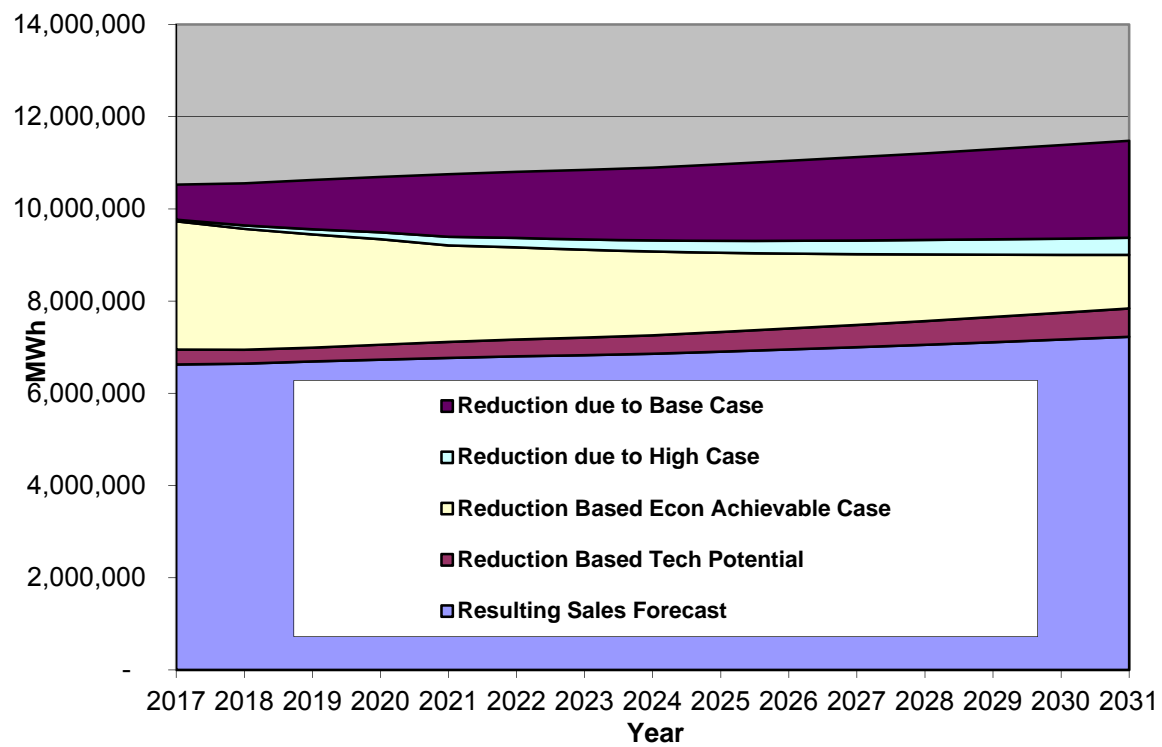


Figure 1-6 EEPDR Affected Sales Forecast with Technical Economic and Achievable Energy Savings Decrements – TE



## 2.0 INTRODUCTION

### 2.1 PURPOSE OF THE STUDY

This Market Study presents an analysis of energy efficiency and peak demand reduction potential in the Companies' respective service territories as of March 31, 2016.

Reliably estimating the economic potential for energy efficiency sets the upper success limit of the programs designed and implemented to achieve that potential given the set of most current available information. New, as well as existing, programs have been modified and informed through a continuous stream of communication between Company and Harbourfront personnel.

Energy savings potential is generally defined by the nationwide energy efficiency community as consisting of technical, economic, and market or achievable potential. As required by the Ohio Administrative Code, this assessment includes the following:

1. Analysis of *technical* potential<sup>2</sup> – Each electric utility shall survey and characterize the energy-using capital stock located within its certified territory and quantify its actual and projected energy use and peak demand. Based upon the survey and characterization, the utility shall conduct an analysis of the technical potential for energy efficiency and peak-demand reduction obtainable from applying alternate measures.
2. Analysis of *economic* potential<sup>3</sup> – For each alternate measure identified in its assessment of technical potential, the electric utility shall conduct an assessment of cost-effectiveness using the total resource cost test.
3. Analysis of *achievable* potential<sup>4</sup> – For each cost-effective alternate measure identified in its analysis of economic potential, the utility shall conduct an analysis of achievable potential. This analysis shall consider the ability of the program design to overcome barriers to customer adoption, including, but not limited to, appropriate bundling of measures.
4. For each measure considered, the utility shall describe all attributes relevant to assessing its value, including, but not limited to potential energy savings or peak-demand reduction, cost, and non-energy benefits.<sup>5</sup>

### 2.2 APPROACH

The design of EEPDR reduction programs involves a parallel methodology that considers customer

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<sup>2</sup> Ohio Administrative Code Section 4901:1-39-01(X) defines "Technical Potential" as "the reduction in energy usage or peak demand that would result if all homes and businesses adopted the most efficient measures, regardless of cost."

<sup>3</sup> Ohio Administrative Code Section 4901:1-39-01(H) defines "Economic Potential" as "the reduction in energy usage or peak demand that would result if all homes and businesses adopted the most efficient and cost-effective measures. Economic potential is a subset of the 'technical potential'".

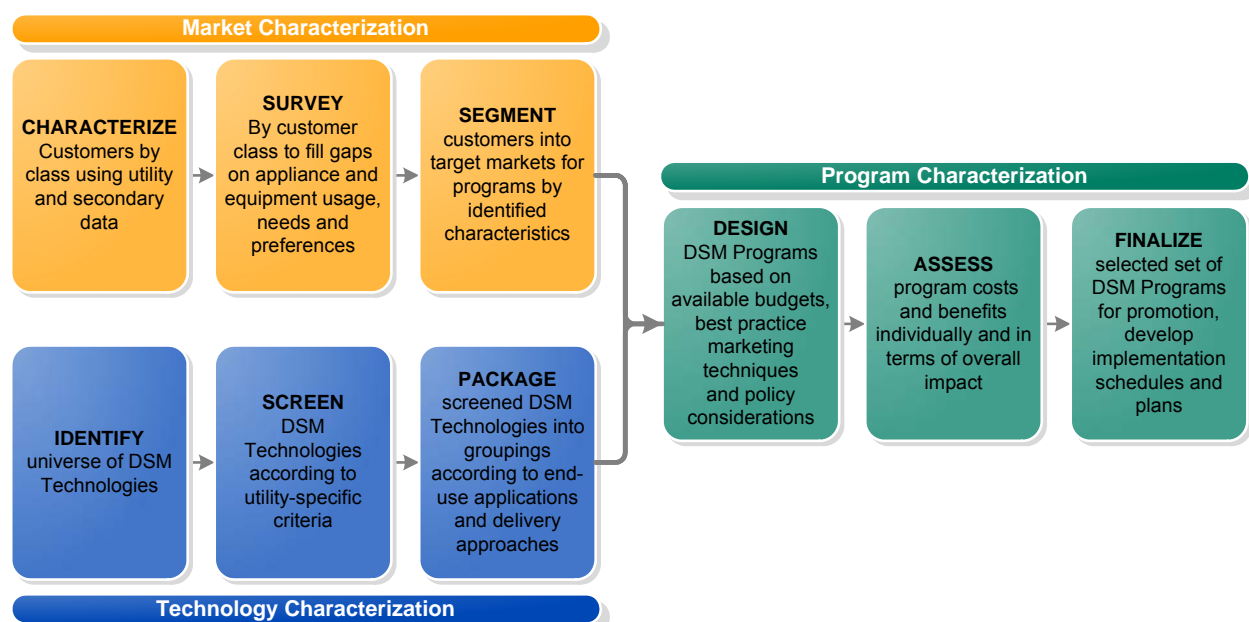
<sup>4</sup> Ohio Administrative Code Section 4901:1-39-01(A) defines "Achievable Potential" as "the reduction in energy usage or peak demand that would likely result from the expected adoption by homes and businesses of the most efficient, cost-effective measures, given effective program design, taking into account remaining barriers to customer adoption of those measures. Barriers may include market, financial, political, regulatory, or attitudinal barriers, or the lack of commercially available product. "Achievable potential" is a subset of 'economic potential'".

<sup>5</sup> Ohio Administrative Code Section 4901:1-03(A)(1)-(4).



segments and preferences, appliance/end-use ownership and energy efficiency technologies and techniques that can be offered to customers to achieve energy savings. The left side of Figure 2-1 presents a generic schematic diagram of the analysis process that leads from this Market Study to actual program designs.

Figure 2-1 Methodology Describing Progression from Market Study to Program Design



The right side of the diagram summarizes the second phase of work that culminates in the Companies' Proposed Plans that are to be filed with the Public Utilities Commission of Ohio ("PUCO") on April 15, 2016.

Harbourfront employed a top-down approach for determining the technical potential and a bottom-up approach, on a measure-by-measure basis, for assessing the economic and market potential for energy efficiency and peak demand reduction.

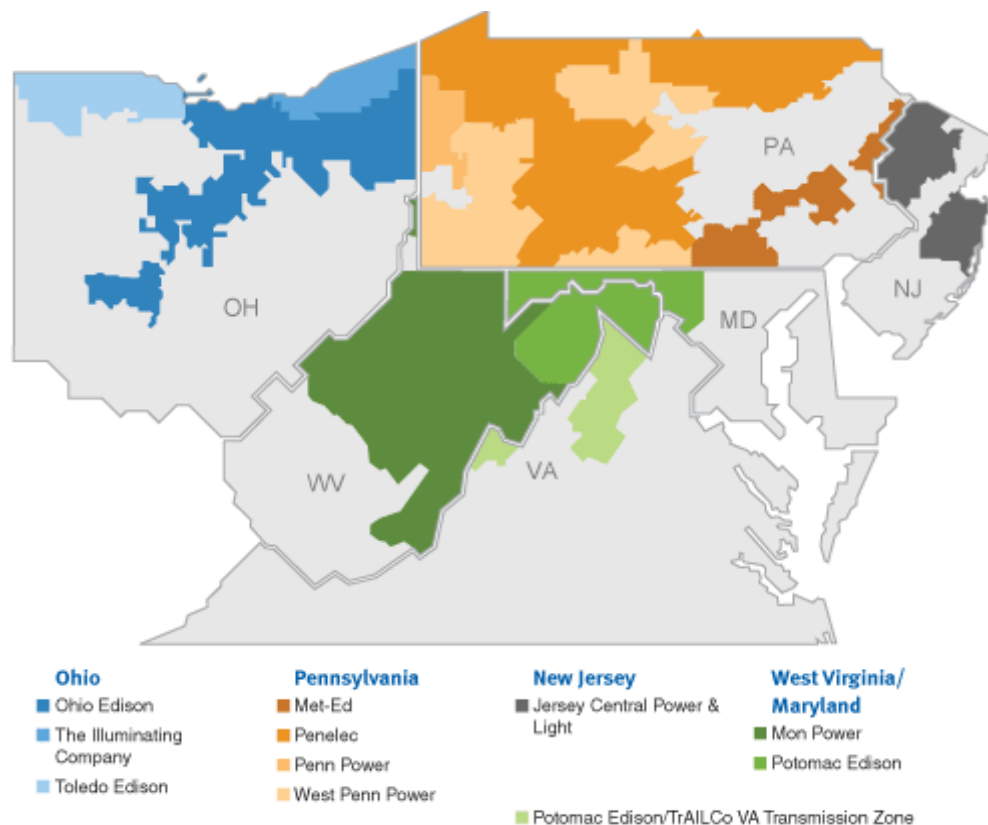
## 2.3 OVERVIEW OF FIRSTENERGY CORP

FirstEnergy Corp. ("FirstEnergy") is a diversified energy company headquartered in Akron, Ohio. FirstEnergy's 10 regulated distribution companies form one of the nation's largest investor-owned electric systems, based on serving 6 million customers within a nearly 65,000 square mile area of Ohio, Pennsylvania, West Virginia, New Jersey and Maryland. Stretching from the Ohio-Indiana border to the New Jersey shore, the companies operate a vast infrastructure of more than 194,000 miles of distribution lines and are dedicated to providing customers with safe, reliable and responsive service.

FirstEnergy's transmission operations include approximately 24,000 miles of lines and three regional transmission operation centers. All of FirstEnergy's transmission facilities operate as part of PJM Interconnection, LLC.

FirstEnergy's diverse generating fleet produces approximately 85 million megawatt-hours of electricity annually from a fleet of non-emitting nuclear, scrubbed coal, natural gas, and hydro plants. With nearly 500 megawatts of wind power under long-term contracts, FirstEnergy is one of the largest providers of renewable energy in the region.

Figure 2-2 FirstEnergy Service Territory Overview



In Ohio, FirstEnergy provides electric distribution service to over 2.1 million customers through OE, CEI and TE. **OE** serves approximately 1,039,100 electric utility customers over more than 6,000 square miles in northeast and central Ohio. **CEI** serves approximately 746,100 electric utility customers over more than 1,600 square miles in and around Cleveland, Ohio. **TE** serves approximately 308,200 electric utility customers over more than 2,300 square miles in northwest Ohio.

## 2.4 MARKET STUDY FEATURES UNIQUE TO OHIO OR THE COMPANIES

When developing this Market Study, the following factors, somewhat unique to Ohio and/or the Companies, were considered:

1. **Customer Action Program and Mercantile Customer Sited Projects** – R.C. 4928.66 allows for documented energy savings generated by customers from customer self-directed projects to be counted toward the statutory benchmark mandates. This Market Study therefore includes estimated potential savings from the Customer Action Program and the Mercantile Projects identified and projected by the Companies based on historic results.

2. **The Community Connections Program** – will continue at a higher funding level during the term of the Companies’ Stipulated Fourth Electric Security Plan (“Stipulated ESP IV”).<sup>6</sup> The Community Connections Program is a program that delivers comprehensive weatherization services to customers who qualify within 200% of the Federal Poverty Income Guidelines along with educational materials for maximum energy savings.<sup>7</sup>
3. **Effects of 2019-2021 transition of Residential Customers to Straight Fixed Variable Distribution Rates.** As part of the Stipulated ESP IV, the Companies have agreed to file a case before the Commission by April 3, 2017 that will propose a plan “...to transition to straight fixed variable (SVF) cost recovery for residential customers’ base distribution rates, with a three-year phase-in, and cost recovery based on an allocation of 75 percent fixed costs and 25% variable costs.” After evaluation of this potential rate structure change, Harbourfront has concluded that the short-term impact during the 2017-2019 period in which the Proposed Plans would be in effect would be negligible. And, in the longer term, price elasticity-related effects may have a small impact on residential energy efficiency measure adoption, however, in Harbourfront’s opinion, such impact would be well within the estimation variances of any 15-year Achievable Potential forecast of EEDPR in the Companies’ service territories<sup>8</sup>. Additional considerations are as follows:
  - a. In the short term, the decoupling mechanism shall be phased in beginning January 1, 2019 and reach the final 75% fixed cost-25% variable cost base distribution rate formula by the beginning of 2021. The decoupling mechanism may only impact the last year of the Proposed Plans.
  - b. This transition to straight- fixed variable rates may only affect the base distribution and lost distribution revenue components of the residential distribution rate. Commercial and industrial customers would be unaffected.
  - c. Even under Commission-envisioned straight fixed-variable rate on components of the residential distribution rate, residential customers participating in EEPDR programs would still enjoy the full EEPDR benefits of a lower generation and transmission rate component and a portion of the lower distribution rate component.

## 2.5 ORGANIZATION OF THE REPORT

Section 3.0 describes the methodology used to conduct the Market Study. Section 4.0 summarizes the characteristics of the Companies’ customers as derived from publicly available Company data and surveys conducted by the Harbourfront study team. Section 5.0 presents information regarding a characterization of the market for energy efficiency services in the region based on

<sup>6</sup> The Companies’ Stipulated ESP IV had several provisions related to EEPDR, all of which have been considered by Harbourfront when developing this Market Study. For a discussion of the Companies’ most recent ESP, see, *In re the Application of [the Companies] for Authority to Provide for a Standard Service Offer Pursuant to R.C. 4928.143 in the Form of an Electric Security Plan*, Case No. 14-1297-EL-SSO, Opinion and Order (March 31, 2016).

<sup>7</sup> Pursuant to Ohio Administrative Code Section 4901:1-39-04 (B) the Proposed Plans must be cost effective on a portfolio basis.

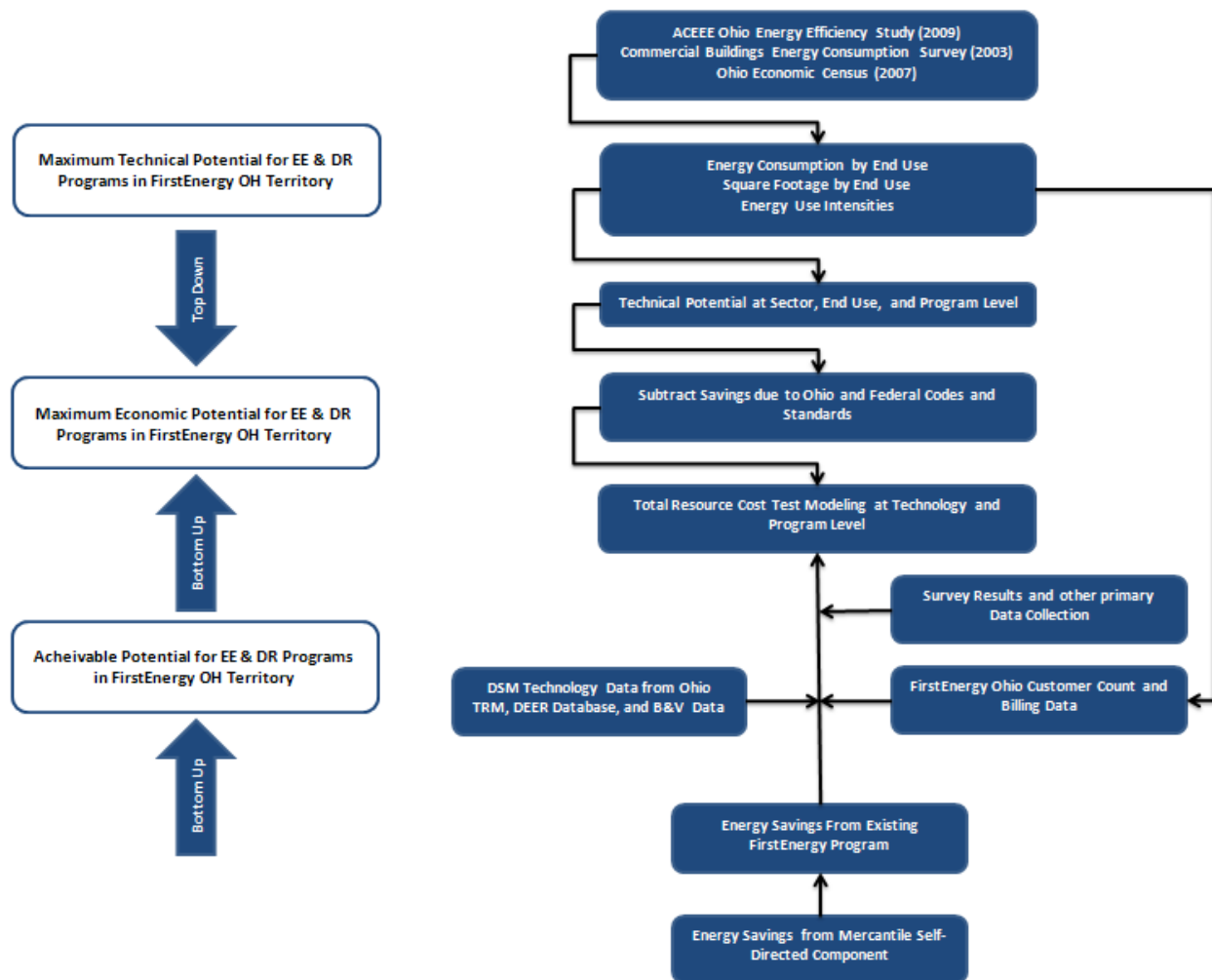
<sup>8</sup> Additionally, other elasticities (cross price and income elasticities) could work to negate any potential “own price” elasticity effect.

research conducted in Ohio during January-March 2016. Section 6.0 presents detailed results of two surveys – residential telephone and email surveys and a small and medium commercial business telephone survey. Section 7.0 presents the lists of energy efficiency technologies considered in this MPS. Section 8.0 presents the detailed results of the market potential for energy savings analyses resulting from the modeling of all data collected.

### 3.0 METHODOLOGY

The Market Study consists of a top-down review of Technical Potential and a bottom-up analysis of Economic and Market Potential. Figure 3-1 summarizes the elements of the Market Study components.

Figure 3-1 Market Potential Study Diagram



#### 3.1 HOW THE THREE LEVELS OF POTENTIAL ARE DETERMINED

The left side of the diagram in Figure 3-1 shows the three levels of energy efficiency potential, moving from largest to smallest, top to bottom. The right side of the diagram shows how the estimates of each of the three potential levels are estimated in this study.

Technical, economic and achievable potentials had been estimated for the State of Ohio by the American Council for an Energy Efficient Economy (“ACEEE”) in a 2009 report entitled “Shaping Ohio’s Energy Future: Energy Efficiency Works”. In September 2015, ACEEE published another report entitled “New Horizons for Energy Efficiency: Major Opportunities to Reach Higher Electricity Savings by 2030”. These two studies served as references for Harbourfront’s study team in the preparation of its analyses and findings.

Economic and achievable market potentials are determined from a bottom-up analysis that considers appropriate cost-effective technologies, customer counts by sector, consumption levels by sector, measure lives, incremental costs of energy efficient options over standard equipment, and a range of other detailed assumptions and data. Critical to both of these estimates are the assumed participation rates. More specifically, how many technologies can be predicted to be adopted each year by customer sector and end use? These figures were developed by Harbourfront by surveying customers in each of the Companies' respective service territories in order to assess the following:

- Current levels of measure adoption.
- Likelihood of adoption of measures in the near term.
- Interest levels and intentions regarding future program participation.

Data from residential telephone and email surveys, commercial telephone surveys and large customer account interviews were used to assess likely participation levels for each sector by Company to inform both the Base Case and High Case estimates. This method takes into account current economic conditions, customer self-reported actions already taken, and expressions of interest and intent.

All data on characteristics, technologies and likely participation or adoption behaviors were combined with the Companies' actual energy usage data for samples of customers by sector – Residential, Commercial, Industrial and Street Lighting. Actual historic program participation, as well as the Companies' cost and savings data, was also incorporated into the study.

### 3.2 EEPDR TECHNOLOGY DATA SOURCES

The following data sources were considered in the development of the key inputs used in this Market Study:

- California Deemed Energy Database ("DEER");
- ACEEE Market Potential Study for Ohio-(2009);
- ACEEE New Horizons for Energy Efficiency...Report No. U1507 (2015);
- Association of Energy Service Professionals publications and resources;
- Department of Energy QUick Energy Simulation Tool (eQUEST);
- Harbourfront Energy Efficiency Technologies Database;
- Ohio Technical Reference Manual ("TRM");
- Pennsylvania TRM;
- Evaluation, Measurement and Verification ("EM&V") work performed by ADM Associates Inc. ("ADM");
- ENERGY STAR Unit Shipment and Market Penetration Report-Calendar Year 2104 Summary;
- Presentation entitled "Energy Efficiency Program Ideas for Ohio" January 27, 2016, Environmental Law and Policy Center; and
- Ohio Stakeholder Collaborative Group.

Cost and savings data were considered from these sources for non-weather sensitive measures; data for weather-sensitive measures were simulated through eQUEST using building parameters outlined in TRM Appendix A, “Prototypical Building Energy Simulation Model Development”.

**Customer Usage Data** – The Companies provided energy consumption data by customer sector for survey and analysis purposes to assess baseline usage levels from which energy savings could take place. Forecasts of usage were also provided and used as consistent with the baseline forecast. Harbourfront also performed a detailed analysis of energy consumption, square footage and energy use intensity by end use. The primary data sources for this analysis were U.S. Energy Information Administration’s Commercial Building Energy Database (“CBECS”), State of Ohio Economic Census Data (2007) and Company customer data.

**Customer Characteristics, Behavior and Intentions** – Surveys were conducted of random statistical samples of residential and business customers. Completed residential Internet and telephone surveys totaled 1172 for OE, 1297 for CEI and 1311 for TE, and another 100 commercial telephone surveys per Company were completed (300 total). Fifty large, managed account, commercial-industrial customers were represented in the large C&I sector analysis and a census of street lights and estimates of traffic and pedestrian signals were combined to characterize the municipal lighting sector.

### 3.3 CUSTOMER ACTION AND MERCANTILE SAVINGS

The energy savings identified and validated from these customers will be applied to meet benchmark mandates. An estimated forecasting of EEPDR savings from these customers is included in the Market Study as part of the first three years of savings.

### 3.4 SAVINGS FROM PROGRAMS PREVIOUSLY FILED BY THE COMPANIES

Consistent with Ohio law, the Companies have submitted several EEPDR plans for prior plan periods that have been approved by the PUCO and implemented by the Companies. Results from the implementation of these approved programs were factored into this Market Study by taking the Companies’ estimates of existing kWh and kW savings for the 2009-2015 timeframe and including those savings in the cumulative savings estimates, thus reducing the base case of the annual energy forecast through 2031.

Harbourfront conducted surveys in the beginning of 2016 that address the issue of current and past customer EEPDR activities. Based on these results, Harbourfront estimated the amount of EEPDR savings prior to 2016 and reduced future potential accordingly.

### 3.5 OTHER KEY REFERENCES USED IN THIS STUDY

The Harbourfront study team examined the following regarding the Market Study and lists below the assumptions used for the key study parameters referenced.

1. **Template for the Filing.** The filing document for the Market Study contains sections consistent with the required elements as shown in Section 4901:1-39-03 Ohio Administrative Code.
2. **Study Time Period.** The Market Study analyzes market potential through 2031, or for fifteen years from the beginning of 2017, although Ohio law only establishes energy



efficiency benchmarks through 2027. The scope of the Companies' Proposed Plans are for the period January 1, 2017 through December 31, 2019.

3. **Budget Cap.** There is no budget cap or constraint for the EEPDR budgets either annually or in total over the period.
4. **Renewables and Customer Renewable Energy Measures.** These are not part of the Market Study as they are addressed in other proceedings.
5. **List of Measures.** The analysis covers a comprehensive list of practically implementable measures included in the Ohio Technical Reference Manual. In addition to this, Harbourfront also examined a number of emerging technologies not included in the Technical Reference Manual. For this purpose, Harbourfront used its own list of EEPDR measures as well as DEER Database in the analysis. This list builds upon the list previously used by Black & Veatch in its 2012 Market Potential Study prepared for the Companies in Case Nos. 12-2190-EL-POR *et seq.*
6. **Economic Tests.** The TRC test was applied to the measures, programs and portfolio of programs in the Market Study as part of the Economic Potential. The Utility Cost Test and the Participant Tests are also included to provide reference.
7. **Avoided Costs.** The avoided generation capacity and energy supply costs are based on the Companies' forecast of energy and capacity utilized in Stipulated ESP IV. The avoided transmission and distribution capacity costs are based on the Avoided T & D Study performed by Harbourfront for the Companies.<sup>9</sup>
8. **Best Practices.** Prior to, and during the course of, the development of the Market Study, Harbourfront personnel conducted a comprehensive analysis of the resources listed in Section 3.2 to insure that the Proposed Plans have addressed a comprehensive set of end use technologies and programs that are currently being implemented by utilities in Ohio and nationally. In addition to reviewing information previously mentioned, Harbourfront reviewed best practice utility programs from states such as California, Pennsylvania, New York, and Vermont and paid special attention to information provided by Ohio Collaborative members. During this activity, Harbourfront took special note of increased focus on LEDs in residential and commercial applications, occupancy sensors and controls, higher efficiency heat pumps for space heat, water heat and clothes drying, smart strips and smart thermostats for both residential and commercial applications, and energy efficiency measures for manufactured homes.

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<sup>9</sup> April 2016 Avoided T & D Study performed by Harbourfront Group, Inc.



## 4.0 CUSTOMER CHARACTERIZATION

This section describes characteristics of the Companies' customers based upon publicly available data and from surveys conducted by the Harbourfront study team. The analysis determined the numbers and types of customers by Company that are available to participate in energy efficiency programs.

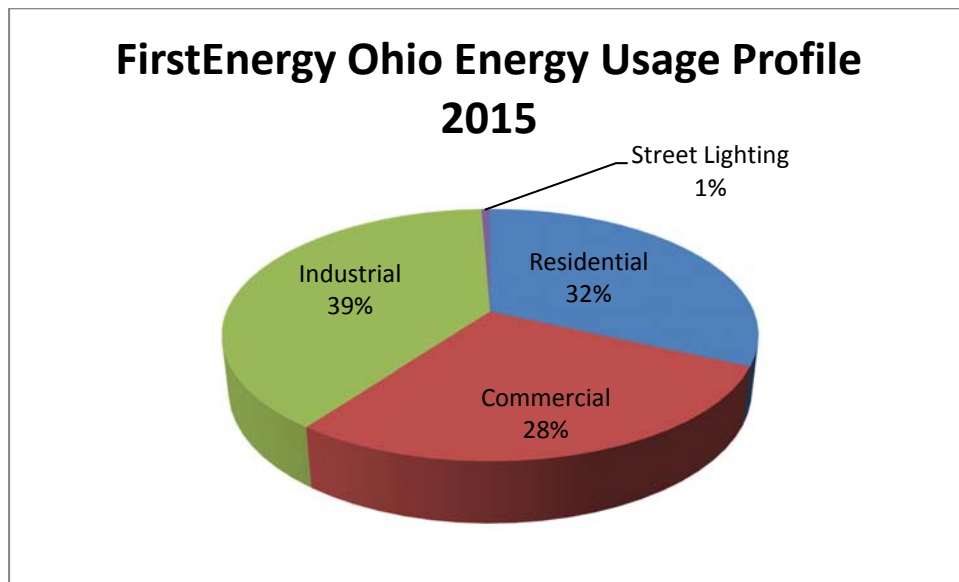
### 4.1 DATA SOURCES

Harbourfront utilized the Companies' 2015 FERC Form No. 1 information and primary data collected from customer surveys and interviews as the basis for the information in this chapter. Table 4-1 provides FERC Form No. 1 combined customer and sales information.

Table 4-1 FirstEnergy 2015 Ohio Customer & Sales Information

FirstEnergy Ohio Operating Information	Values
<b>Residential Customers</b>	1,853,377
Residential % of Total Customers	88.64%
Residential MWh per Customer	9.3
<b>Commercial Customers</b>	231,483
Commercial % of Total Customers	11.07%
Commercial MWh per Customer	65.6
<b>Industrial Customers</b>	2,498
Industrial % of Total Customers	0.12%
Industrial MWh per Customer	8,226
<b>Street Lighting Customers</b>	3,650
Street Lighting % of Total	0.17%
Street Lighting MWh per Customer	91.7
<b>2015 Electric Sales (MWh)</b>	<b>53,248,148</b>
<b>Total Customers</b>	<b>2,091,008</b>
<i>Source: 2015 FERC Form No. 1</i>	

Figure 4-1 FirstEnergy Projected Ohio Combined 2015 MWh Usage



The Harbourfront team also interviewed the account representatives who manage large commercial and industrial customer accounts with demands of more than 700kW. The account representatives generally have a very good understanding of their customers' energy consumption and usage patterns. The account managers provided valuable on-point information that has been incorporated into the analyses.

Harbourfront implemented a two-pronged approach for the Companies' National Account customers, using both surveys and interviews. National Account customers are typically commercial customers in terms of demand and energy consumption, and were included in Harbourfront's telephone surveys. Since the Companies have National Account representatives who provide a single point of contact for the customer and are knowledgeable of the customer's energy-related information, Harbourfront also interviewed these account representatives in order to gain further insight into these customers' usage characteristics.

## 4.2 CUSTOMERS AND MWH SALES BY COMPANY

The following tables and charts identify the number of customers, and sales by Company.

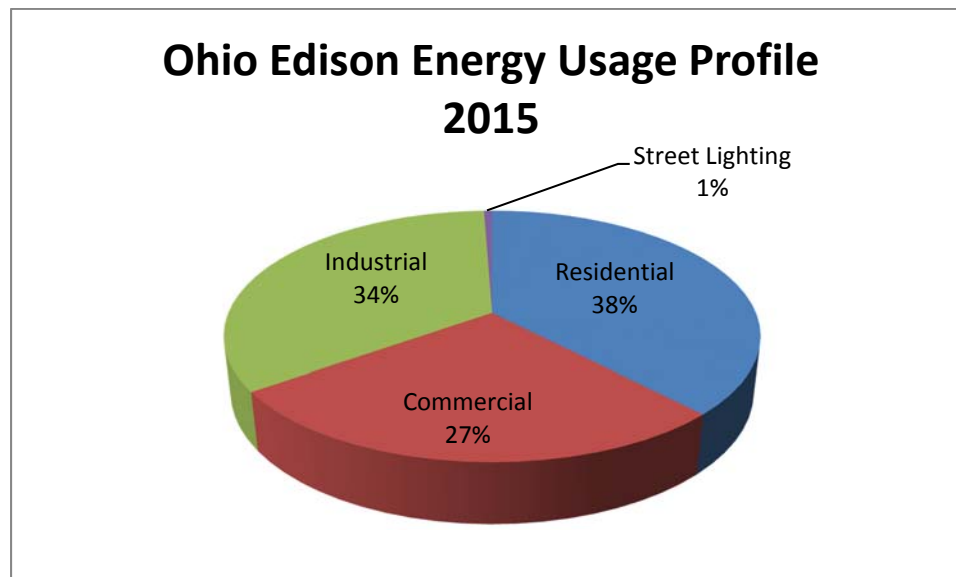
### Ohio Edison:

Table 4-2 Ohio Edison Operating Information

Ohio Edison Operating Information	
<b>Total Customers (2015)</b>	<b>1,037,216</b>
Residential Customers	921,461
Residential % of Total Customers	88.84%
Residential MWh per Customer	10.0
Commercial Customers	112,293
Commercial % of Total Customers	10.83%
Commercial MWh per Customer	59.3
Industrial Customers	1,341
Industrial % of Total Customers	0.13%
Industrial MWh per Customer	6,164
Street Lighting Customers	2,121
Street Lighting % of Total	0.20%
Street Lighting MWh per Customer	66.9
<b>2015 Electric Sales (MWh)</b>	<b>24,291,651</b>

Source: 2015 FERC Form No. 1

Figure 4-2 Ohio Edison Electricity Use (MWh)

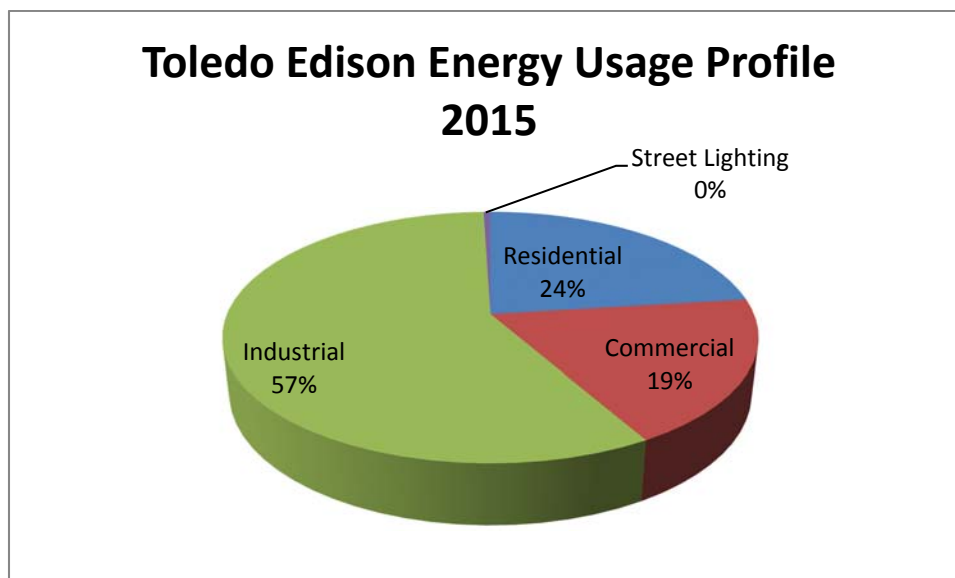


**Toledo Edison:**

Table 4-3 Toledo Edison Operating Information

Toledo Edison Operating Information	
<b>Total Customers (2015)</b>	<b>308,151</b>
Residential Customers	270,773
Residential % of Total Customers	87.87%
Residential MWh per Customer	9.1
Commercial Customers	35,827
Commercial % of Total Customers	11.63%
Commercial MWh per Customer	55.1
Industrial Customers	507
Industrial % of Total Customers	0.16%
Industrial MWh per Customer	11,753
Street Lighting Customers	1,044
Street Lighting % of Total	0.34%
Street Lighting MWh per Customer	49.3
<b>2015 Electric Sales (MWh)</b>	<b>10,454,511</b>
<i>Source: 2015 FERC Form No. 1</i>	

Figure 4-3 Toledo Edison Electricity Use (MWh)

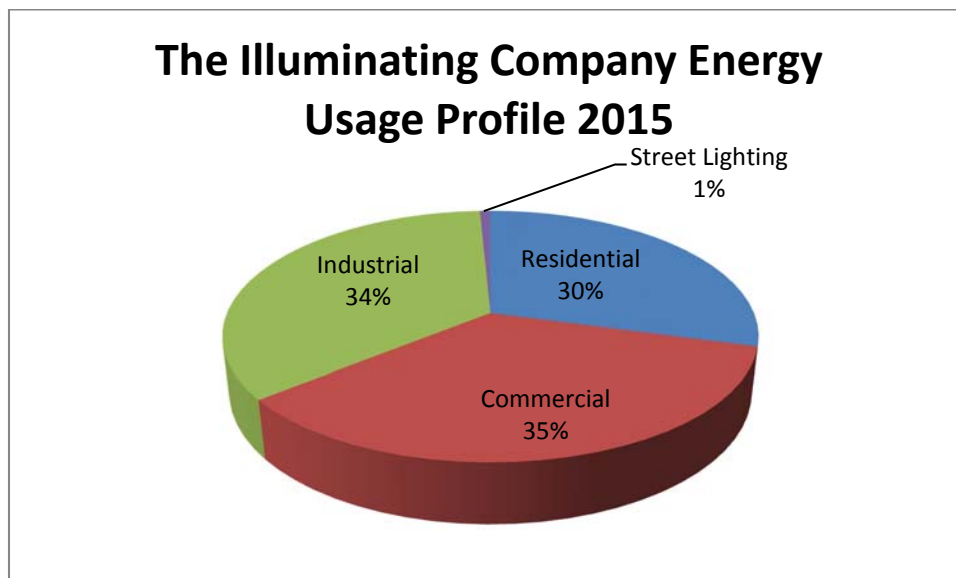


### The Illuminating Company:

Table 4-4 The Illuminating Company Operating Information

The Illuminating Company Operating Information	
<b>Total Customers (2015)</b>	<b>745,641</b>
Residential Customers	661,143
Residential % of Total Customers	88.67%
Residential MWh per Customer	8.3
Commercial Customers	83,363
Commercial % of Total Customers	11.18%
Commercial MWh per Customer	78.5
Industrial Customers	650
Industrial % of Total Customers	0.09%
Industrial MWh per Customer	9,727
Street Lighting Customers	485
Street Lighting % of Total	0.07%
Street Lighting MWh per Customer	291.3
<b>2015 Electric Sales (MWh)</b>	<b>18,501,986</b>
<i>Source: 2015 FERC Form No. 1</i>	

Figure 4-4 The Illuminating Company Electricity Use (MWh)



### 4.3 RESIDENTIAL SECTOR DESCRIPTION

This section of the Market Study presents a high-level overview of the Residential Sector in the Companies' service territories informed by three studies: (1) the 2016 survey conducted by Harbourfront in February 2016, which included 3,780 total Internet and email responses from customers of the three Companies' combined (2) the 2012 Residential Survey done by Black & Veatch, which included more than 500 responses from customers of each of the Companies; and (3) the 2010 Residential Survey conducted by Black & Veatch. The survey results underline a number of trends regarding energy efficiency. In general, the trends show an increasing number of customers who have already adopted particular energy efficiency measures and show continuing interest in expanding their use of these measures.

In a significant change to the methodology, responders in 2016 had an option of responding via the Internet. This led to a sample set that better represents the Companies' customers.<sup>10</sup>

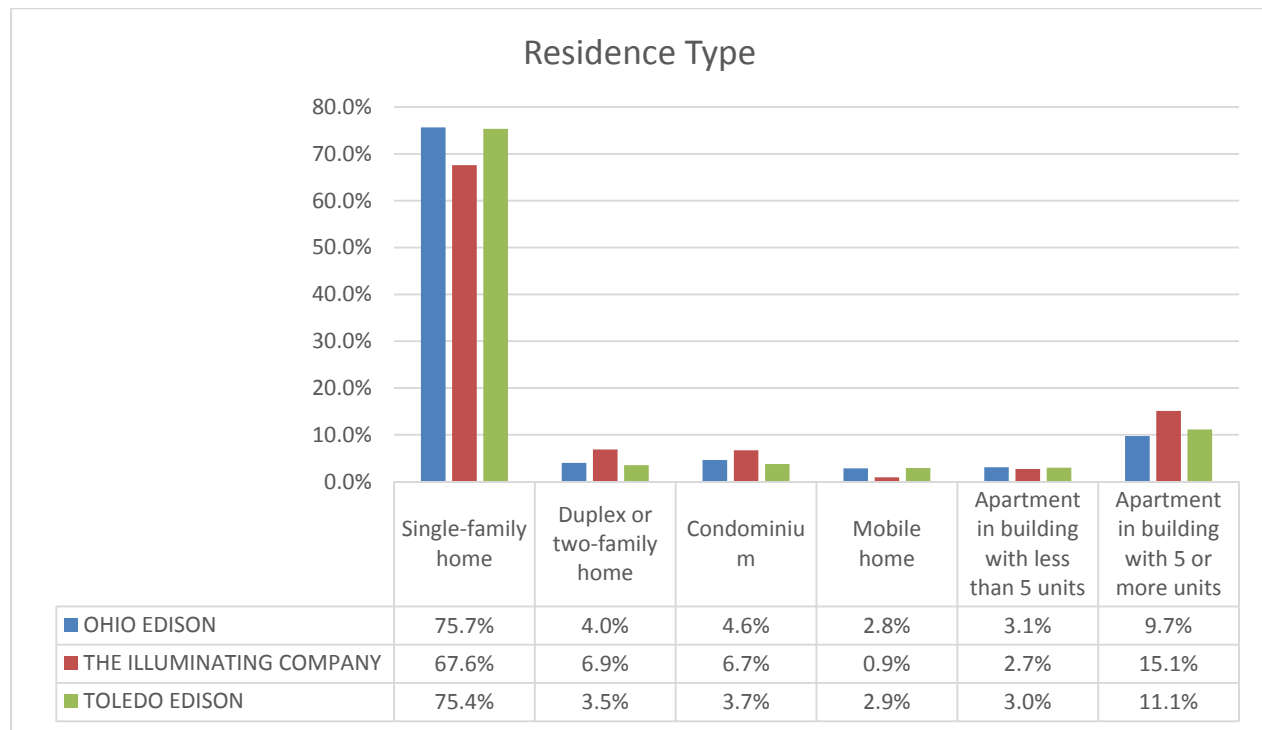
Table 4-5 Survey Household Age Comparison

Head of Household Age	US Census 2010-2014 American Community Survey	2016 Survey (combined online/phone)
<b>Under 25</b>	4.2%	3.9%
<b>25-44</b>	31.6%	32.3%
<b>45-64</b>	40.3%	38.3%
<b>65 +</b>	23.9%	17.3%
<b>(Don't know)</b>	-	8.3%

The results from the 2016 survey showed that 72.8% of the homes in the Companies' service territories are single-family homes, with the remaining distributed among duplexes, condominiums, mobile homes and apartment buildings:

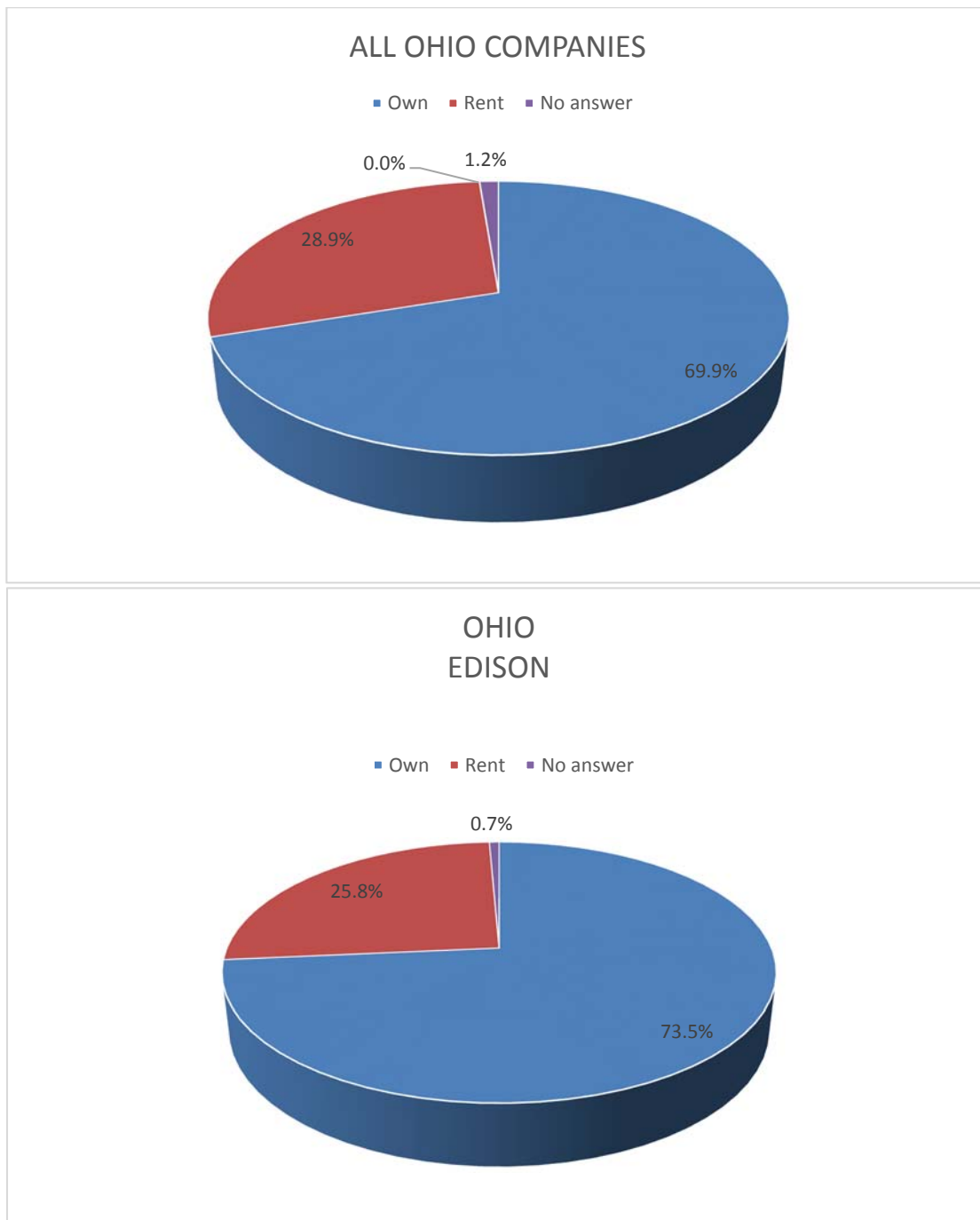
<sup>10</sup> In prior surveys where respondents could not respond via the computer, respondents tended to be older, providing a bias towards senior citizens.

Figure 4-5 Type of Housing: 2016 Harbourfront Survey



On average, 69.9% of respondents own their residence. Of the remainder, 28.9% rent a home and 1.2% did not provide an answer. Below is a summary of responses both on a total Company basis, as well as on an individual Company basis:

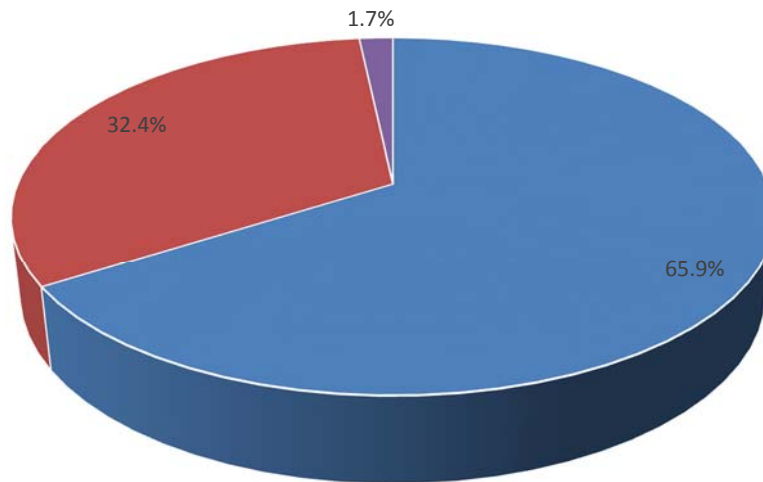
Figure 4-6 Home Ownership 2016 Harbourfront Survey



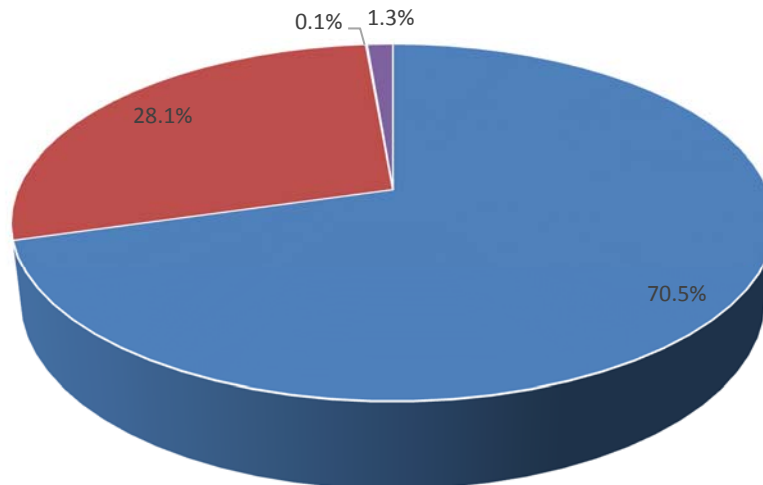


THE ILLUMINATING  
COMPANY

■ Own ■ Rent ■ No answer

TOLEDO  
EDISON

■ Own ■ Rent ■ No answer



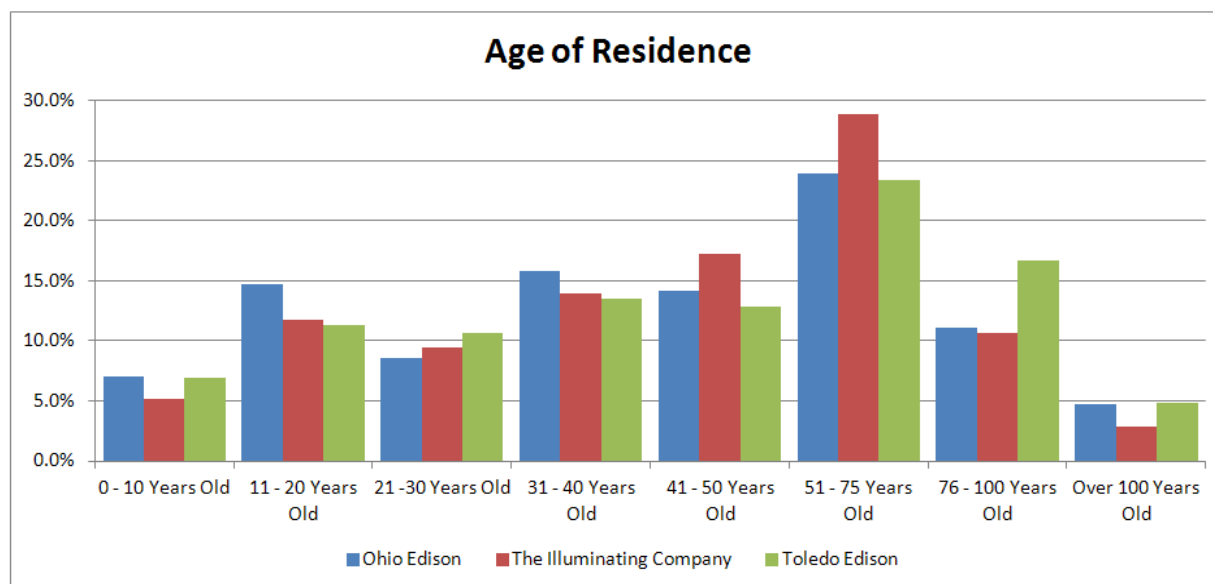
The primary space heating fuel/energy for homes in the Companies' service territories is natural gas (68.7%), followed by electricity (18.2%). Electric heaters take the lead in secondary space heating, constituting more than half (60%) of the secondary heaters used by respondents who had a second heater.

Natural gas is also the dominant fuel (61.7%) for residential water heating, followed by just over a quarter of respondents who have electric water heaters (25.7%):

Table 4-6 Primary Heating Fuel Usage 2016 Harbourfront Survey

	Total Ohio	OE	TE	CEI
<b>Space Heating Fuel/Energy</b>				
<b>Electricity</b>	18.2%	18.9%	18.8%	16.9%
<b>Natural gas</b>	68.7%	68.2%	67.6%	70.2%
<b>Oil</b>	1.3%	2.2%	0.5%	1.2%
<b>Other</b>	6.5%	6.9%	9.2%	3.5%
<b>NA/None</b>	0.3%	0.1%	0.7%	0.2%
<b>Don't know</b>	0.1%	0.2%	0.1%	0.2%
<b>No answer</b>	4.9%	3.5%	3.2%	7.9%
<b>Water Heating Fuel/Energy</b>				
<b>Electricity</b>	25.7%	30.6%	26.0%	20.8%
<b>Natural gas</b>	61.7%	60.4%	61.3%	63.4%
<b>Other</b>	2.6%	2.0%	4.8%	0.9%
<b>NA/None</b>	0.4%	0.2%	0.2%	0.9%
<b>Don't know</b>	0.7%	0.4%	0.5%	1.0%
<b>No answer</b>	8.9%	6.3%	7.2%	13.0%

Figure 4-7 Age of Residence 2016 Harbourfront Survey



Below is a summary of the 2016 residential appliance saturation results for several common household appliance or end-uses. Note that percentages are calculated using the total number of appliances in households, rather than the number of households with these appliances.

Table 4-7 Appliance and End Use Saturation Rates 2016 Residential Survey

Appliance Type	CEI		OE		TE	
	2016	2030	2016	2030	2016	2030
Electric Furnace	10%	11%	11%	11%	12%	13%
Heat Pump	2%	2%	3%	4%	1%	1%
Geothermal Heat	0%	0%	1%	2%	2%	3%
Total Electric Heat	12%	13%	15%	16%	14%	16%
Secondary Electric Heater	15%	14%	13%	13%	16%	16%
CAC	72%	77%	67%	72%	69%	78%
Heat Pump Cooling	2%	2%	2%	3%	1%	1%
Geothermal Cooling	0%	0%	1%	2%	2%	3%
Total CAC	74%	80%	70%	76%	72%	81%
Room Air Conditioner	46%	46%	44%	44%	51%	51%
Electric Water Heater	19%	20%	26%	28%	24%	26%
Electric Cooking	99%	102%	118%	121%	113%	116%
Second Refrigerator	21%	22%	13%	14%	15%	15%
Freezer	41%	41%	45%	44%	47%	46%
Dish Washer	61%	69%	56%	63%	56%	63%
Clothes washer	85%	85%	86%	86%	86%	86%
Electric Dryer	67%	67%	63%	63%	64%	65%
TV	100%	100%	100%	100%	100%	100%
Furnace Fans	78%	78%	76%	76%	77%	77%
Light	100%	100%	100%	100%	100%	100%
Misc	100%	100%	100%	100%	100%	100%

## 4.4 COMMERCIAL CUSTOMERS

### 4.4.1 Commercial and Small Manufacturing Class (<700 kW)

Table 4-8 shows the types of small businesses that responded to the 2016 Harbourfront survey by Company, in terms of percentages of respondents.

Table 4-8 Industry of Survey Respondents 2016 Harbourfront Survey

Industry Type	Total Ohio	OE	TE	CEI
Agriculture	3.3%	2.5%	6.0%	1.5%
Oil and Gas Production	0.7%	0.5%	0.5%	1.0%
Construction	5.5%	5.0%	6.5%	5.0%
Manufacturing	10.8%	11.5%	9.0%	12.0%
Wholesale Trade	1.2%	1.5%	2.0%	
Retail Trade	10.8%	7.5%	11.5%	13.5%
Transportation and Warehousing	4.3%	5.0%	4.5%	3.5%
Finance and Insurance	2.2%	3.0%	0.5%	3.0%
Real Estate	4.0%	2.5%	3.0%	6.5%
Professional Services	9.7%	8.0%	10.5%	10.5%
Waste Management and Remediation Services	1.5%	2.0%	1.0%	1.5%
Educational Services	3.7%	4.0%	5.0%	2.0%
Health Care and Social Assistance	8.2%	7.5%	7.0%	10.0%
Entertainment, Arts and Recreation	3.8%	4.5%	4.0%	3.0%
Hotel	0.7%	0.5%	1.0%	0.5%
Food Services or Grocery Store	7.2%	4.5%	9.0%	8.0%
Other	20.8%	28.5%	17.5%	16.5%
Don't know/Refused	1.7%	1.5%	1.5%	2.0%

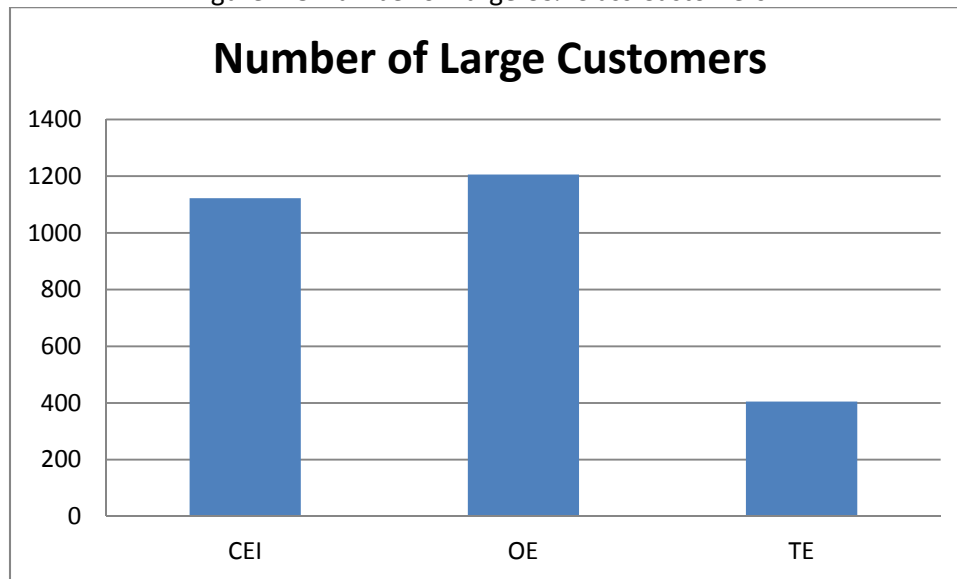
Table 4-9 shows that the majority of businesses represented in the surveys have fewer than 100 employees, with the overall median number of employees in Ohio locations between five and nine.

Table 4-9 Number of Ohio Employees 2016 Harbourfront Survey

Number of Employees	Total Ohio	OE	TE	CEI
One	12.5%	14.5%	11.0%	12.0%
2-4	31.2%	31.5%	29.5%	32.5%
5-9	23.5%	29.0%	23.5%	18.0%
10-19	12.7%	9.0%	13.5%	15.5%
20-99	12.3%	11.0%	16.0%	10.0%
100-499	5.0%	3.5%	4.0%	7.5%
Don't know/refused	1.2%	0.5%	1.5%	1.5%

### 4.4.2 Large Commercial and Industrial Class (>700 kW)

The large commercial and industrial class of customers is characterized by having a billed demand of greater than 700kW. Figure 4-8 below shows the number of Large C&I Class customers by Company, based on Company data.

Figure 4-8 Number of Large C&I Class Customers <sup>11</sup>

Each of the three Companies dedicates a group of individuals to manage accounts that are typically greater than 700kW of billed peak demand. These individuals act as an interface between their customers and other areas within the Companies to help address a wide range of requests from their customers. Often, they work directly with the customers, or arrange for individuals with the necessary technical expertise to assist the customer in troubleshooting and discussing potential EEPDR savings opportunities.

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<sup>11</sup> Data from the Companies.

The Companies' account representatives are one of several sources for information on the Companies' EEPDR programs and available rebates. They are a key factor in the Companies' efforts to help the large C&I accounts become more active in investigating and implementing EEPDR reduction measures. As additional input into the 2016 Market Study, Harbourfront conducted telephone interviews with 20 account representatives and surveyed 50 large C&I customers across the three Companies during February and March 2016.

While each of the customers in the greater than 700kW segment are unique in the products they manufacture or the services that they provide to other businesses or end-use customers, they have a number of common characteristics regarding their approach and behavior toward energy efficiency investment decision-making.

The top business categories in terms of peak demand were metals fabrication, including automobile manufacturing, primary metals, chemical manufacturing, medical centers, food processing and other manufacturing. It is likely that these categories of businesses continue to have high peak demand. In the 2016 interviews, most account representatives stated that, based on the activities of their customers, it appears that business has improved since the 2012 survey. Positive signs included expansion of facilities and staff, adding a new production run, adding another shift, and vacant commercial properties being investigated for development. Based on the survey responses, companies that are expanding are more likely to invest in energy efficient technologies for new construction or renovation. Account managers also stated that some businesses and municipalities struggle with having adequate cash or sources of capital to afford investing in energy efficient technologies, which may require adjustments to rebates in order to encourage EEPDR investments in these sectors.

Below is a list of the major business categories represented in the survey:

Table 4-10 Customer Business Categories

Customer Business Categories
Chemical & Allied Prod
Education
Electronic Mfg.
Entertainment
Food and Kindred Products
Health
Mining & Oil Gas Extract and Transportation
Paper Mills & Products
Primary Metals & Heavy Mfg.
Professional Offices
Refining & Plastics Mfg.
Large Retail
Transport Mfg.

Survey results indicate that large C&I customers will typically look for the shortest payback periods and often accept no more than a year of payback time for their capital investment in energy efficient

technologies. Small to medium-sized customers may be more flexible investing in technologies with payback periods in the one to two-year range, though still favoring the one-year or less payback. Municipalities and schools were the most flexible and, based on the survey results, it appears that some are willing to accept a payback of three to five years on their energy efficiency investments.

Programs that help increase awareness and educate customers about the Companies' future EEPDR programs and the benefits to customers, along with the purchase of more efficient products and financial incentives, aid in reducing peak demand in this class because of the short payback times that are desired for energy efficiency installations.

The survey results also generated the following observations:

- Generally large C&I customers tend to be aware that energy efficiency programs exist, but may not immediately recall specific program details and are hopeful that there will be similar programs in the future.
- Company account representatives' discussions and meetings with customers, providing monthly electronic newsletter, program administrators and trade organizations are historically effective media for conveying information about programs.
- Most of these customers do not have an internal dedicated energy manager, so the importance of the Companies' outreach is critical to helping educate and guide customers to making informed decisions regarding investing in energy efficiency measures, especially measures such as lighting modifications and motor upgrades, that could be relatively easy to implement.
- Large industrial customers, large commercial facilities, hospitals and universities generally have people on staff to focus on their company's processes and costs of operating the business including their electric bill.
- There are a significant number of customers in this group that have already installed energy efficiency measures such as lighting and motor upgrades, but cannot afford the time and effort to go back and research, prepare and submit the paperwork to receive credit exemptions or rebates.

Based on interviews with the account representatives, the most common findings among these business categories regarding energy efficiency are:

- While many customers have already made improvements in lighting and motors, etc. over the last several years (with the support of prior Company EEPDR program incentives), there continues to be opportunities for improvements in manufacturing processes, lighting, motors and behavioral improvements, particularly for the largest customers who are looking for higher potential energy efficiency savings. A key driver is their current electric bill and their desire to minimize that cost.
- Improvements to manufacturing processes require significant preplanning to accomplish. Therefore, these customers need to be informed of EEPDR programs as early as possible.
- As large C&I customers respond to increased demand for their products and services, the opportunity exists for improvements in energy efficiency, in new developments and in existing equipment, such as in lighting modifications and motor upgrades.
- Companies experiencing an uptick in their business may be adding additional staff, extending shift hours or adding additional shifts, adding new production runs or expanding their

physical facilities. All of these companies provide potential opportunities for EEPDR reduction and should be a focus for account representatives.

- Architects, engineers, equipment vendors and other facility and equipment influencers provide an additional resource for potential EEPDR reduction opportunities in the large C&I sector.

#### 4.4.3 National Accounts

There are approximately 250 customers that are designated as Company national account customers and each is managed by a Company national account representative that works across the three individual Company's boundaries. To obtain additional information regarding market potential in this sector, Harbourfront conducted telephone interviews with each of the Company national account representatives in February 2016.

The commonality among national accounts is that they are businesses that have a national presence and operate under the guidance of a corporate headquarters. National account businesses within FirstEnergy's service territories are either owned and operated by corporate headquarters or owned and operated by a franchisee. Company national account representatives focus their efforts on EEPDR related staff and decision makers at the national account's corporate headquarters.

In cases where the local customer site is owned and operated by corporate headquarters, all energy efficiency related decisions are made for and funded by headquarters. Typically, the focus of energy efficiency investments in local sites by corporate headquarters will be targeted on a priority basis to those locations where energy costs are higher and where the utility or State offers energy efficiency improvement programs and financial incentives.

In cases where the local customer site is owned by a franchisee, the corporate headquarters will typically offer the local owner the same energy efficiency information as it does to its corporate sites, however, all decisions and investments will be funded and made by the local owner. As a result, these franchisees may react more favorably to energy efficiency programs and incentives and will seek to implement measures that reduce their costs.

As with large C&I accounts, whether they are a site owned by a corporate entity or a franchisee, decisions to invest the capital and time in pursuing and implementing energy efficiency measures will be based on economics - specifically, costs and reasonable paybacks. As with other commercial customers, this group of customers requires that the process for implementing energy efficiency improvements be simple enough to understand and act on while running their businesses including:

- Being informed and educated about the Companies' future EEPDR programs and what can be done to improve their energy efficiency;
- Better understanding their energy usage and potential savings;
- Knowing how to get into the utility programs;
- Knowing how to get improvements implemented; and
- Knowing how to obtain their rebates.

The Companies' managed account representatives explain that there are three tiers of awareness and EEPDR implementation activity among the national accounts.

The first tier (Tier A) consists of those companies that are the most involved in making their properties as energy efficient as possible. These are typically those businesses that have as a goal



becoming more “Green” in their operations. They understand that EEPDR measures will help their bottom line in the long run and support their Green initiatives. These accounts typically have a dedicated energy manager, or a person who is accountable for energy budgets and reducing operating costs. They may have funds budgeted for EEPDR related capital improvements, performing energy audits and will include the impact on improving the environment in their EEPDR decision making process. While they may have already upgraded lighting and HVAC applications, there are still opportunities to upgrade motors and install energy optimizer support tools. These accounts have often chosen to implement EEPDR measures even when no utility supported rebate programs were available, since their usage is large enough to make their action justifiable, without additional rebates. The offer of utility energy efficiency rebates is a key tool for FirstEnergy in capturing additional energy efficiency savings among these customers. These accounts include combination gas station and convenience stores, high-end grocery stores, large department and box stores.

The second tier (Tier B) national account customers may investigate what EEPDR measures can do for them. However, even if they have corporate management backing, they typically don’t have the capital funding for EEPDR projects and therefore as a group are typically not implementing energy efficiency measures. They need to be convinced that each project will provide a quick payback and demonstrated in a strong business case. These customers may have implemented some lighting upgrades utilizing FirstEnergy’s prior EEPDR rebates. Customers in this category include the full range of national account business categories. Opportunities still exist for energy efficiency savings in lighting, motors, HVAC, compressors and energy monitoring applications.

The third tier (Tier C) national account customers are typically not actively investigating the benefits of EEPDR measures. Similar to the second tier, customers in this category include the full range of national account business categories. Often these companies do not have funds available to invest in EEPDR measures and are focused on the continuation of their businesses. These customers will be a difficult group of customers to convince to invest in EEPDR measures. The Companies’ program rebates will be an important tool to move some of these companies to consider investing in energy efficiency measures. Opportunities exist for EEPDR savings in interior and exterior lighting, motors, HVAC, compressors and energy monitoring applications.

#### 4.4.4 Regional Governmental Accounts

Each of the three Companies also has area managers that are the primary point of contact for officials representing Counties, Cities, Townships, Villages, Co-ops and Authorities located in each Company’s service territory. These individuals are one of several sources for information on the Companies’ EEPDR programs. To obtain additional information regarding the market potential for this segment, Harbourfront conducted telephone interviews in early March 2016 with seven area managers throughout the Companies’ service territories. Based on these interviews, the following observations were made:

- There are hundreds of governmental entities within the Companies’ service territories. Typically, these entities do not have a dedicated individual that manages energy efficiency related issues, or has the responsibilities of monitoring and / or reducing energy costs.
- If there is someone, it typically will not be a dedicated person, but rather this task will be added to the duties of individuals such as the city manager, director of public works or village administrator.

- Many municipalities are very small and often have minimal full time employees who are tasked with the demands of managing a small government while covering their current costs without raising taxes or reducing the services they provide.
- Many municipalities lack the resources (knowledge, staff, and funding) to fully investigate EEPDR opportunities. Many have limited budgets and rely on grants to fund improvements. Smaller municipalities lack the knowledge and staff to seek out and apply for grants. They will often need assistance with the process of applying for the money, as well as the process of planning for and executing an energy efficiency capital project.
- Some municipalities have worked with consultants who specialize in EEPDR services and may offer a shared savings program.
- While rebates are always helpful, the local government still needs to raise money to make the improvements. Once EEPDR opportunities are identified and planned for, the EEPDR program needs to then be included in the appropriate future government capital budget cycle.
- Municipalities may differ in their levels of interest and activities regarding EEPDR. While some are investigating and pursuing new technologies to reduce energy costs (typical for larger cities such as Cleveland and Toledo), others may simply not have focused much effort on EEPDR initiatives to date.
- Counties and cities will generally have more governmental buildings, treatment plants, and other facilities than their smaller counterparts. Significant EEPDR opportunities may exist at treatment plants and other large governmental facilities, but in order to determine the scope of these opportunities, an energy audit or survey may be necessary. Typically, such facilities are replacing equipment such as motors when they break and may replace the broken equipment with the lowest cost motor that is available, which may be a standard efficiency motor rather than a more efficient one. When upgrades are planned, typically the new equipment will be energy efficient. Potential in this sector may be increased through focused educational materials and dedicated staff familiar with government budgeting processes.

## 5.0 MARKET CHARACTERIZATION

### 5.1 CHARACTERIZATION OF THE MARKET FOR ENERGY EFFICIENCY

An important aspect in determining the realization of the potential for energy efficiency program initiatives in a given region is to understand the extent of the retail market offerings for energy efficient appliances and end use equipment. The ready and widespread availability of a wide variety of energy efficient appliances, end use equipment and high efficiency lighting options insures that energy efficiency programs that target such products can reach achievable potential estimates that are developed. Harbourfront conducted product availability research of major appliances, end uses and lighting across the Companies' service territories through in-person visits to retailers in the Akron-Canton, Cleveland and Toledo areas. Harbourfront personnel also conducted Internet research of on-line store sites, and reviewed periodicals and print sources of current energy efficiency messaging to consumers at the stores visited. This work also included searches and summaries of local and national energy efficiency programs, energy audit programs, and other resources that a consumer in the specified area may access when looking to conserve energy.

Research results indicate that the availability of energy efficient appliances and end uses, especially lighting, in the Companies' service territories is increasing. Other observations from this research are as follows:

1. Onsite visits were made to 13 retail stores in the Akron-Canton, Cleveland and Toledo areas<sup>12</sup>. The onsite visits confirmed that the in-store displays for both CFL and LED bulb options were both extensive and eye catching. These displays were placed in high traffic areas and the display designs were colorful and appealing to the consumers. Pricing was clear and energy efficiency/electricity cost saving messaging was easy to identify. Additionally, in store displays demonstrated the brightness and color rendition of various CFL and LED product examples.
2. Below is a summary of the number of ENERGY STAR appliances available as a percentage of total numbers of appliances on the sales floor based on actual floor inventory:
  - a. Refrigerators over 22 cu. ft.: 68%
  - b. Refrigerators 22 cu. ft. and below: 29%
  - c. Freezers-Upright: 62 %
  - d. Freezers-Chest: 17%
  - e. Dishwashers: 91%
  - f. Clothes Dryers: 29%
  - g. Clothes Washers: 70%
3. Based on discussions with retail store sales personnel about customer preferences, it appears that shoppers did not often ask sales personnel to point out ENERGY STAR appliances – something that was more commonly asked in earlier years. During these discussions, sales personnel varied in their opinions as to why this was the case, concluding that customers either recognized the familiar ENERGY STAR signage or were more focused on appliance features or price, rather than efficiency ratings.

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<sup>12</sup> Additional stores were contacted through telephone inquiries or reviewed via Internet websites.

4. Based on reviews of the ENERGY STAR information attached to the appliances, the following observations were made:
- a. *Refrigerators*-the average difference in annual estimated kWh consumption between ENERGY STAR and non-ENERGY STAR refrigerators in the 22-28 cu ft. size range was between 60 and 150 kWh. However, the energy savings resulting from either size unit when compared to the devices that were being replaced would represent a significant annual kWh savings. According to a 2014 DOE estimate, approximately 80% of all refrigerators are ENERGY STAR certified. The survey results show a lower percentage of ENERGY STAR refrigerator availability than the DOE report, underscoring the need to continue refrigerator rebate programs to create additional demand for efficient refrigerators, especially in the smaller cu ft. sizes. Price comparisons between ENERGY STAR and Non-ENERGY STAR refrigerators indicated that ENERGY STAR appliances were more expensive. In the 18-24 cu. ft. size range, ENERGY STAR refrigerators were, on average, \$ 700 more expensive than their non-ENERGY STAR counterparts, and, for the Over-24-30 cu ft. category, the ENERGY STAR refrigerators were, on average, \$ 200 more expensive than their non-ENERGY STAR counterparts. These average price differences were estimated after reviewing a sample of each type of refrigerator in each of the two size categories. It was observed that the ENERGY STAR models, in the Over-24-30 cu ft. category, tended to have more features than the non-ENERGY STAR models.
  - b. *Dish Washers* - virtually all dishwashers in the 13 stores visited were ENERGY STAR rated. These appliances use less water than earlier models, have soil sensors, more efficient jets, temperature control for heating water and better filtration, which removes food particles from wash water. Depending on the features, the ENERGY STAR dishwashers ranged in price from \$ 300-\$950. The few non-ENERGY STAR models found had selling prices in the \$250-\$300 range.
  - c. *Electric Dryers* - compared to other appliances surveyed, electric dryers had the least amount of ENERGY STAR rated appliances available. However, many of the non-ENERGY STAR rated dryers were labeled as High Efficiency due to certain energy saving functions. These include temperature sensors, which use the temperature of dryer exhaust air to estimate when clothes are dry and automatically shut off the dryer, as well as moisture sensors, which shut off the dryer when the humidity of the exhaust air indicates the clothes are dry. (Older dryers use timed settings to dry clothes, which probably lead to over-drying by running the dryer when clothes may already be dry and needlessly using additional energy.) Insofar as costs were concerned, electric dryers varied in cost depending on capacity, features and energy efficiency. Non-ENERGY STAR electric dryers ranged in price from \$230 to \$1,530, while similar ENERGY STAR machines ranged in price from \$600 to \$1,800.
  - d. *Washing Machines* – the majority of washing machines were ENERGY STAR rated. These units use less energy, and also use far less water than in the past (up to 50% less). In addition, spin cycles remove more water from garments, which allows for shorter drying times. The ENERGY STAR models observed during the in-store surveys ranged in price from \$500-\$1500, while the non-ENERGY STAR models ranged in price from \$360-\$1360.

- e. *Electric Water Heaters* –Only one ENERGY STAR electric water heater with a storage tank was noted and the cost was over \$2,400. However, there were a number of ENERGY STAR-rated tankless, on-demand electric water heaters, with an efficiency rating of 99.8%, that were either in stock or available online through the store's website. There were both whole house models (costs ranged from \$300 to \$800) and point-of-use models (costs ranged from \$180-\$300). There were also several Heat Pump hot water heaters in 50 and 80-gallon storage tank sizes that ranged from \$1,000 for the 50 gallon models to \$1,500-\$1,800 for the 80 gallon models. For reference, standard, non-ENERGY STAR rated electric water heaters had an average cost in the \$300-\$400 range.

## 5.2 SUMMARY OF FINDINGS

The appliance availability research was conducted from December 2015 through March 2016 in the Companies' service territories. The research suggests that consumers in these areas continue to have access to EEPDR information and high-efficiency appliances, both in-store and online. For example, all of the big box stores that carry large appliances had a relatively large inventory of ENERGY STAR qualified versions of all major appliances, except ENERGY STAR electric water heaters as previously noted. Further, in-store sales representatives are, on the whole, knowledgeable about energy efficient technology options. Most store representatives again recognized the ENERGY STAR rating system as a measure for appliance energy efficiency.

A review of the "ENERGY STAR Unit Shipment and Market Penetration Report - Calendar Year 2014 Summary" indicates that of the total units shipped in 2014, ENERGY STAR models dominated in most appliance categories. This is consistent with, and supports, Harbourfront's findings in its Ohio-specific Retailer survey research. The following table provides a sampling of that information by major household appliance:

Table 5-1 U.S. ENERGY STAR Unit Shipment and Market Penetration-2014<sup>13</sup>

U.S. ENERGY STAR Unit Shipment and Market Penetration-2014		
Clothes Washers	6,067	69%
Computers (Notebooks)	40,539	93%
Dehumidifiers	2,003	89%
Dishwashers	6,346	92%
Freezers	536	29%
Multi-Function Printers	23,936	99%
Refrigerators	7,347	75%
Room Air Conditioners	2,981	50%
Central Air Conditioners	1,727	25%
Televisions (All- including LED))	35,102	99%
Televisions (LED)	34,284	100%
Electric Dryers, Electric Water Heaters	Not Reported	

### 5.2.1 Prices of EEPDR Measures

The appliance prices listed in this report are based on the State of Ohio Technical Reference Manual (TRM), Internet research, and telephone research. Discounts associated with in-store credit card use, on-line sales, and temporary price reductions, were not factored into these prices.

Harbourfront notes that stores generally had more permanent discount prices in addition to temporary sales and offers, and it was not always easy to distinguish these long-term discount prices from the original base price as store representatives tended to quote the current available price rather than the original manufacturer or store-recommended price. Competitor price matches further contributed to the difficulty in determining prices. Because many stores now refer to their online stores for a greater selection of products from what they have in-stock, Harbourfront also considered online store options in the pricing analysis.

<sup>13</sup> Table 5-1 contains information excerpted from an EPA publication entitled “ENERGY STAR Unit Shipment and Market Penetration Report Calendar Year 2014 Summary”

## 6.0 CUSTOMER SURVEY RESULTS

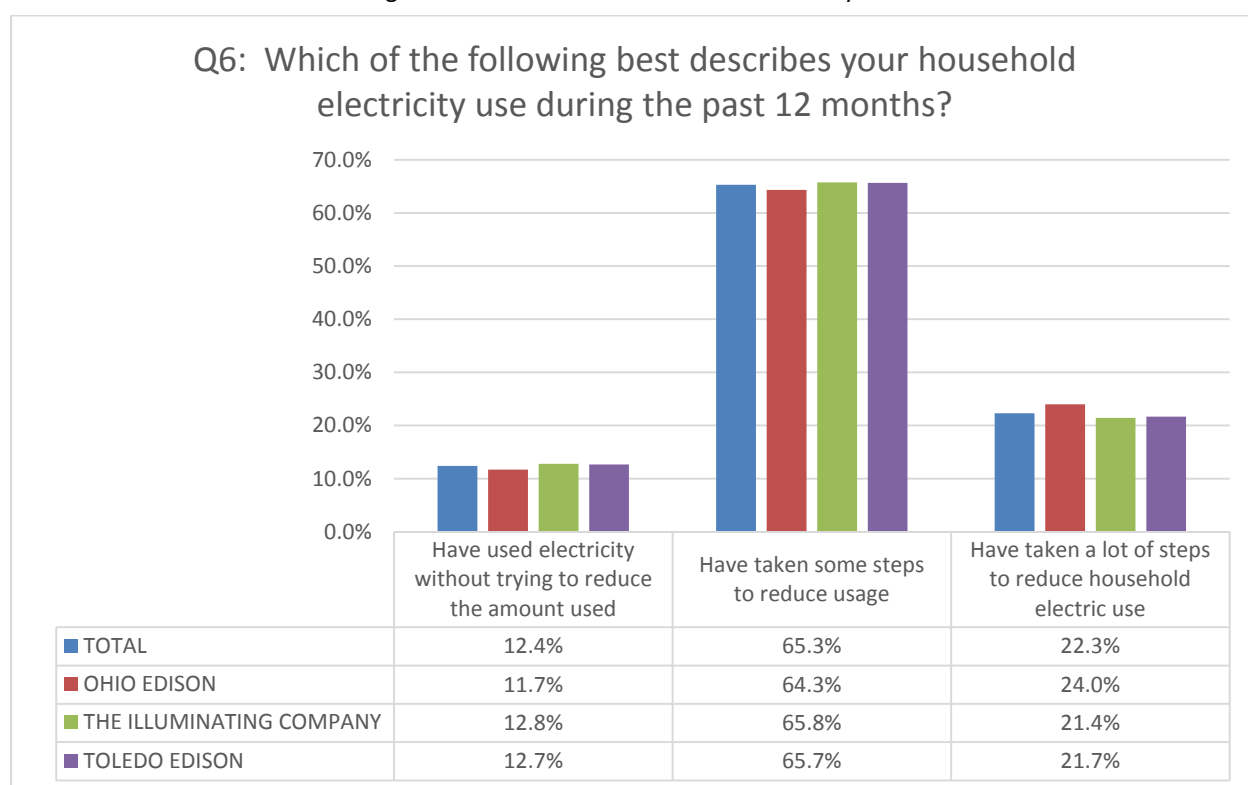
This chapter summarizes the highlights of the Residential Survey and the Commercial Telephone Surveys conducted by Triad Research Group (Triad) on behalf of Harbourfront. Both surveys were conducted in February 2016.

### Residential Mail Survey Results

#### 6.1.1 Level of Energy Efficiency Actions Taken and Intentions

Most respondents across all of the Companies have taken steps to conserve energy. About two thirds of all the respondents (65.3%) have taken some steps to reduce usage during the past 12 months and nearly the same percentage (62.8%) plan to do a little more over the next year.

Figure 6-1 Residential – Household Electricity Use

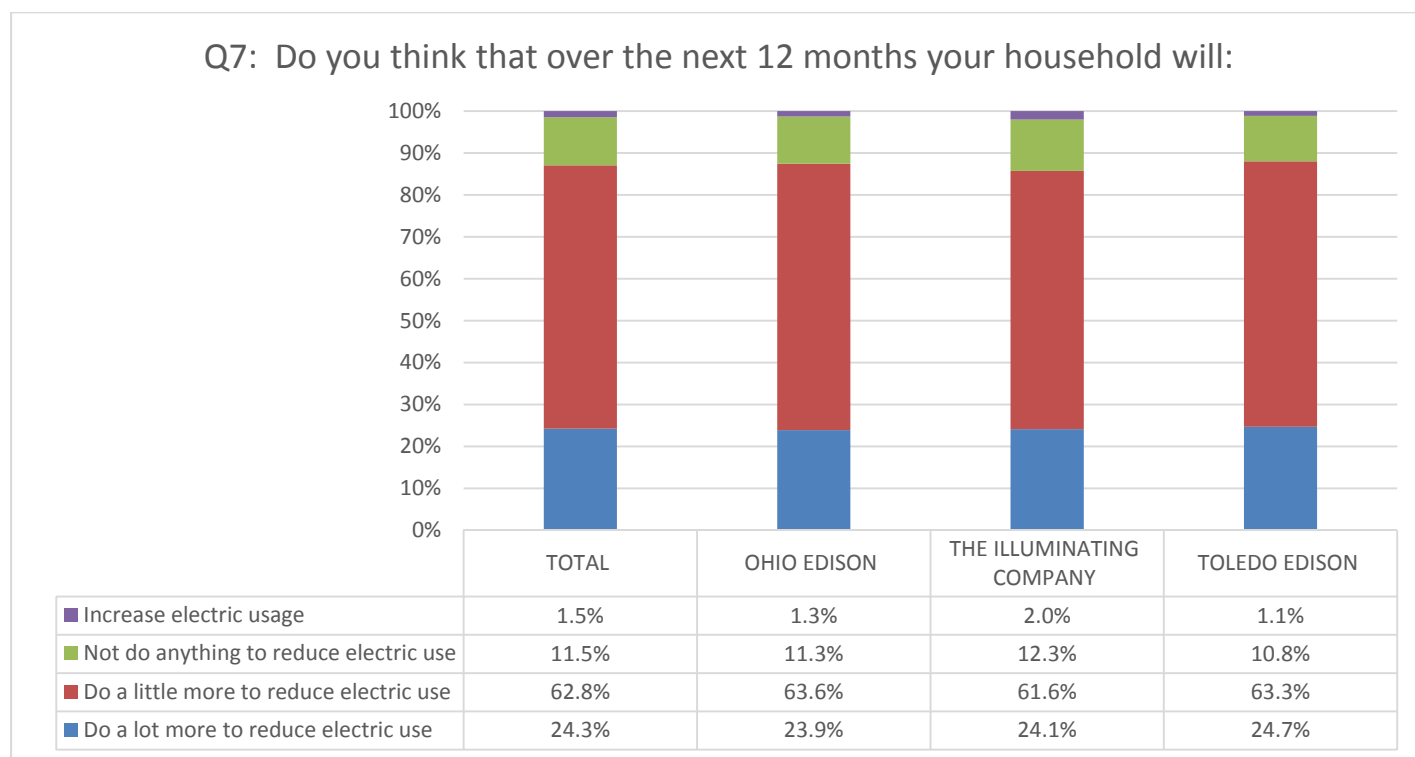


Additionally, more than a fifth of respondents (22.3%) “have taken a lot of steps to reduce” their use of electricity in the past 12 months. OE leads CEI and TE for customers who have taken “a lot of steps.”

Compared to the share of households who have taken a lot of steps in the past 12 months, a comparable share of the total respondents (23.9%) reported they would “do a lot more to reduce electric use” over the next year as well.



Figure 6-2 Residential – Future Energy Behavior



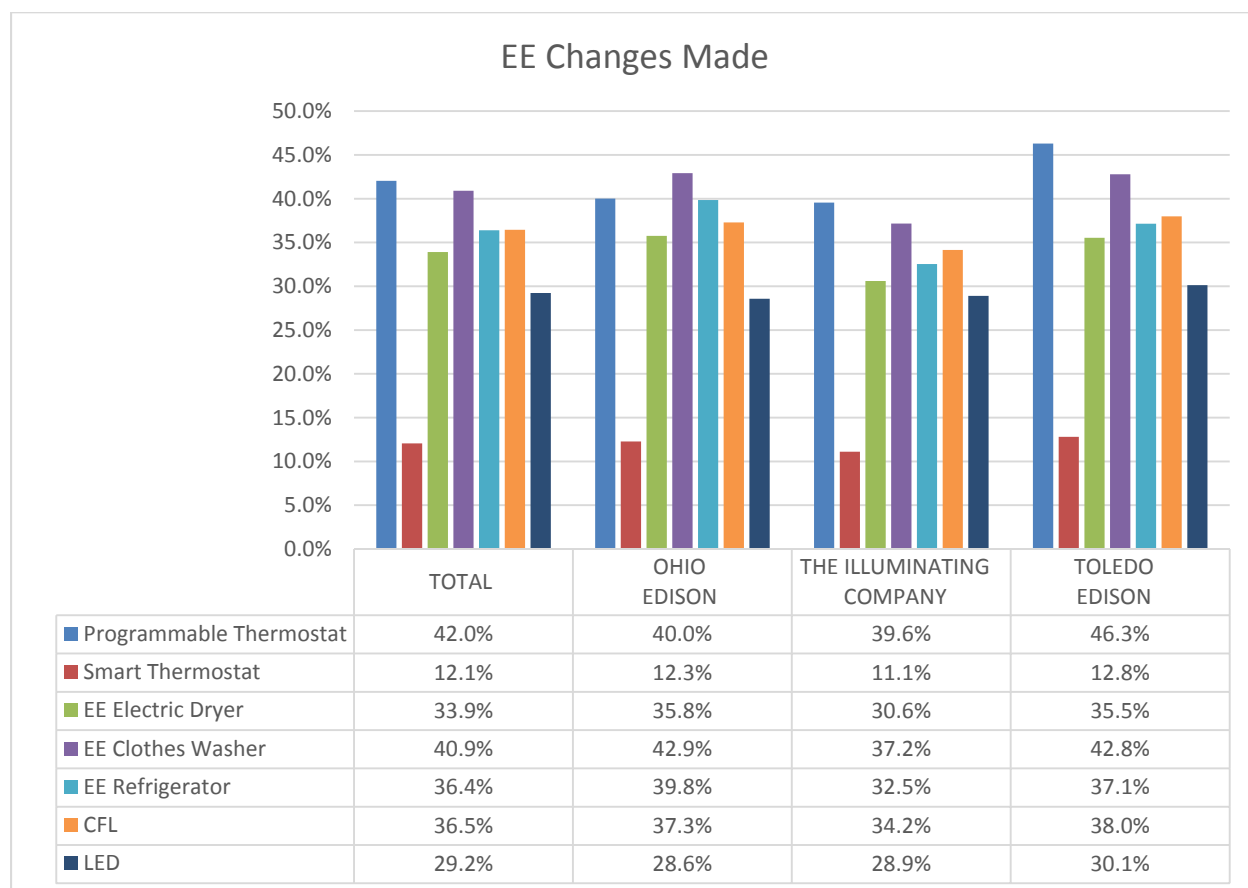
A combined 87.1% of respondents plan to do more over the next 12 months to use less electricity. Anxiety about the economy, concerns about the increasing cost of electricity, job stability and general concern for environment are provided as reasons for doing so.

The survey explored the specific types of changes, replacements, or modifications that the Companies' customers have already made, plan to make, or might consider making in terms of their home energy usage behaviors.

Overall, more respondents reported purchasing CFL bulbs (36.5%), programmable thermostats (42.0%), energy efficient refrigerators (36.4%), energy efficient clothes washers (40.9%), and energy efficient electric dryers (33.9%), compared to implementing other EEPDR measures in the last five years. The survey also shows that smart thermostats and LEDs are starting to penetrate the market successfully.



Figure 6-3 Residential – DSM/EE Changes Made



### 6.1.2 Energy Attitudes, Opinions and Behaviors

Customer perceptions about the cost of electricity have driven “organic” conservation efforts in the past. The cost of electricity and the environment are a concern to a majority of the respondents in the sample. Respondents were asked to rate their concerns about the cost of electricity and the environment using a 5 point scale where 1 equaled “Not At All Concerned” and 5 equaled “Very Concerned”. A combined 72.4% expressed some level of concern about the cost of electricity and 70.5% indicated concern about the environment. The concern over energy costs is less of a factor than in the prior survey, presumably because of current low fuel costs. The concern over the environment has increased since the last survey.

Figure 6-4 Residential – Concern about the Cost of Electricity

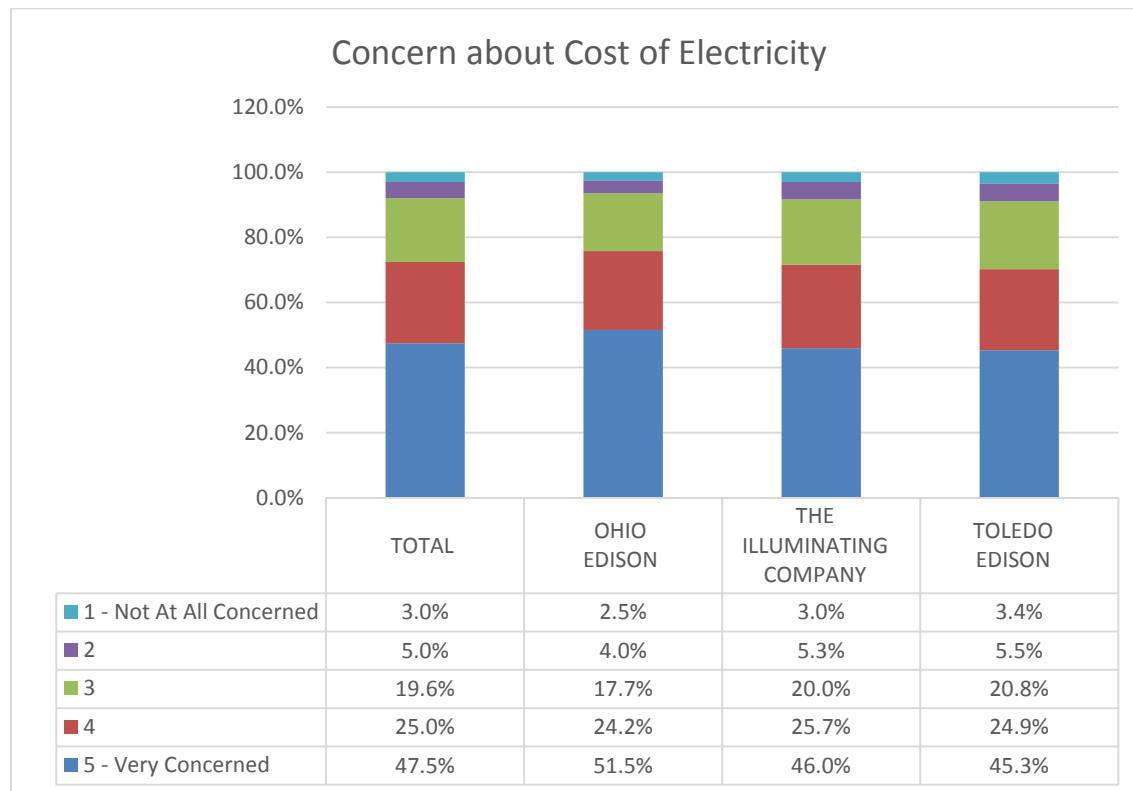
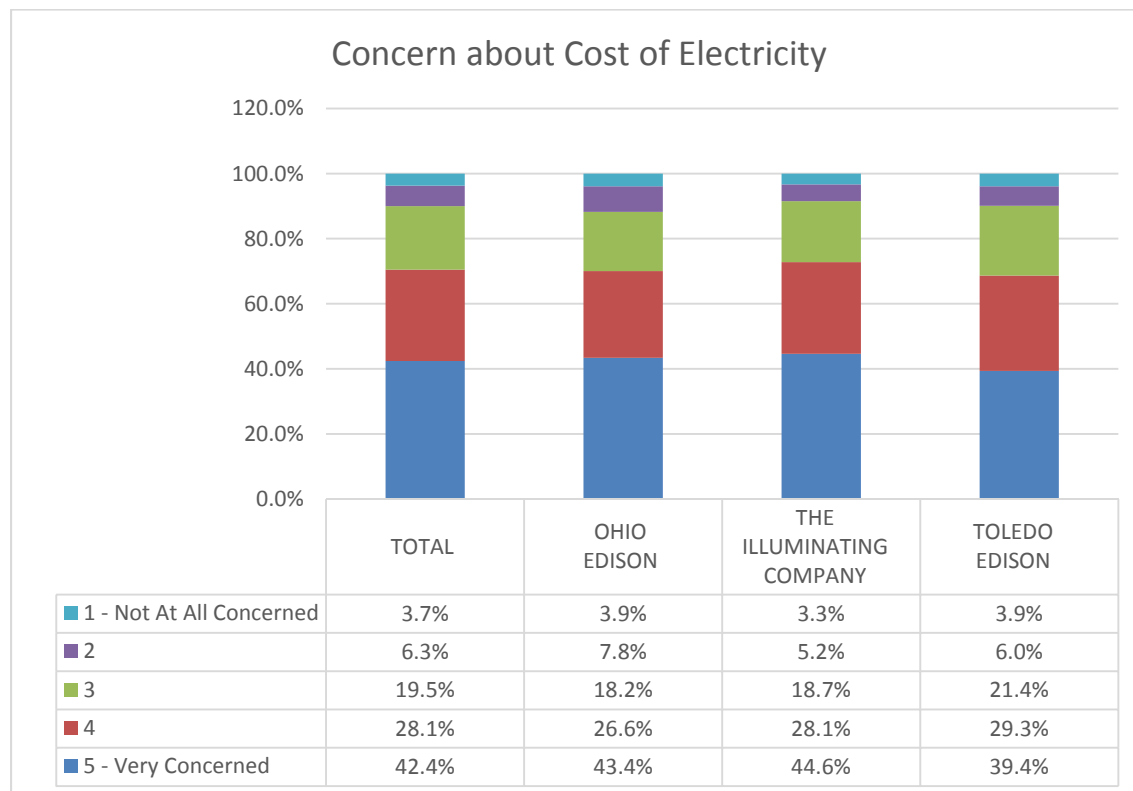


Figure 6-5 Residential – Concern about the Environment

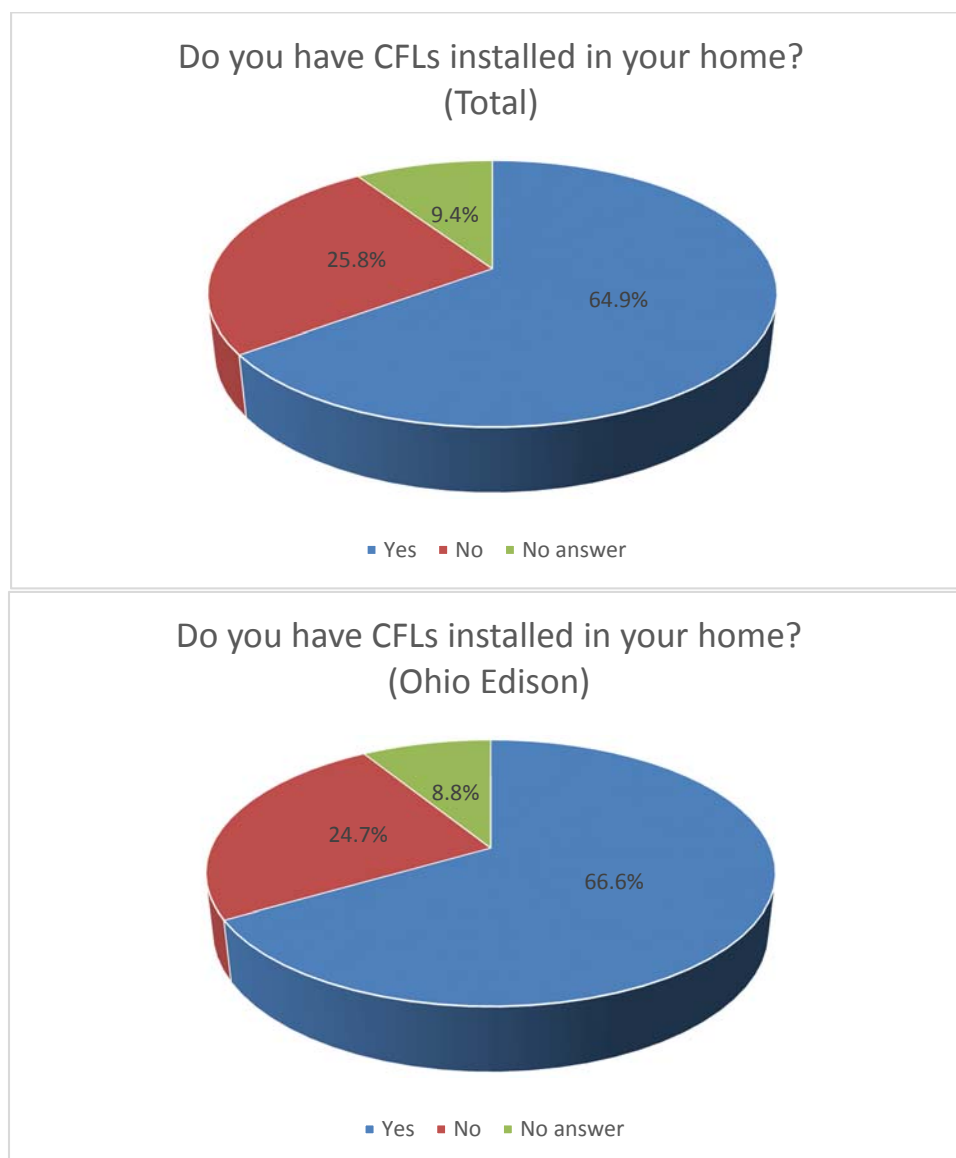


The data also suggests that respondent concern about the cost of electricity is causing a change in behavior. A little more than sixty percent of total respondents (60.4%) reported that the cost of electricity caused them to use it differently over the past years Appliance and Equipment Holdings and Information

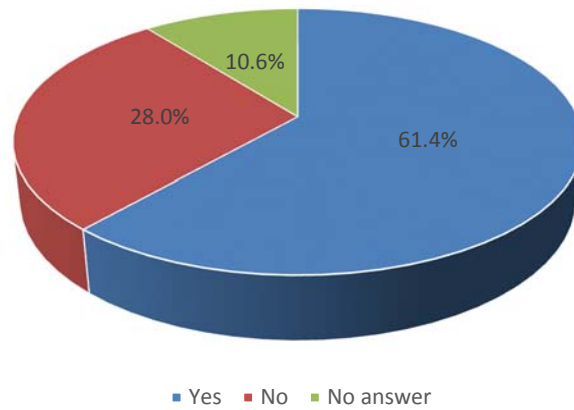
### Indoor and Outdoor/Security Lighting

Nearly two-thirds (64.9%) of the respondents in each of the Companies' service territories have compact fluorescent light (CFL) bulbs installed in their homes. The median number of CFL bulbs installed in respondents' homes is four.

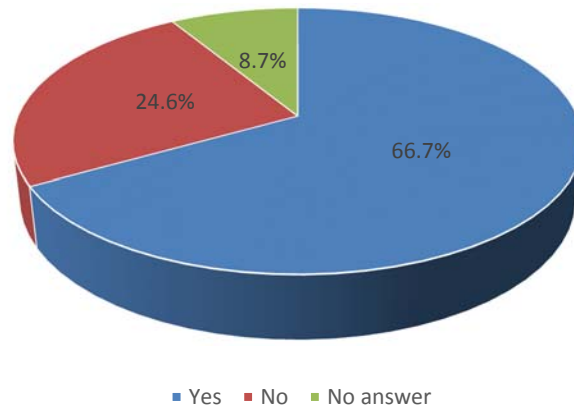
Figure 6-6 Residential – Percentage of CFL Ownership



Do you have CFLs installed in your home?  
(The Illuminating Company)



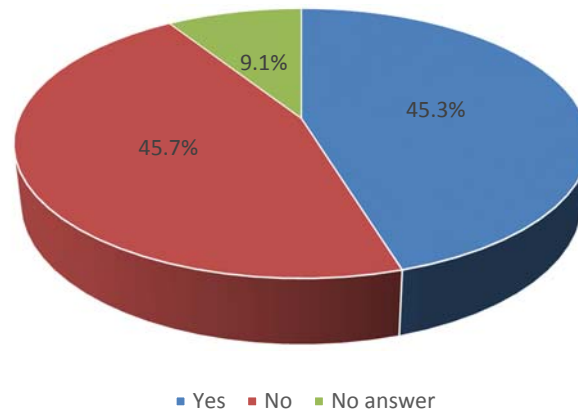
Do you have CFLs installed in your home?  
(Toledo Edison)



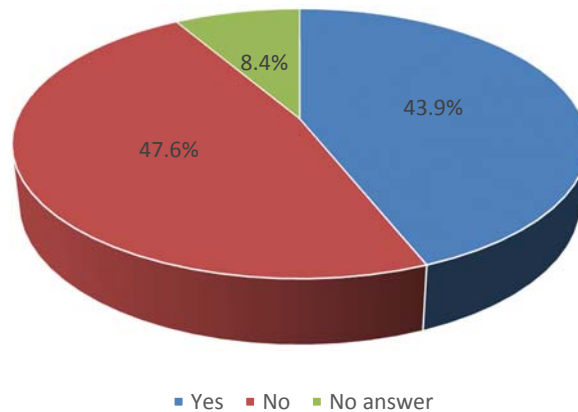
Approximately 45% of the homes have installed LEDs. The median number of LEDs installed in a home is five.

Figure 6-7 Residential – Percentage of LED Ownership

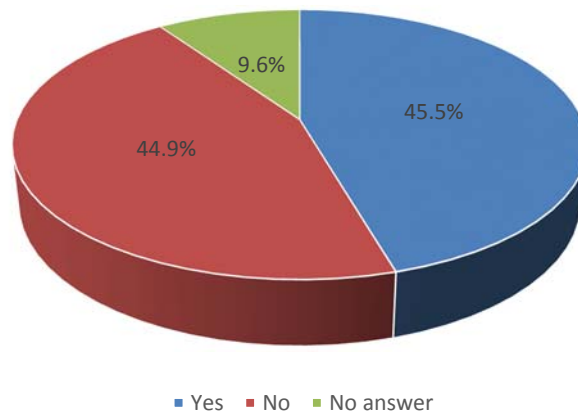
Do you have any LED installed in your home?  
(Total Ohio)



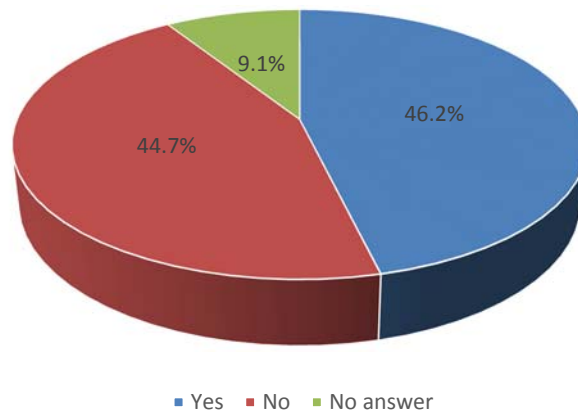
Do you have any LED installed in your home?  
(Ohio Edison)



Do you have any LED installed in your home?  
(The Illuminating Company)



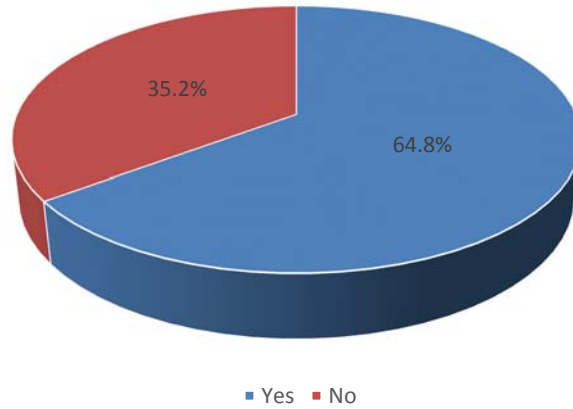
Do you have any LED installed in your home?  
(Toledo Edison)



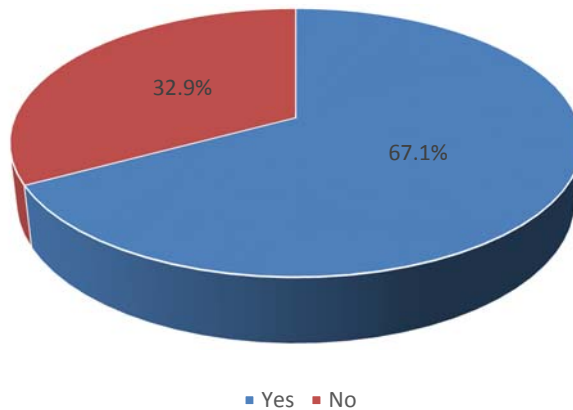
On average, 4.8 lights are on for more than four hours per day in respondent homes. More than half of the respondents overall in the Companies' service territories have outdoor/security lights. More respondents have outdoor security lighting in the Ohio Edison service territory (67.1%) than in Toledo Edison (63.3%) or the Illuminating Company (64.2%) service areas. All these numbers are up 2-6%, indicating growing preference for outdoor lights. The majority of customers with security lights have some combination of security lights that are operated by motion sensor (40.1%), switch (42.8%), and/or photocell (24.7%).

Figure 6-8 Residential – Percentage of Security Lights

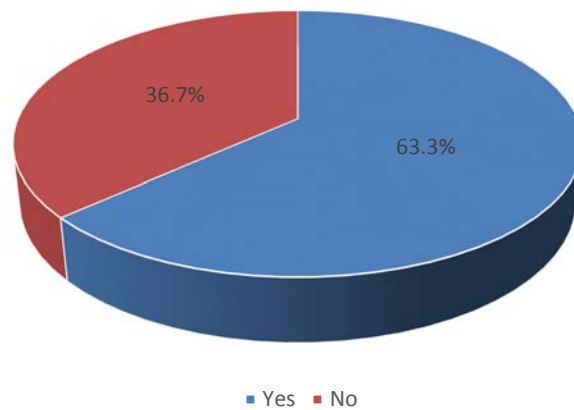
Do you have outdoor/security lighting?  
Total Ohio



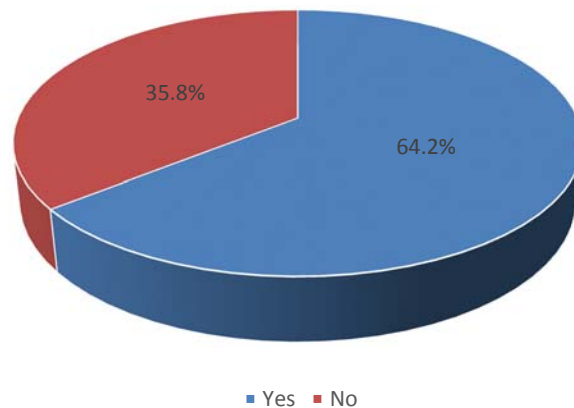
Do you have outdoor/security lighting?  
(Ohio Edison)



Do you have outdoor/security lighting?  
(The Illuminating Company)



Do you have outdoor/security lighting?  
(Toledo Edison)



### Refrigerators

Almost seventy-one percent (70.5%) of respondents have a refrigerator that is 10 years old or less. Although the majority of respondents do not own a second unit, one third reported that they have a second refrigerator. Almost eighty-two percent (81.6%) of the second refrigerators are used year round, while 13.5% are used part time, and 4.5% are unplugged and not in use. There was approximately a 5% increase in respondents who have a second refrigerator and reported using their second refrigerator year-round.



Figure 6-9 Residential – Age of Primary Refrigerator

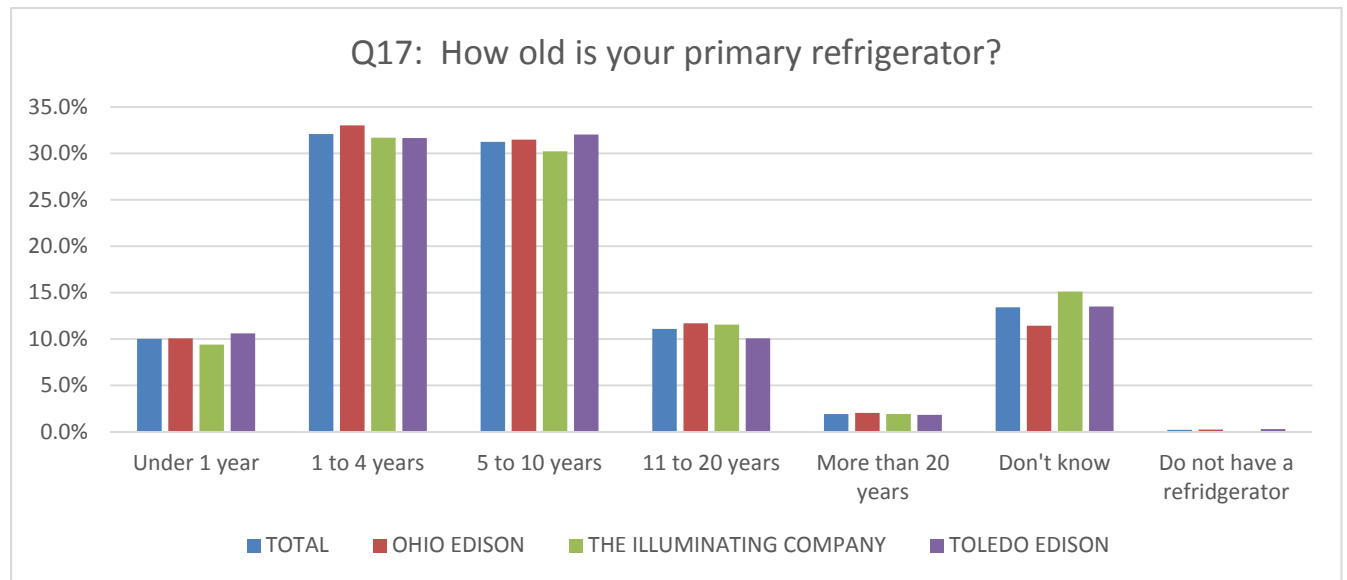
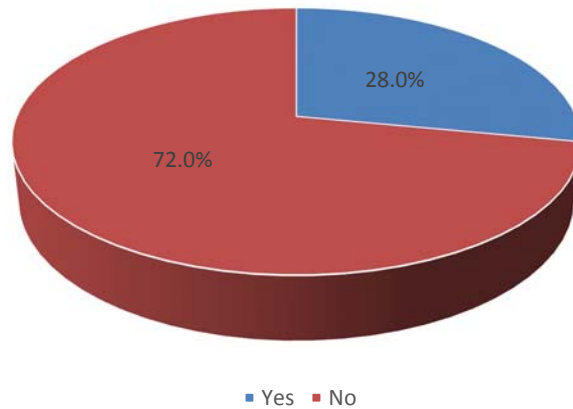
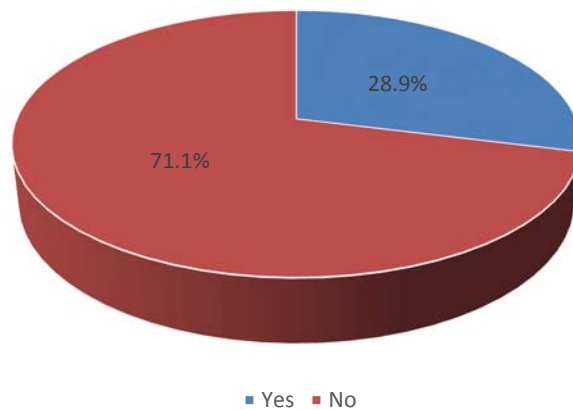


Figure 6-10 Residential – 2<sup>nd</sup> Refrigerator Ownership

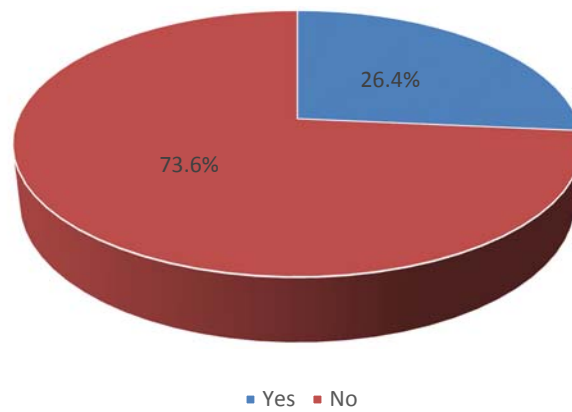
Do you have an additional refrigerator?  
(Total Ohio)



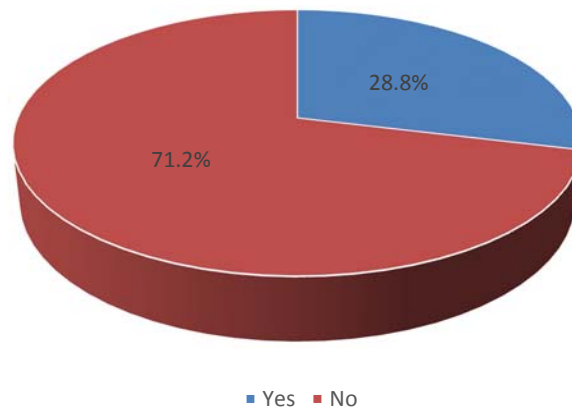
Do you have an additional refrigerator?  
(Ohio Edison)



Do you have an additional refrigerator?  
(The Illuminating Company)



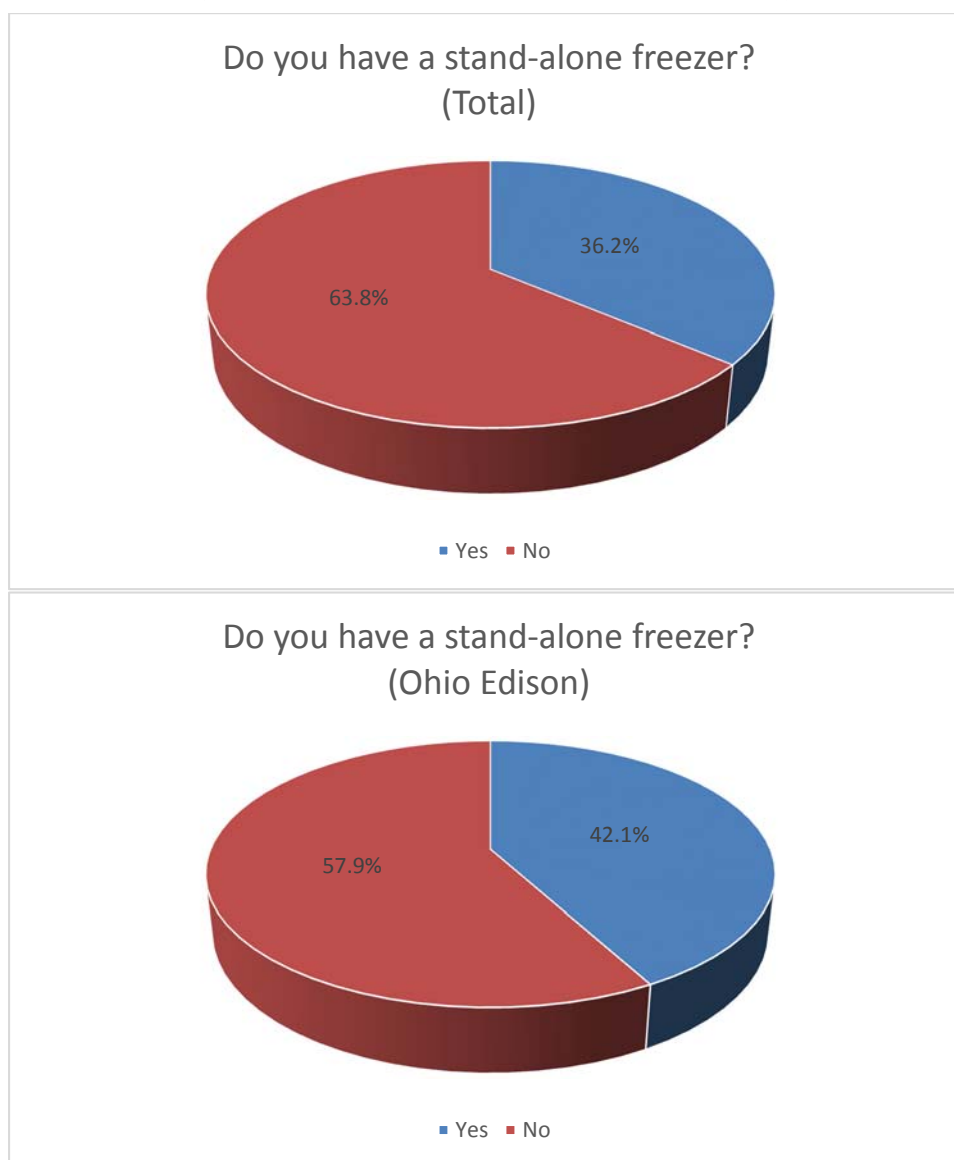
Do you have an additional refrigerator?  
(Toledo Edison)



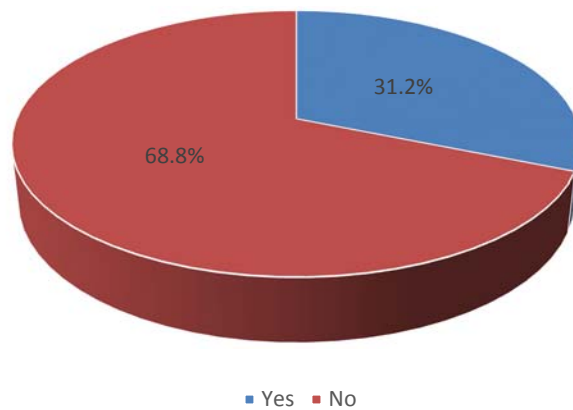
### Stand-Alone Freezers

More than thirty-six percent (36.2%) of surveyed customers indicated that they own a stand-alone freezer. A higher percentage of customers in the Ohio Edison territory (42.1%) have stand-alone freezers compared to The Illuminating Company (31.2%) and Toledo Edison (36%). Of customers who have a stand-alone freezer, the vast majority operates it year-round (81.3% overall). Ensuring that these freezers are run efficiently could provide additional opportunities for energy savings.

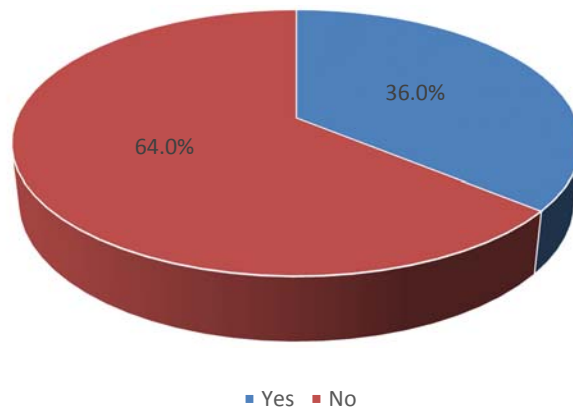
Figure 6-11 Residential – Stand-Alone Freezer Ownership



Do you have a stand-alone freezer?  
(The Illuminating Company)



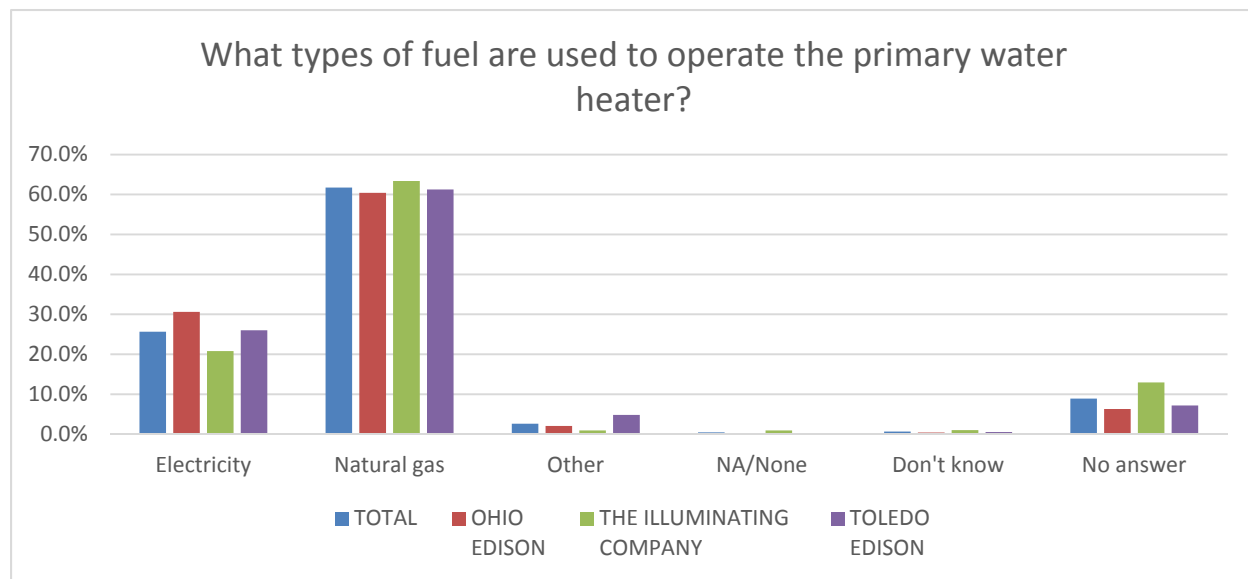
Do you have a stand-alone freezer?  
(Toledo Edison)



### Water Heating

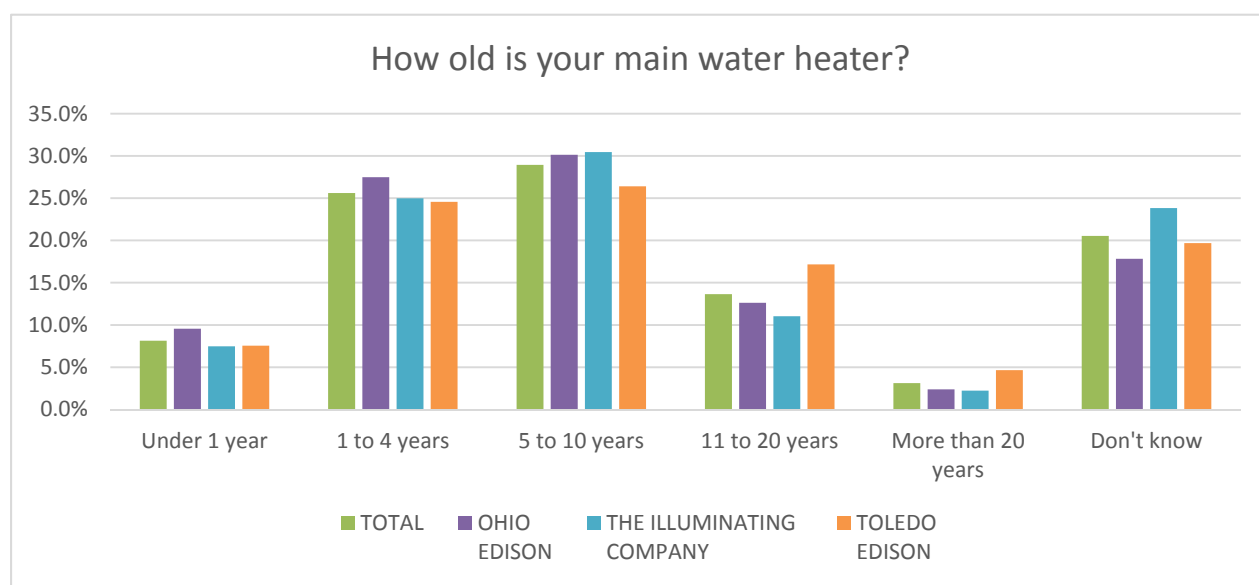
Natural gas and electricity are the two fuels cited most often for water heating. Overall, more respondents (61.7%) heat their water with natural gas than electricity (25.7%). The Companies may be able to improve the efficiency of the stock of electric water heaters their service territories by incentivizing the purchase of both high efficiency and hybrid electric water heaters.

Figure 6-12 Residential – Main Water Heating Fuel



Almost sixty-three percent (62.7%) of respondents said their water heater was 10 years old or less.

Figure 6-13 Residential – Age of Primary Water Heater



### Heating and Air Conditioning

System-wide, more respondents heat their homes with natural gas (68.7%) than any other fuel. Sixty-one percent (60.8%) of respondents reported that their primary heating system is a gas furnace (hot air). Less than half of respondent's main heating systems (47%) are 10 years old or less, 32.7 percent are over 10 years old, and 20.7 percent of residents do not know how the age of their primary heating system.

Figure 6-14 Residential – Fuel and Type of Heating System

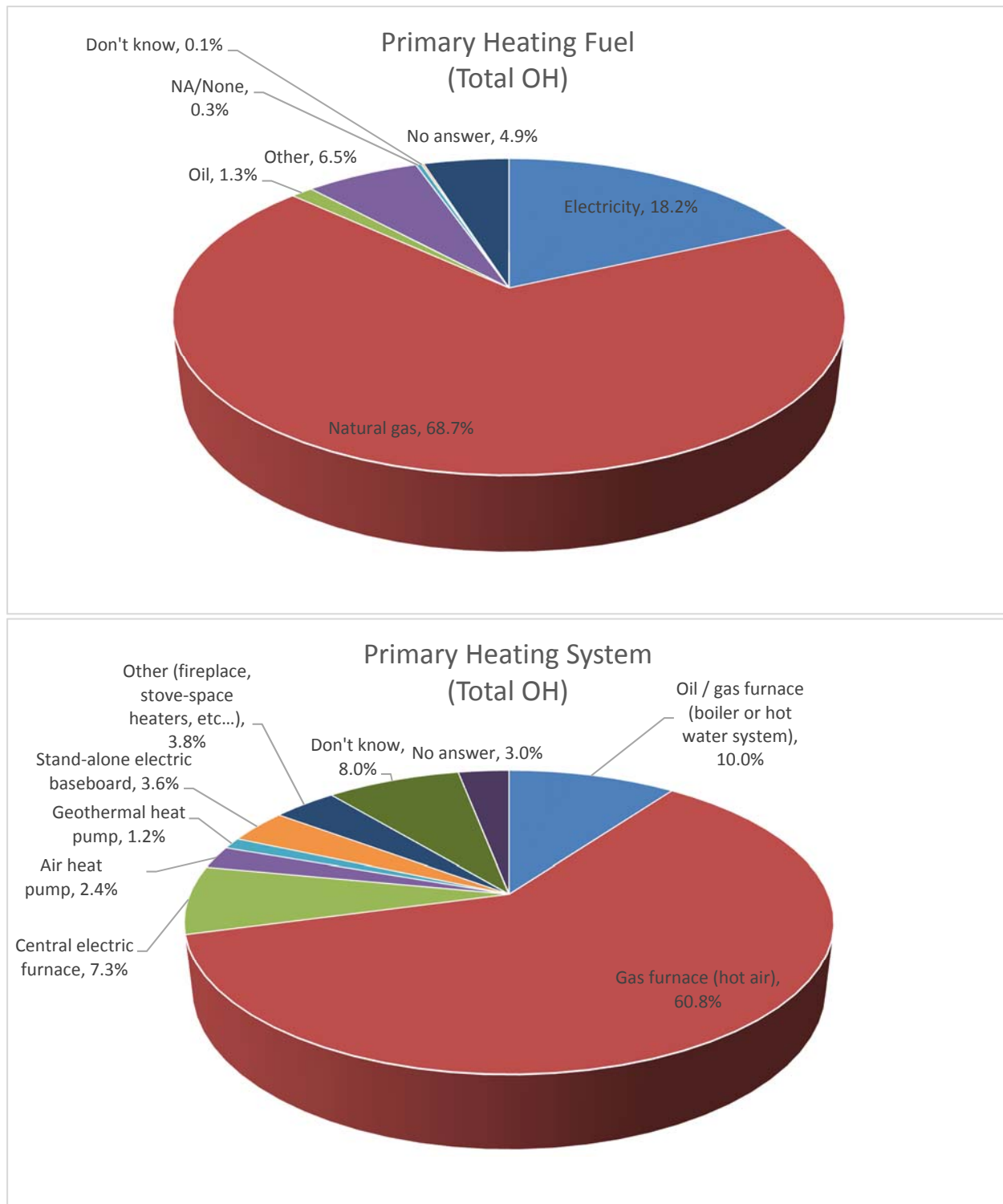
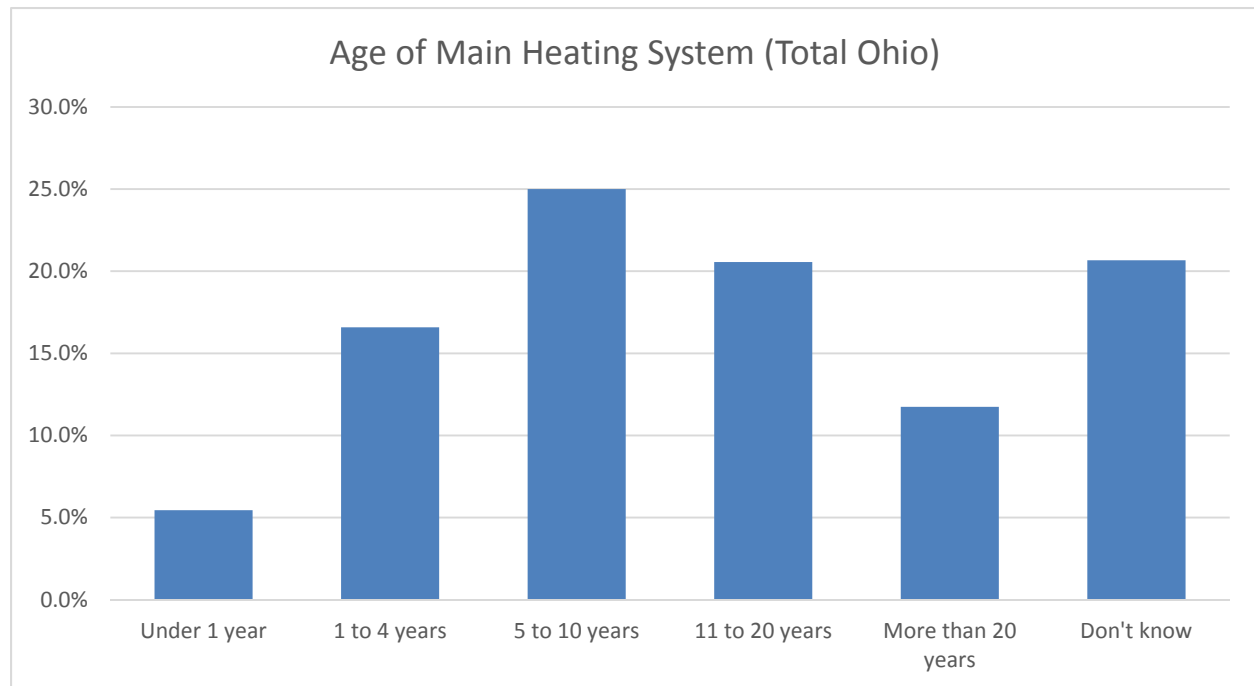


Figure 6-15 Residential – Age of Heating System



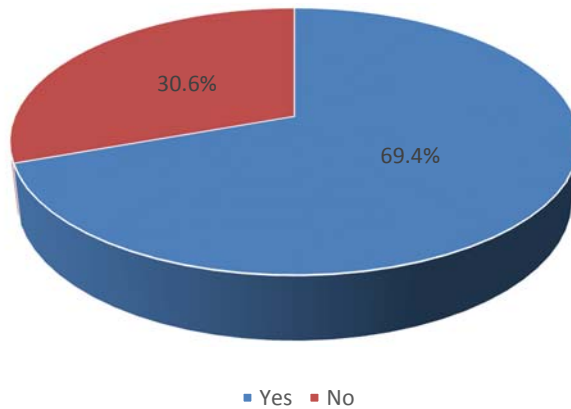
### Central Air Conditioning

Nearly seventy percent of respondents (69.4%) have central air conditioning. The vast majority of these (83.1%) are electric whole house AC units. Approximately one quarter of all respondents indicated that their units are 5 to 10 years old (27.2%); with another quarter of respondents reporting that their units were over 10 years old (24.8%).

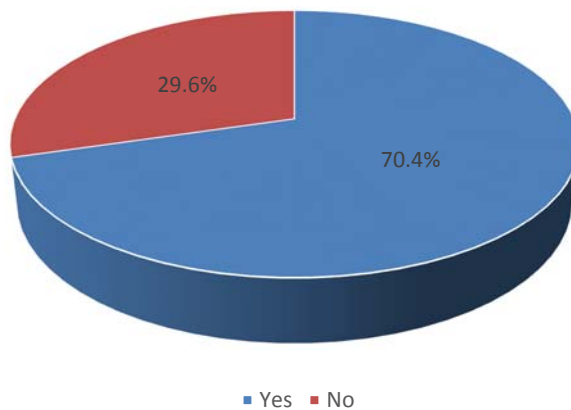


Figure 6-16 Residential – Percentage of CAC

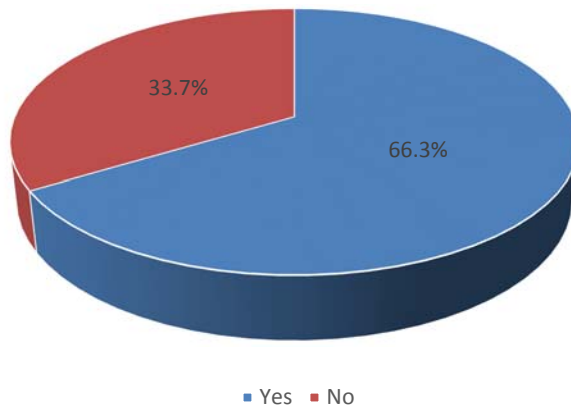
Do you have Central Air Conditioner?  
(Total Ohio)



Do you have Central Air Conditioner?  
(Ohio Edison)



Do you have Central Air Conditioner?  
(The Illuminating Company)



Do you have Central Air Conditioner?  
(Toledo Edison)

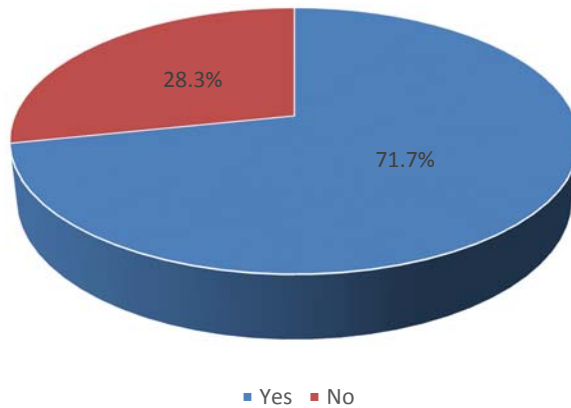
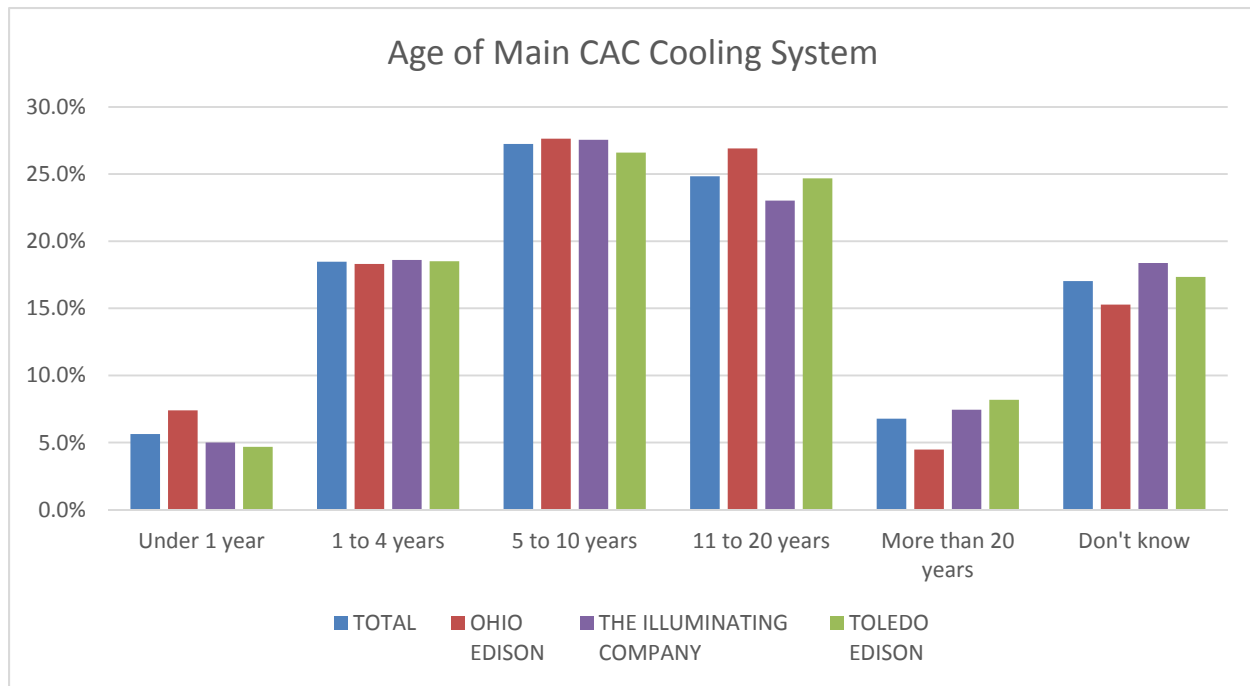
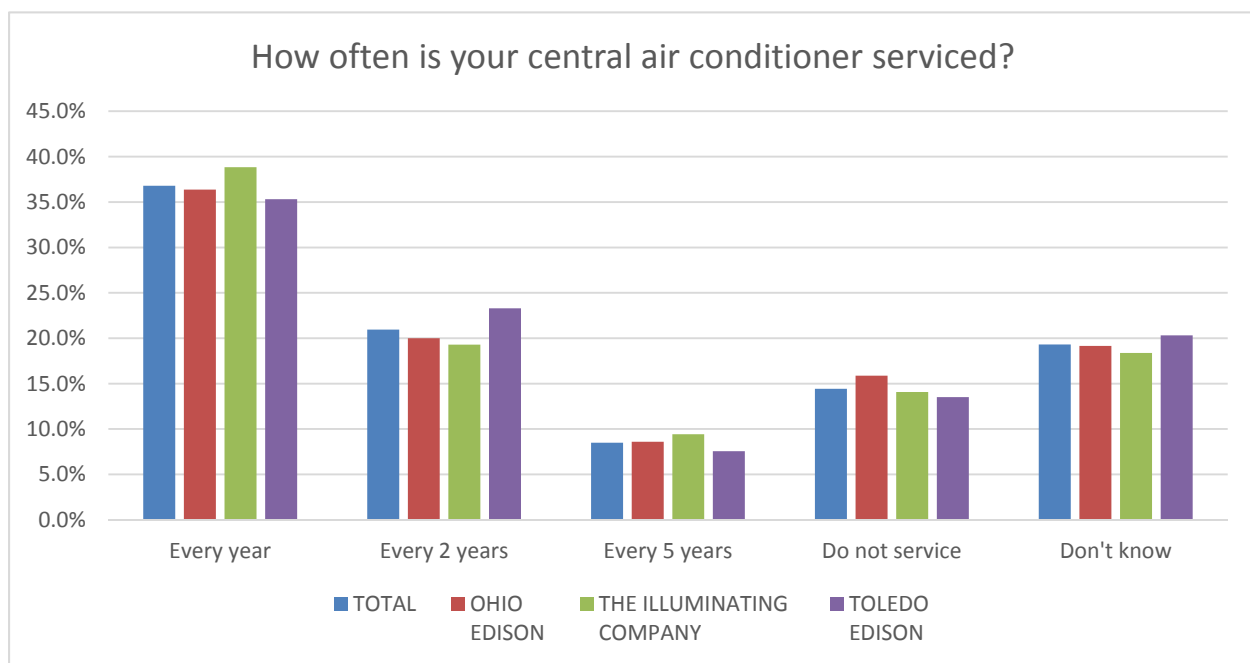


Figure 6-17 Residential – Age of Main CAC System



Almost thirty-seven (36.8%) percent of the respondents with central air conditioning have their units serviced every year, with more customers in The Illuminating Company servicing their units annually compared to customers in Ohio Edison and Toledo Edison.

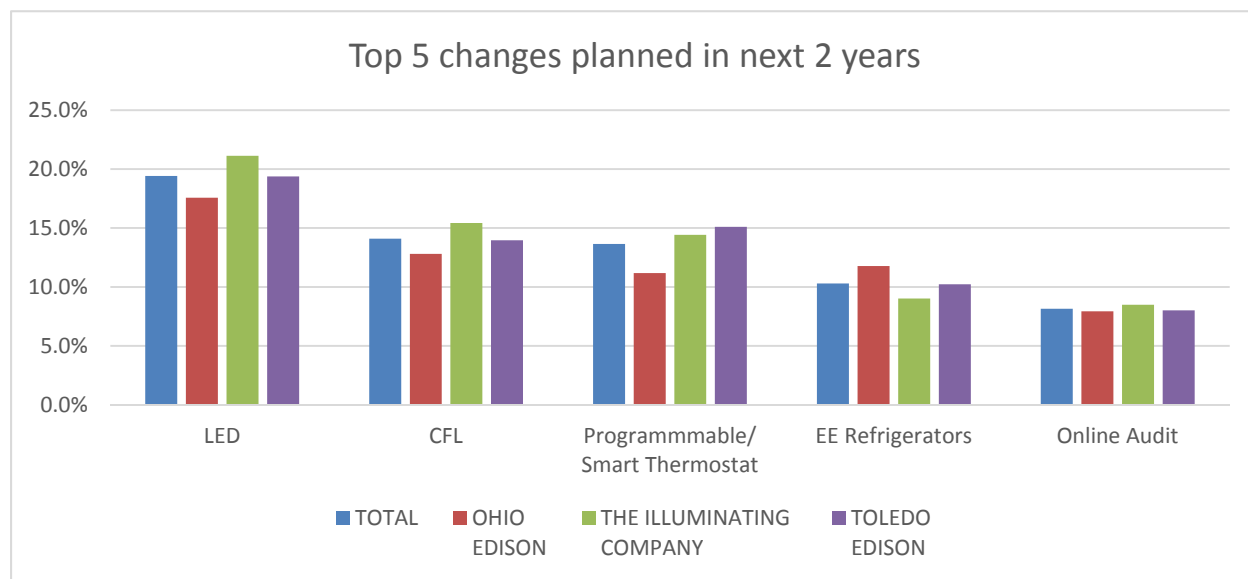
Figure 6-18 Residential – CAC Service Schedule



### Intentions to Purchase New Appliances or Equipment in Near Term

In general, survey respondents did not anticipate purchasing any major new appliances or energy efficient equipment in the near future. Of those who expressed intent to make such a purchase, LED's, CFLs, smart thermostats, and energy efficient refrigerators were the most popular:

Figure 6-19 Residential – Intentions to Purchase New Appliances



### Needs and Preferences Regarding Energy Use, Energy Conservation

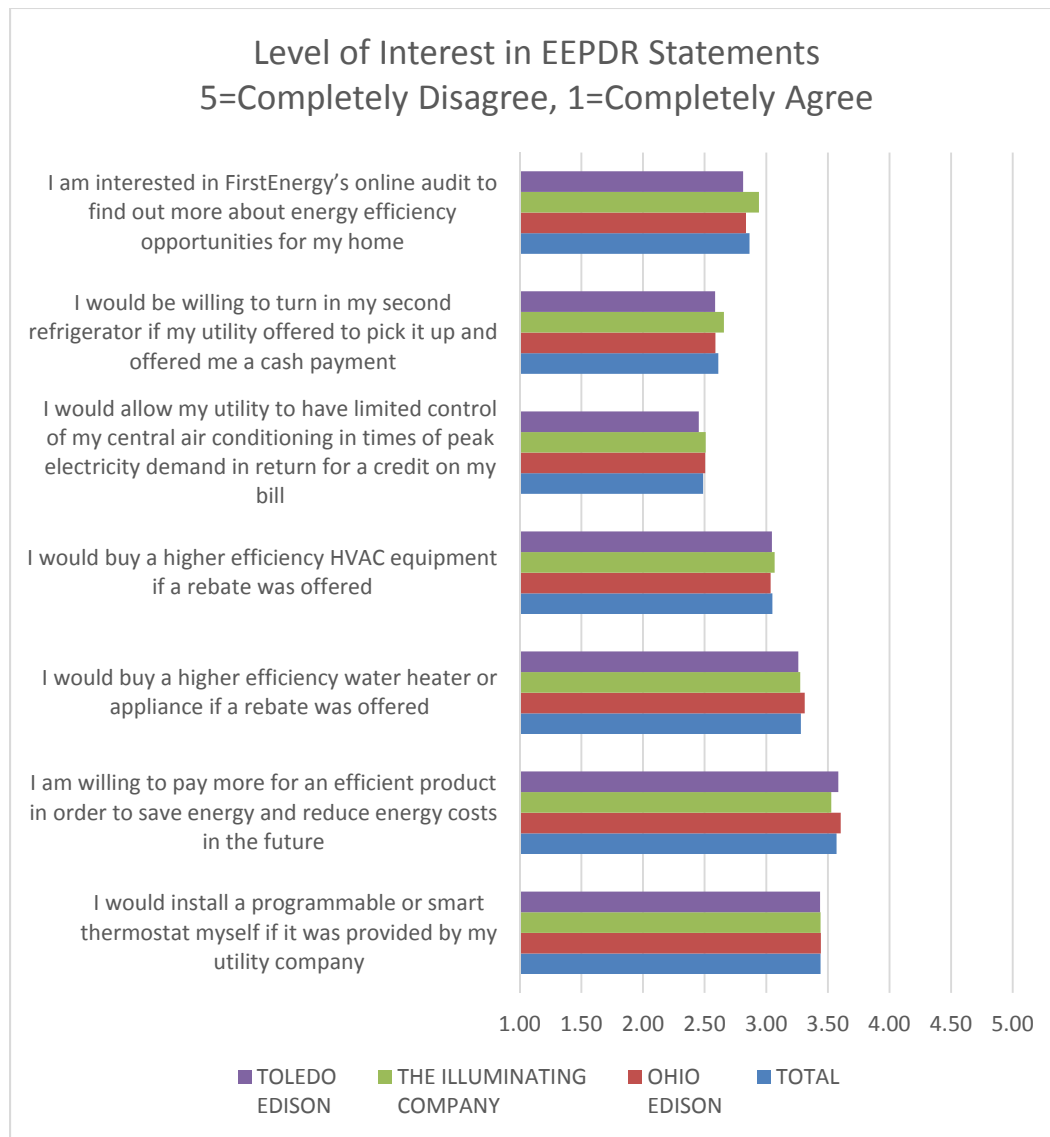
Respondents demonstrated varying attitudes and opinions about energy conservation and demand side management measures. The survey asked respondents to rate their level of agreement with a series of statements using a 5 point scale where 1 = Completely Disagree and 5 = Completely Agree.

Respondents were presented with statements related to their acceptance of and willingness to adopt several EEPDR program measures.

- "I am willing to pay more for an efficient product in order to save energy and reduce energy costs in the future."
- "I would install a programmable thermostat myself if it was provided by my utility company."
- "I would buy a higher efficiency water heater or appliance if a rebate was offered."
- "I would allow my utility to have limited control of my central AC in times of peak electricity demand in return for a credit on my bill."
- "I would be willing to turn in my second refrigerator if my utility offered to pick it up and offered me a cash payment."
- "I am interested in FirstEnergy's Free Online Audit to find out more about energy efficiency opportunities for my home."

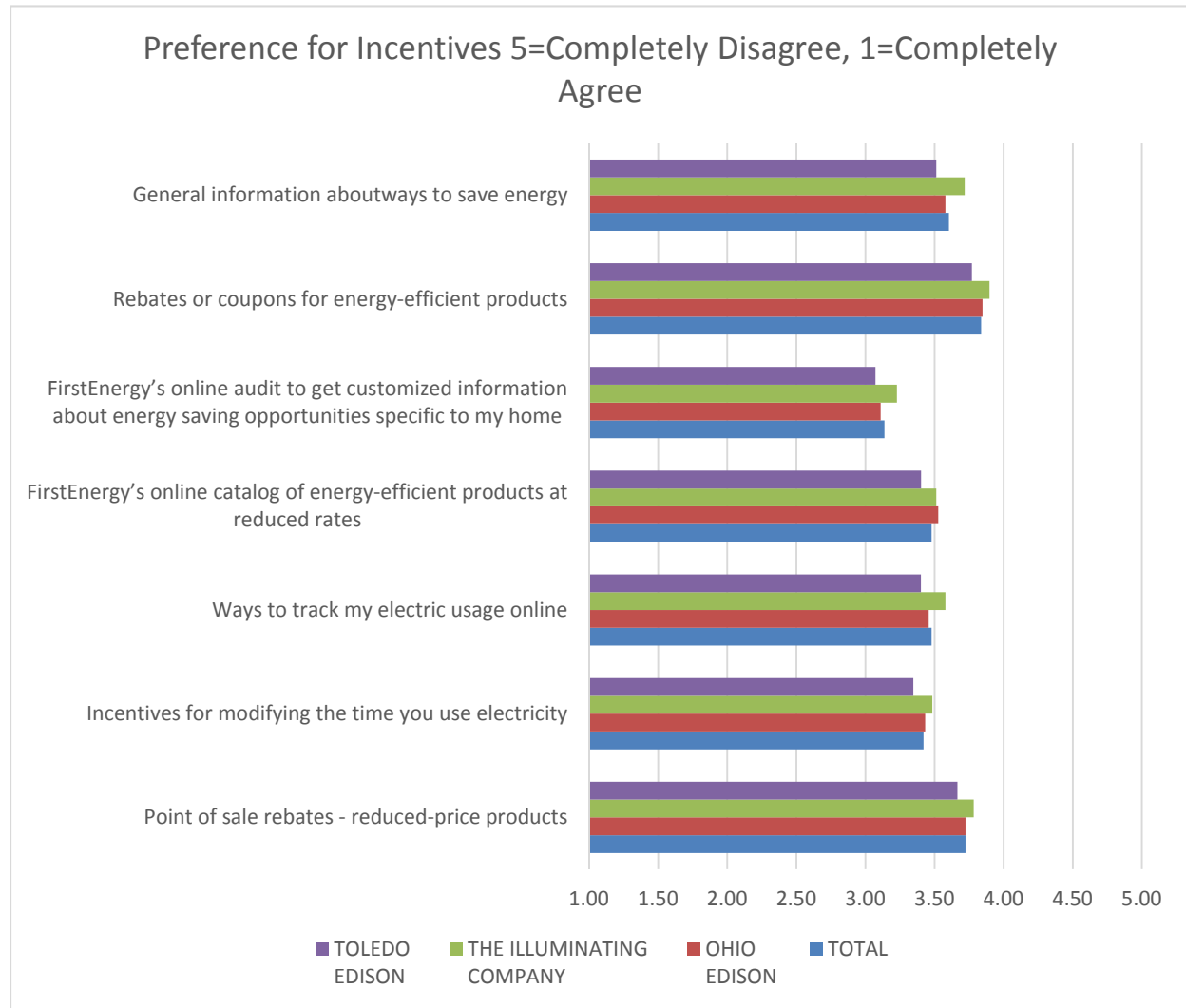
As shown in Figure 6-20, program measures related to programmable thermostats and energy efficient water heater rebates, received the highest levels of agreement.

Figure 6-20 Residential – Level of Agreement



The survey also assessed respondents' interest levels in several program delivery methods. Cash rebates, coupons, and general information received the highest mean interest ratings:

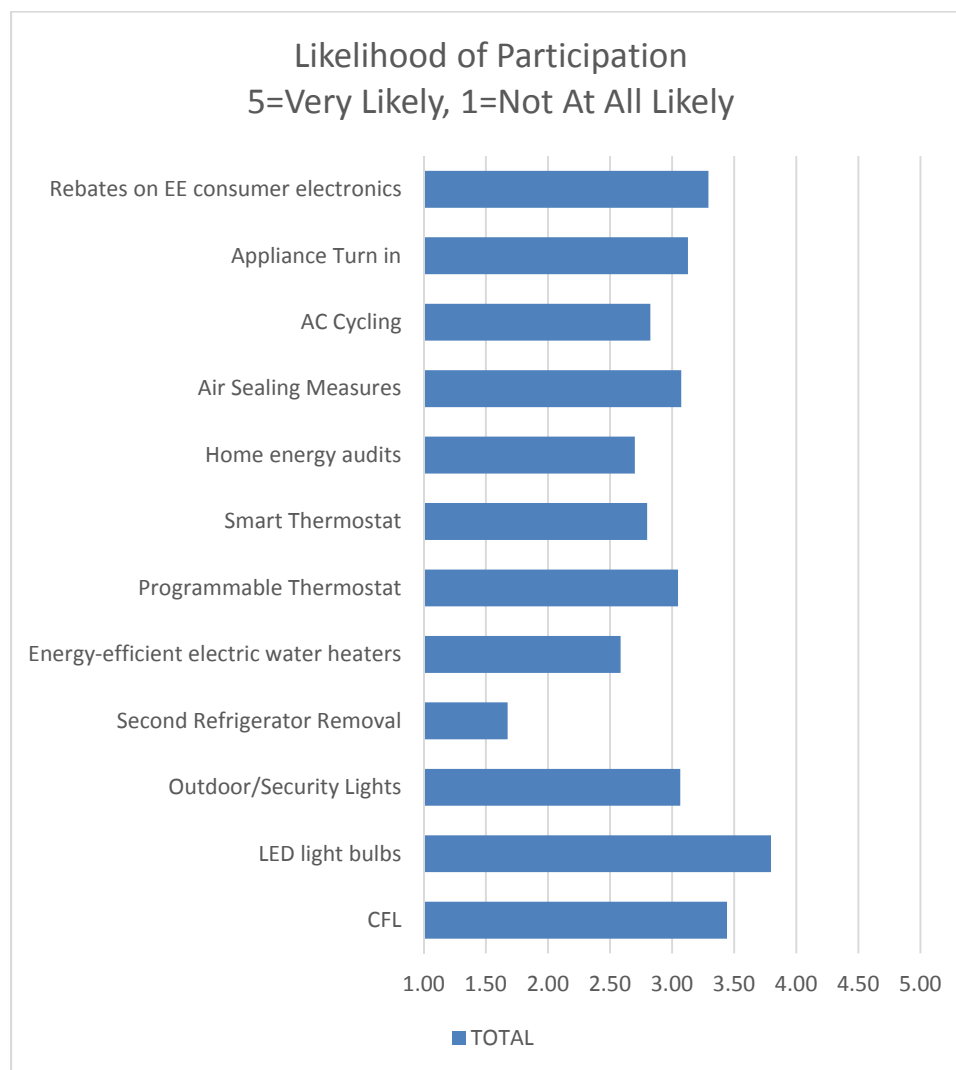
Figure 6-21 Residential – Likelihood of Customer Participation



## Reactions to Load Management and Rate Concepts

The data suggests that respondents would be more likely to participate in programs that provide LED's, CFL's, programmable thermostats and air sealing measures

Figure 6-22 Residential – Response to Load Management & Rate Concepts



## 6.2 COMMERCIAL CUSTOMER SURVEY RESULTS

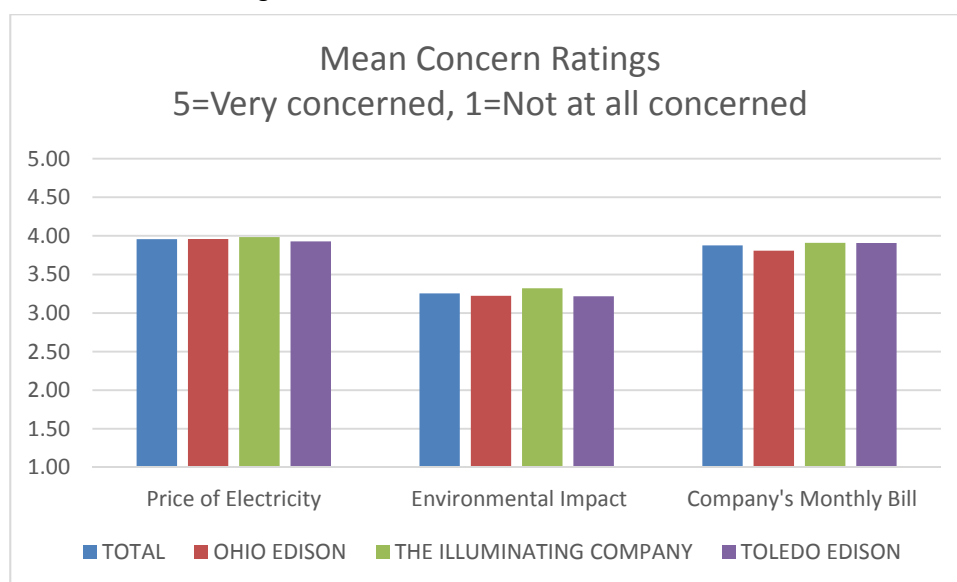
This section highlights the results from the telephone survey of 300 of the Companies' small to medium sized commercial and small manufacturing customers (100 each).

### 6.2.1 Findings

#### Energy Attitudes, Opinions and Behaviors

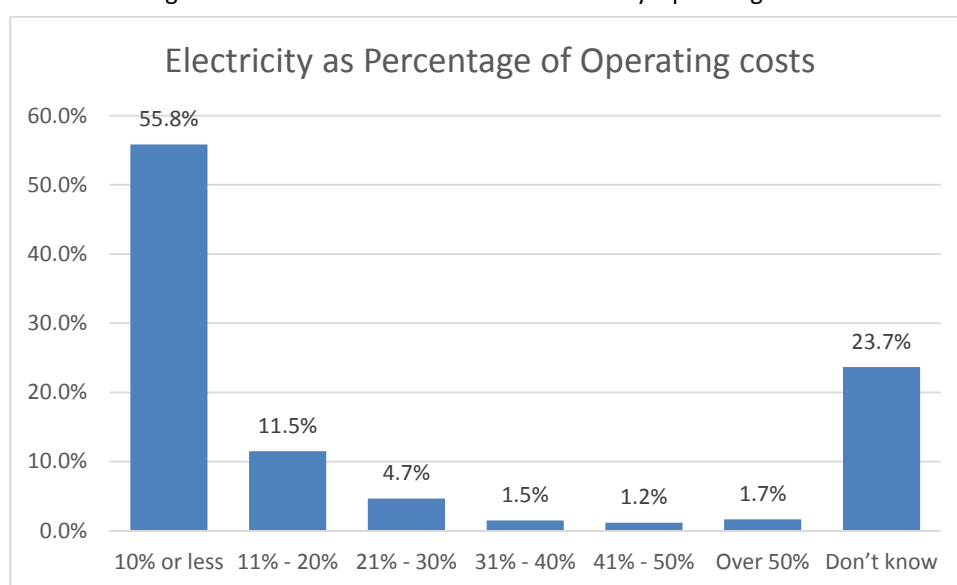
Using a 5-point scale where 1 equaled "Not At All Concerned" and 5 equaled "Very Concerned", respondents were asked to rate their concerns about the cost of electricity, the environmental impact of electricity consumption and their monthly electric bill.

Figure 6-23 Commercial – Customer Concerns



On average, commercial respondents are more concerned with the price of electricity and their monthly electric bill than they seem to be about the environment. More than half of the respondents (55.8%) indicated that electricity accounts for 10% or less of their operating costs.

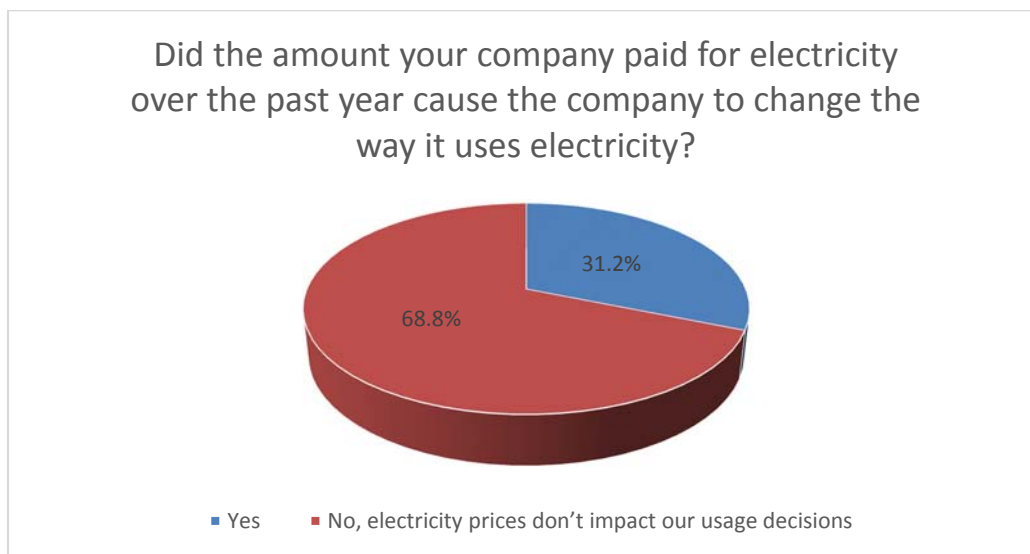
Figure 6-24 Commercial – Customer Electricity Operating Costs



The highest single percentage of respondents reported that the cost of electricity has not yet caused them to use it differently, but that it is a concern for them. Almost a third (31.2%) of respondents reported that electricity prices have had an impact on their use of electricity in the past year and the rest (68.8%) responded that electricity costs do not impact their usage decisions.

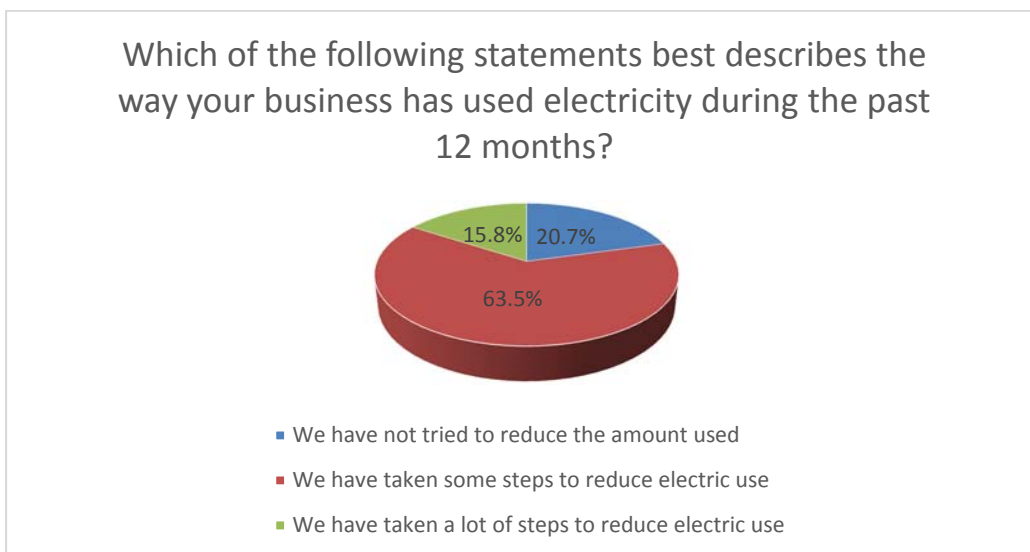


Figure 6-25 Commercial – Impact of Electricity Prices on Usage



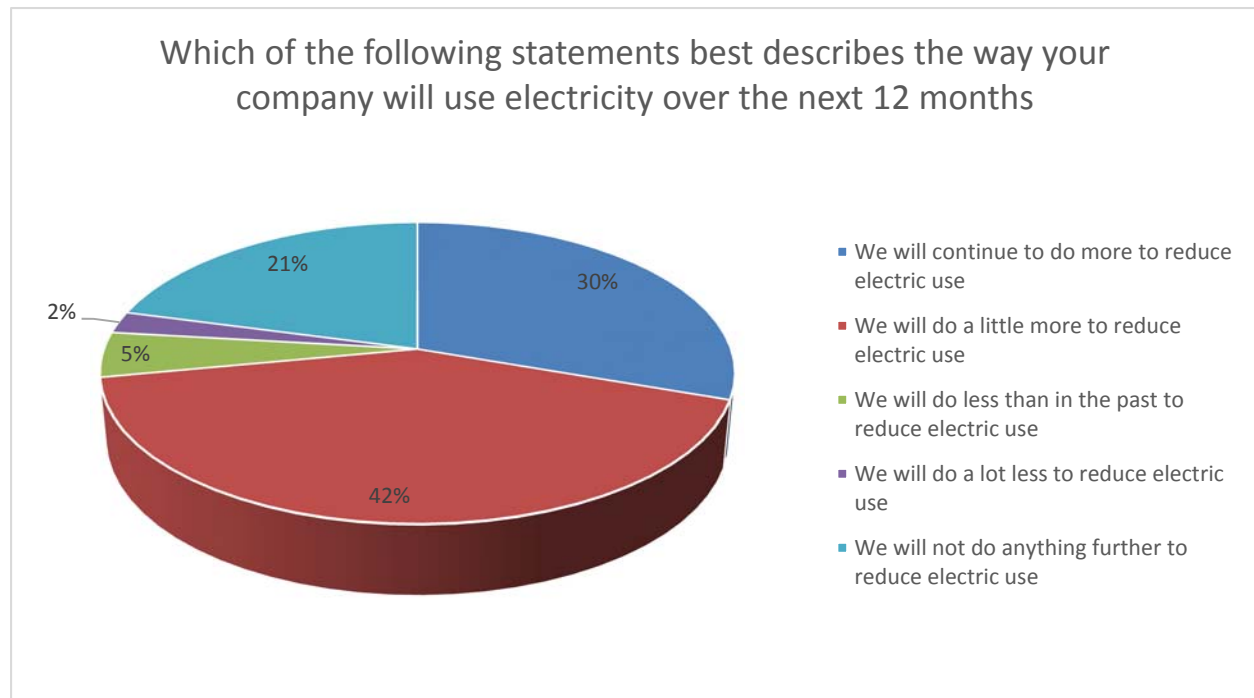
A combined 79.3% of the respondents have done something to reduce their electric use. Of this group, 61% have taken some steps to reduce their use, while 18.3% said they have done a lot.

Figure 6-26 Commercial – Electricity Usage for Past 12 Months



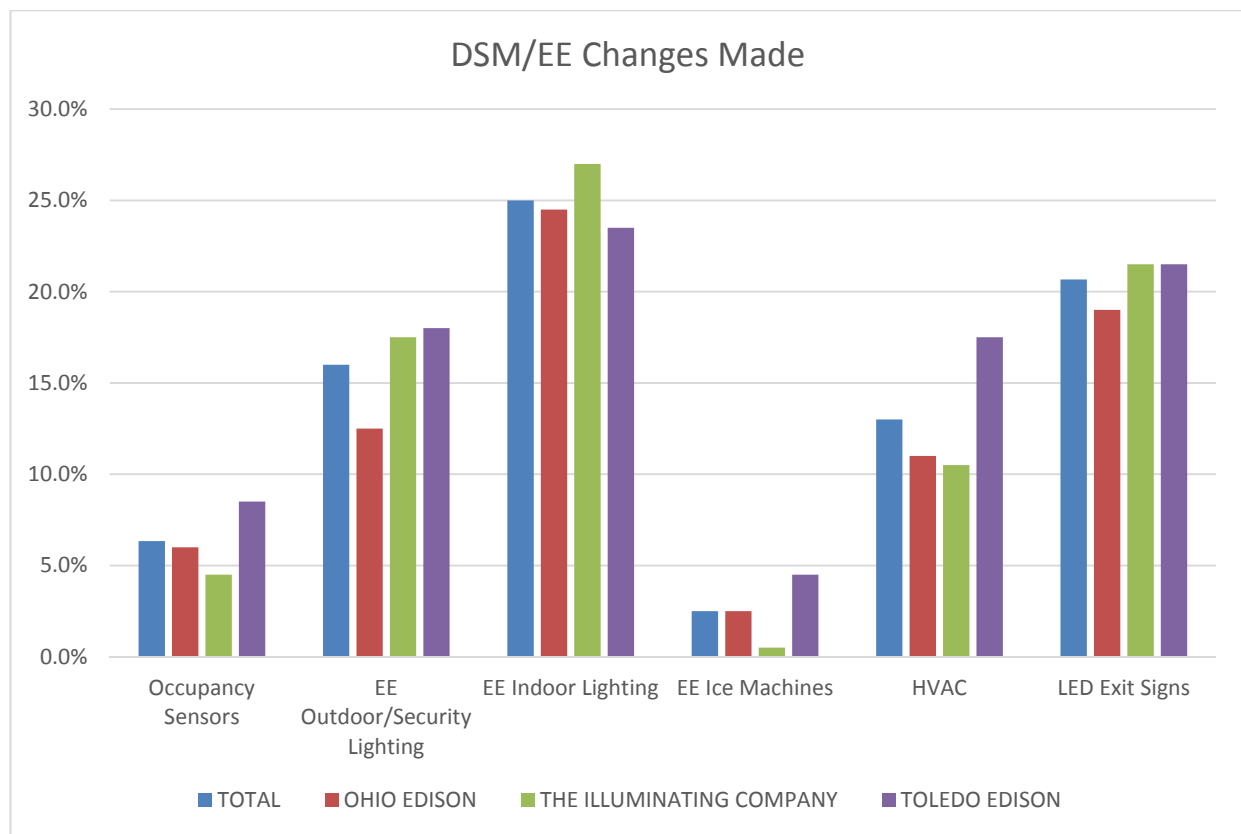
Going forward, almost three-quarters of the respondents (72%) reported that they would do something to save electricity. Of this group, 41.7% will do a little more and 30.3% said they would do a lot more.

Figure 6-27 Commercial – Electricity Usage for Next 12 Months



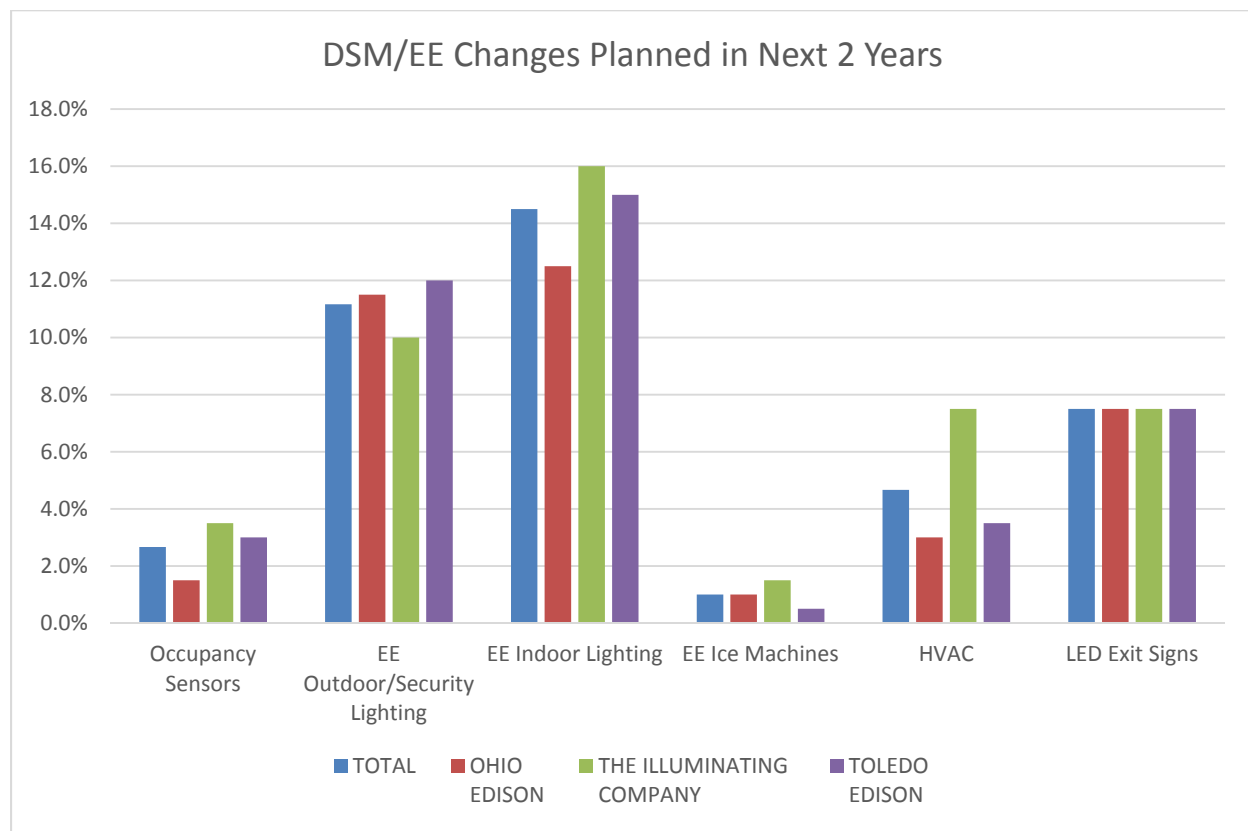
While a majority of the survey respondents have not made any changes to their business, some commercial respondents have already installed energy efficient indoor lighting (25%), outdoor security lighting (16%), and energy efficient LED exit signs (20.7%).

Figure 6-28 Commercial – DSM/EE Changes Made



Few respondents plan to make efficiency changes in the future. A little over eleven percent (11.2%) reported they would install energy efficient outdoor lighting in the next two years. Similarly, for energy efficient LED exit signs, less than eight percent (7.5%) of the commercial respondents indicated that they planned to install energy efficient LED exit signs in their buildings. Only about three percent (2.7%) of respondents answered that they planned to install occupancy sensors.

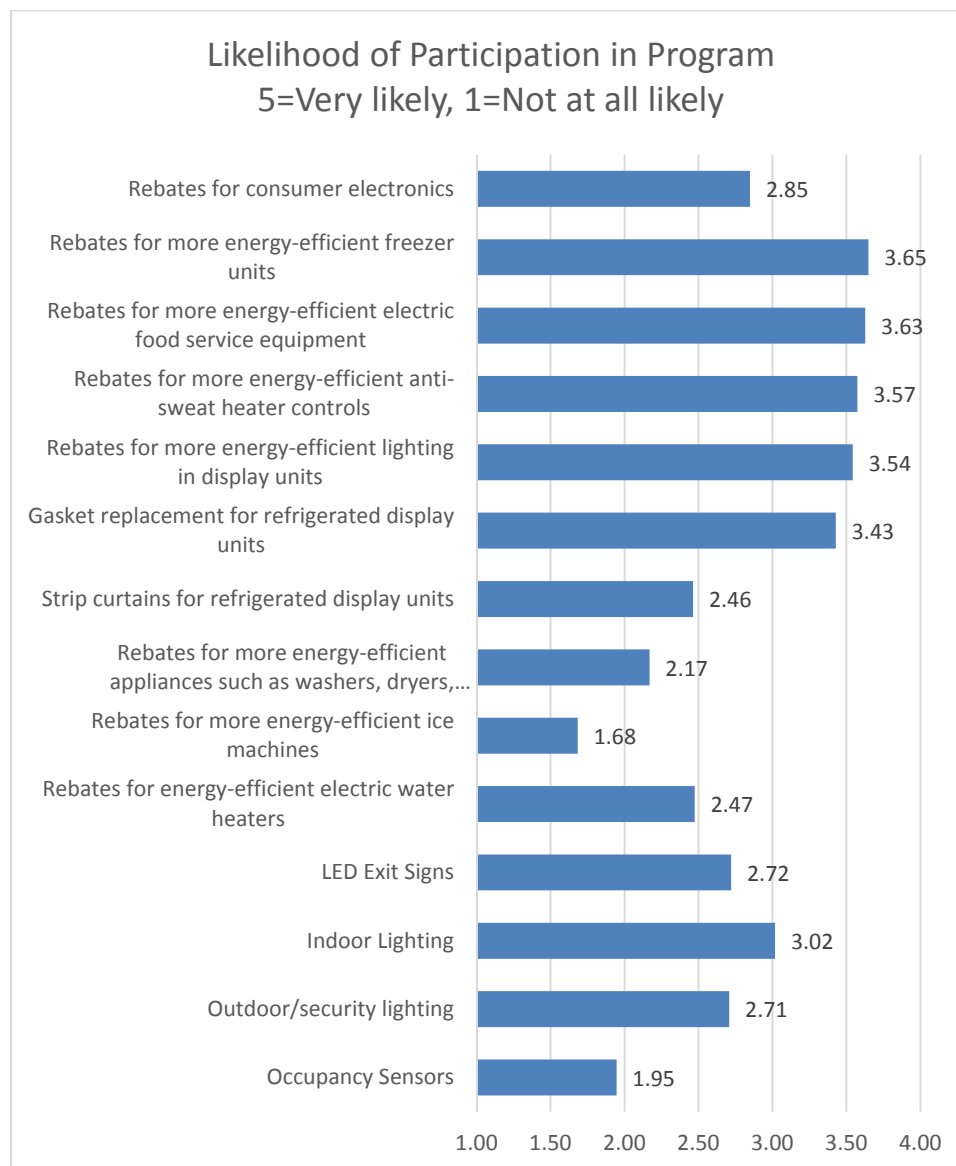
Figure 6-29 Commercial – DSM/EE Planned Changes



### Program Participation

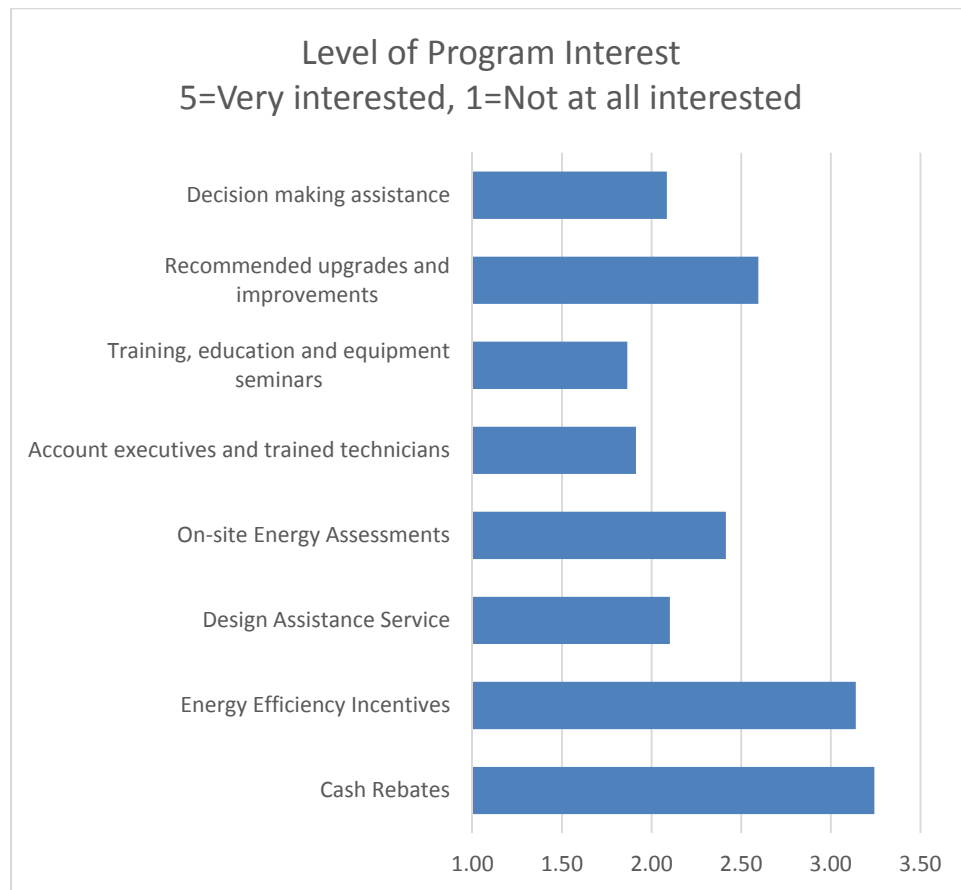
Respondents were asked to rate the likelihood that they would participate in selected energy conservation programs. They were asked to use a five-point scale where 1= Not At All Likely and 5=Very Likely. Below are the results:

Figure 6-30 Commercial – Likelihood of Program Participation



The survey assessed respondents' interest levels in several program delivery methods. Cash rebates received the highest interest ratings.

Figure 6-31 Commercial – Mean Interest Levels in Select DSM/EE Program Types



## 7.0 ENERGY EFFICIENT TECHNOLOGIES

The Market Study considered a large number of both residential and non-residential EEPDR measures. Table 7-1 lists the number of technologies by end-use studied by the team.

Table 7-1 EEPDR Technologies Considered

Rate Class	Number Considered	Number Economic*
Residential	31	19
Commercial	34	25
Industrial	12	10

\*All Measure Considered, but not all pass TRC

The evaluation started with a high-level screening process of Harbourfront's updated measure database to find the most applicable measures to screen in the Market Study Model. This preliminary screening was based on the previous Market Potential study plus additional measures that were identified as having potential in Ohio. Harbourfront personnel further screened the measure list based primarily on commercial availability, contribution to coincident summer peak load reduction, cost per kWh and/or kW saved. As a result of this screening, the following technologies were included in the modeling for this Market Study:

Table 7-2 EEPDR Technology/Measure List

Technology/Measure	Sub Program Category	Market Segment
Direct Load Control	Direct Load Control	Res
Behavioral	Behavioral	Res
Lighting Occupancy Sensors	Lighting	Res
CFL Lights POS	Lighting	Res
Plug Occupancy Sensors	Consumer Electronics	Res
POS TV	Consumer Electronics	Res
Residential Online Audit	Audits & Education	Res
Energy Efficiency Kit	EE Kits	Res
Energy Efficiency Kit-LED	EE Kits	Res
Schools Children Education	School Education	Res
Refrigerator/Freezer recycling	Appliance Turn In	Res
Room Air Conditioners recycling	Appliance Turn In	Res
Room Air Conditioners CEE TIER 3	HVAC	Res
CAC - SEER 16	HVAC	Res
EE Ground Source Heat Pump	HVAC	Res
HP Water Heater	Appliances	Res
Smart Thermostat_Heat	Smart Thermostat	Res
Smart Thermostat_CAC	Smart Thermostat	Res
Smart Thermostat DLC	Direct Load Control	Res
Clothes Washer CEE, Electric Water heater, Electric Dryer	Appliances	Res
Dehumidifiers 25-35 pints/day	Appliances	Res
Pump and Motor 2 Speed	Appliances	Res
Pump and Motor Variable Speed	Appliances	Res
Refrigerators-Freezers CEE TIER 2 - Side	Appliances	Res
Smart Strip plug outlet 5 plug	Appliances	Res
Residential New Construction - 30%	New Homes	Res
CAC - Maintenance	HVAC	Res
Kitchen Aerator	EE Kits	Res
Furnace Fans	HVAC	Res
Low Income Whole House (PA WARM)	LI - New Homes	LI RES
Current Community Connections	Community Connections	LI RES

Commercial and industrial technologies used in the model are listed in Table 7-3.



Table 7-3 DSM Technologies Commercial &amp; Industrial

Technology/Measure	Sub Program Category	Market Segment
Commercial, Industrial Audit - Sm&Md	Audits & Education - SCI	COM
Commercial, Industrial Audit - Large	Audits & Education - LCI	IND
Custom Building	Custom Buildings - SCI	COM
Commercial Appliance Turn-in	Appliance Turn In - SCI	COM
Exterior HID replacement above 175W to 100 HPS retrofit	Lighting - SCI	COM
LED Exit Signs Electronic Fixtures (Retrofit Only)	Lighting - SCI	COM
Lighting Design and Controls	Lighting - SCI	COM
Exterior HID replacement above 175W to 250W HID retrofit	Lighting - LCI	IND
LED Exit Signs Electronic Fixtures (Retrofit Only)	Lighting - LCI	IND
Lighting Design and Controls	Lighting - LCI	IND
LED Auto Traffic Signals 8"	Government Tariff Lighting	GOV
Street Lighting - 175 Mercury to 100 HPS	Government Tariff Lighting	GOV
AC 65,000 - 135,000 (10 Ton)	HVAC - SCI	COM
AC 240,000 - 760,000 (25 Ton)	HVAC - SCI	COM
Clothes Washer CEE, Electric Water heater, Electric Dryer	Appliances - SCI	COM
Dishwasher - Commercial	Appliances - SCI	COM
HVAC - Maintenance	HVAC - SCI	COM
Ductless Mini-Split HP	HVAC - SCI	COM
Anti Sweat Heater Controls	Food Service	COM
Clothes Dryer (Elec Heat Pump)	Appliances - SCI	COM
Efficient Dairy Equipment	Agricultural	COM
Custom - Refrigeration	Custom - SCI	COM
Refrigerators - Reach In	Food Service	COM
Freezers - Reach In	Food Service	COM
ENERGY STAR Ice Machines less than 500 lbs RC	Food Service	COM
Convection Oven	Food Service	COM
ENERGY STAR Steam Cookers 3 Pan	Food Service	COM
Hot Food Holding Cabinets	Food Service	COM
HP Water Heater	Appliances - SCI	COM
Commercial Smart Pump	Custom - SCI	COM
Commercial Smart Strip Plug Occupancy Sensors (Motion Sensor)	Appliances - SCI	COM
Pre Rinse Sprayers	Appliances - SCI	COM
Strip curtains for walk-ins - freezer	Food Service	COM
Beverage Vending Machine - Control	Food Service	COM
Window Film	HVAC - SCI	COM

Technology/Measure	Sub Program Category	Market Segment
Water-Cooled cent Chiller 150 - 300 ton 0.57 kW/ton with 0.46 kW/ton IPLV	HVAC - LCI	IND
High Efficiency Fans	Agricultural	COM
Window Film	HVAC - LCI	IND
Commercial Smart Strip plug outlet	Appliances - LCI	IND
Water Pumps with VFD's 1	Custom - LCI	IND
HVAC Fans with VFD's 1	Custom - LCI	IND
Air Compressors with VFD's 1	Custom - LCI	IND
Water Pumps with VFD's 5	Custom - LCI	IND
HVAC Fans with VFD's 5	Custom - SCI	COM
Air Compressors with VFD's 5	Custom - SCI	COM
Custom - VFDs < 10HP	Custom - LCI	IND

## 8.0 TECHNICAL POTENTIAL FOR ENERGY SAVINGS AND DEMAND REDUCTIONS

This section will highlight the results from the modeling and other analyses underlying this Market Study, and will provide:

1. Estimates of the potential demand reduction and energy savings for 15 years in the Companies' service territories;
2. The test results for cost-effectiveness for a wide variety of EEPDR measures;
3. The methodologies generally used for determining cost-effectiveness of individual measures;
4. Estimates of the costs of implementing all cost-effective EEPDR measures;
5. An identification of the technical data used to support estimated energy and demand savings attributed to each customer class; and
6. EE model outputs and resulting targeted savings and budgets per measure.

### 8.1 METHODOLOGY

Harbourfront calculated the maximum technical potential based on a top-down approach. It also created three model-based bottom-up scenarios: Economically Achievable Scenario (Economic Potential) and two Actual Achievable Scenarios, (Market Potential Base Case, Market Potential High Case). Each of the three scenarios are discussed later in this Section.

The EEPDR technologies and measures included within the scope of this Market Study were based on the various sources listed in Section 3.2 and were evaluated using the Harbourfront EEPDR Model (EE Model)<sup>14</sup>. The EE Model requires that inputs be formatted into unique measures and not included as part of a combined program. Once the results of each measure are calculated, Harbourfront aggregates the measures into groups/end-use types, which are then presented as programs.

### 8.2 MEASURE DATA

All estimated EEPDR savings are based on the various databases including: CA DEER, ACEEE, OH TRM ADM's direct EM&V, and PA TRM. All equipment costs and equipment lives are based on the TRM, publicly available data, and/or information provided by the Companies. The residential and commercial weather sensitive load savings are based on Ohio sources such as the OHIO TRM ADM's EM&V or ACEEE Reports or are calculated using eQuest simulations in accordance with TRM Appendix A.

Customer costs are based on the full incremental costs of a measure. Most measures are assumed to be replacements and not retrofitted; therefore, only the equipment costs are included. The installation costs are assumed to be the same for either the base equipment or the more efficient equipment, so the customer is not compensated for the install costs. In commercial lighting measures, installation costs for identified by square foot per the ACEEE report entitled "New Horizons for Energy Efficiency: Major Opportunities to Reach Higher Electricity Savings by 2030".

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<sup>14</sup> The model is licensed to FirstEnergy and remains the property of Harbourfront Group, Inc. FirstEnergy has full rights to obtain values from and utilize this model.

For each of the Companies, Harbourfront reviewed different Residential, Commercial and Industrial EEPDR programs that incorporated a total of 77 measures as summarized below:

Table 8-1 Programs Evaluated (By Class & Type)<sup>15</sup>

Rate Class	Number Considered	Number Economic*
Residential	31	19
Commercial	34	25
Industrial	12	10

\*All Measure Considered in Plan, but not all pass TRC

### 8.3 MAXIMUM TECHNICAL POTENTIAL

There are a number of approaches to determine maximum technical potential. Harbourfront uses a top-down approach that builds on end-use intensities (EUIs) and unit energy consumptions (UECs) presented in this Section.

This approach determines three levels of energy consumption.

1. Assuming that every unit in the service area was a baseline unit, the resulting consumption would lead to Baseline EUIs/UECs.
2. Assuming Current Market Average EUIs/UECs. This average reflects the stock of units of all vintages and Efficiency levels in the market today.
3. Assuming every unit in the service area was converted to the most energy-efficient technology available, the resulting consumption would be Most Efficient EUIs/UECs.

$$\text{Max. Savings (\%)} = \frac{\text{Baseline EUI (or UEC)} - \text{Efficient EUI(or UEC)}}{\text{Baseline EUI (or UEC)}}$$

<sup>15</sup> All measures considered in the EEPDR Plan, but not all passed the TRC test.

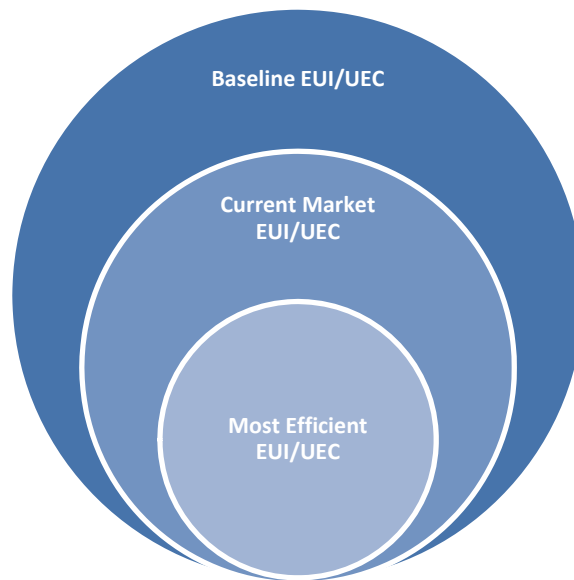


Figure 8-1 Energy Consumption Levels

The analysis of technical potential is based on the premise that at any point, market energy consumption lies in between the baseline consumption and most efficient consumption. Hence, the current state of market ( $\lambda$ ) can be assessed by solving one of the following equations for  $\lambda$ .

$$\text{Market Average EUI} = \lambda * \text{Efficient EUI} + (1 - \lambda) * \text{Baseline EUI}$$

Or

$$\text{Market Average UEC} = \lambda * \text{Efficient UEC} + (1 - \lambda) * \text{Baseline UEC}$$

Where  $\lambda$ : Proportion of fixtures/units in market that can be considered to be efficient.

Note that  $\lambda$  is a notional proportion calculated considering only two levels of efficiencies in the market, i.e. baseline and most efficient.

Once the current state of market is known, technical potential can be calculated using a simple formula.

$$\text{Technical Potential (\%)} = (1 - \lambda) * \text{Max. Savings (\%)}$$

### 8.3.1 Residential Technical Potential

Table 8-2 represents Harbourfront's estimate of the current market state and technical potential for major end uses. Residential technical potential calculations were performed using UECs by end use. A blanket potential of 33% of current kWh usage is used for miscellaneous loads.

Table 8-2 Residential Technical Potential (%) by End Use

End Use	Maximum Savings (%)	Current Market State (λ)	1-λ	Technical Potential (%)
Lighting	63.0%	18.6%	81.4%	51.3%
Elec Space Heating	77.9%	87.6%	12.4%	9.6%
Air Conditioning	38.1%	43.5%	56.5%	21.5%
Refrigerators	36.7%	-28.8%	128.8%	47.3%
Elec Water Heating	37.5%	51.5%	48.5%	18.2%
Dish washer	36.1%	90.5%	9.5%	3.4%
Freezers	10.1%	0.4%	99.6%	10.1%
Clothes Washer	63.2%	36.7%	63.3%	40.0%
Clothes Dryers	63.2%	53.1%	46.9%	29.6%
Misc Appliances / Plug Loads	N/A	N/A	N/A	33.0%

Harbourfront identifies residential lighting, refrigeration and air conditioning as the biggest saving opportunities on the residential side with a technical potential of 5.92%, 6.05% and 3.14% of the Companies' total residential sales, respectively.

Table 8-3 Residential Technical Potential by Company

End Use	CE	OE	TE	OH Total	% of Res Sales
Lighting	324,395	549,447	143,860	1,017,702	5.92%
Elec Space Heating	55,724	85,723	24,493	165,939	0.97%
Air Conditioning	164,214	287,202	87,239	538,655	3.14%
Refrigerators	369,600	518,186	151,606	1,039,392	6.05%
Elec Water Heating	63,441	136,957	33,268	233,666	1.36%
Dish washer	4,909	6,308	1,812	13,029	0.08%
Freezers	12,524	21,106	5,500	39,131	0.23%
Clothes Washer	140,818	201,650	56,268	398,736	2.32%
Clothes Dryers	68,810	96,473	28,666	193,950	1.13%
Misc Appliances / Plug Loads	505,910	941,433	224,413	1,671,756	9.73%
<b>Total Technical Potential</b>	<b>1,710,345</b>	<b>2,844,485</b>	<b>757,126</b>	<b>5,311,956</b>	<b>30.92%</b>
<b>Percent of total Sales</b>	<b>31.15%</b>	<b>30.85%</b>	<b>30.67%</b>	<b>30.92%</b>	

### 8.3.2 Small Commercial Customer Technical Potential

Table 8-4 represents Harbourfront's technical potential estimate for small commercial customers by end use. The commercial sector calculations are performed using EUIs. Again, a blanket potential of 33% of current kWh usage is used for miscellaneous loads.

Table 8-4 Commercial Technical Potential by End-Use

End Use	Maximum Savings (%)	Current Market State (λ)	Tech. Potential	Tech. Potential (MWh)	% of OH Commercial Sales
Space Heating	46.6%	22.2%	36.2%	241,110	1.6%
Cooling	53.9%	14.7%	46.0%	909,381	6.0%
Ventilation	59.5%	14.4%	50.9%	901,247	5.9%
Water Heat	36.5%	28.4%	26.1%	85,189	0.6%
Lighting	42.3%	0.8%	42.0%	2,530,033	16.7%
Cooking	25.0%	66.6%	8.4%	7,097	0.0%
Refrigeration	40.0%	57.9%	16.8%	254,008	1.7%
Other Office Equipment	49.7%	5.2%	47.1%	139,103	0.9%
Computers	79.2%	5.2%	75.1%	556,217	3.7%
Misc / Other	33.0%	8.8%	30.1%	539,411	3.6%
<b>Total</b>				<b>6,162,796</b>	<b>40.6%</b>

The study indicates large opportunities in lighting and HVAC (space cooling and ventilation) programs. Together, these two end-uses have a technical potential amounting to 28.6% of present sales.

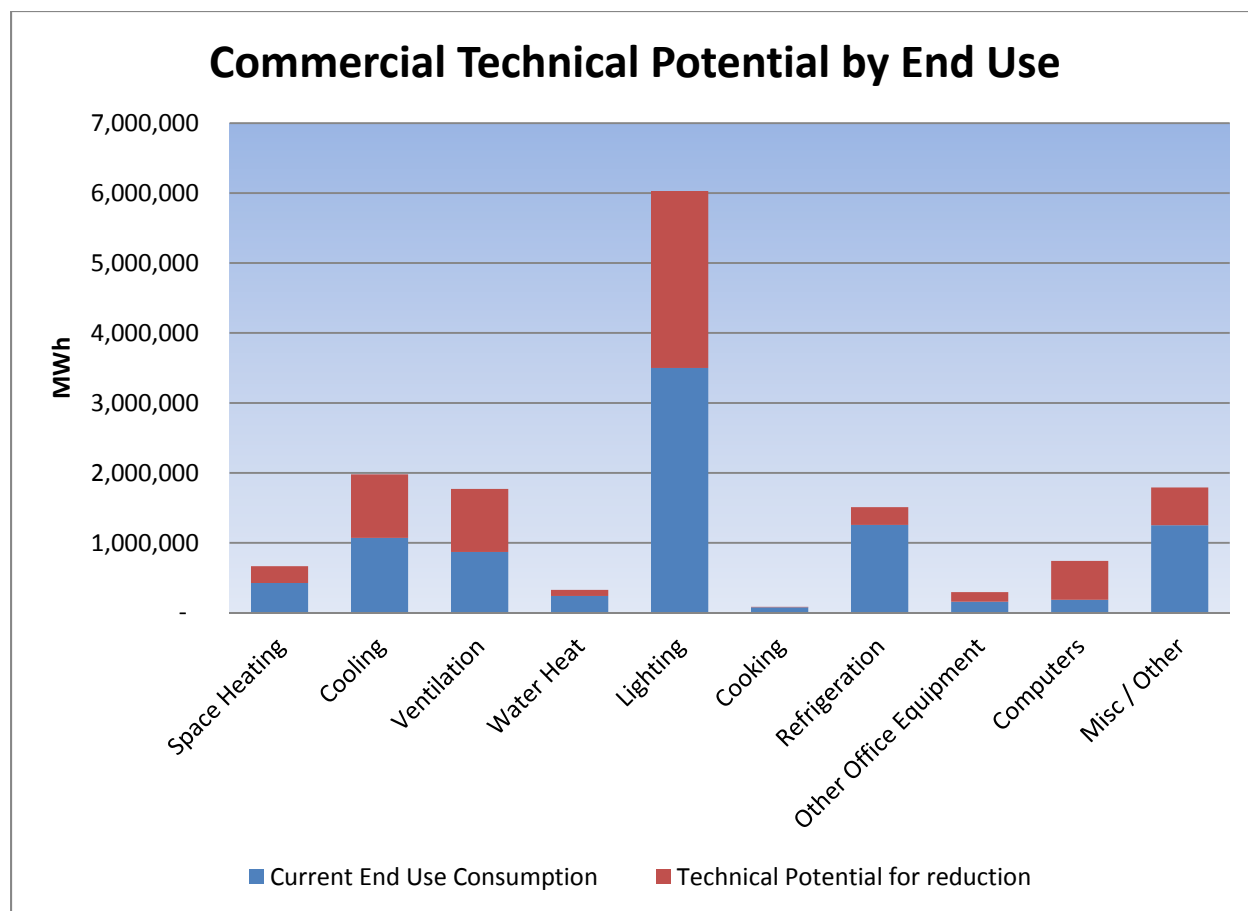


Figure 8-2 Commercial Potential by End Use

Table 8-5 represents technical potential by building type. The highest potential opportunity for reduction in energy consumption were found in educational buildings, at 45%. However, a comparatively small number of such facilities translate to savings of only 3.7% of total sales. Major savings can be achieved in office buildings and mercantile buildings at 10.7% and 6.5%, respectively, of total small commercial sales.



Table 8-5 Commercial Technical Potential by Building Type

Commercial Building Types (CBECS):	Technical Potential	Technical Potential (MWh)	% of OH Commercial Sales
Education	45.0%	563,332	3.7%
Food Sales	27.3%	177,291	1.2%
Food Service	31.9%	226,395	1.5%
Health Care	42.5%	525,097	3.5%
Inpatient	43.4%	364,469	2.4%
Outpatient	40.0%	158,216	1.0%
Lodging	39.9%	471,538	3.1%
Mercantile	39.6%	984,757	6.5%
Retail (Other Than Mall)	39.6%	302,672	2.0%
Enclosed and Strip Malls	39.6%	618,673	4.1%
Office	43.7%	1,621,118	10.7%
Public Assembly	43.5%	293,003	1.9%
Public order and safety	43.7%	146,340	1.0%
Religious Worship	37.6%	76,832	0.5%
Service	40.5%	223,855	1.5%
Warehouse and Storage	38.3%	588,496	3.9%
Other	40.5%	250,822	1.7%
Vacant	38.3%	79,746	0.5%
<b>Total</b>		<b>6,162,796</b>	<b>40.6%</b>

### 8.3.3 FirstEnergy Ohio Total Technical Potential

Below is a summary of the Companies' technical potential as a sales weighted average of individual class technical potentials.

Table 8-6 FirstEnergy Ohio Technical Potential

Sector	2015 Sale MWh	Technical Potential (%)	Technical Potential (MWh)
Residential	17,180,611	30.9%	5,311,956
Commercial	15,185,355	40.6%	6,160,329
Industrial	20,547,490	40.6%	8,335,616
Street Lighting	334,692	42.0%	140,430
<b>Total</b>	<b>53,248,148</b>	<b>37.5%</b>	<b>19,948,331</b>

## 8.4 ECONOMIC POTENTIAL

The Economic Potential scenario estimates the economically achievable potential and will accompany Harbourfront's Maximum Technical potential presentation as a bottom-up confirmation. Economic Potential took the 77 measures and used a premise based on obtaining all savings that are economically achievable for all of the Companies' customers. This scenario has a one-year time horizon where all savings are deemed theoretically obtainable from all subscribing customers. The scenario also factors in the Companies' customers who have already taken energy saving actions.

The number of assumed program recipients (participants) under the Economic Potential scenario is based on survey data, which accounts for those who stated they have already made the EEPDR change. This approach does not take into account equipment life but rather simulates that all equipment would be changed in the first year. Budgets are based on a cost per measure item using Base Achievable Case Assumptions.<sup>16</sup> For OE, there is a potential to save 9,179 GWh and 1,312MW. For CEI, there is a potential to save 5,896 GWh and 889 MW. For TE, there is a potential to save 3,557 GWh and 512 MW.

## 8.5 ACHIEVABLE POTENTIAL (BASE & HIGH CASE)

These scenarios have study periods from 2017-2031, the years in which the savings will be obtainable from all subscribing customers when they either need to replace equipment or have shown interest in installing an energy saving measure. These scenarios apply the results of the Companies' mail and telephone surveys. The residential achievable numbers were based on mail survey data, including the number of people who have a particular end-use, plus those who have indicated an interest in a particular program. There are two levels of interest based on the program parameters that follow: Option 1 includes people who responded "I plan to change" or responded "5 out of 5" in interest in a measure when asked on the survey. This option envisions programs that are designed to contribute to all measures, such that all measures have a positive payback period for the participants and have incentives that are also reasonable for the Companies. Option 2, includes people who responded "I am considering changing" and includes people who responded "4

<sup>16</sup> This study has two Market Achievable cases, Base and High. In the High Case, utility budgets for marketing and customer incentives are increased by measure unit to achieve the higher penetration. The Economic Potential study used the Base Case per measure utility costs.

out of 5” in interest in a measure. In this second option, it is assumed that the Companies will need to spend more money on both marketing and incentives.

For the commercial measures there are many repetitive programs such as the various types of motors that can be installed. Only some of the programs are used to evaluate the quantity of kWh and kW savings that a program can produce. These programs were chosen based on their general representation of the amount of savings that each can yield. These representative programs were matched to the survey data to quantify the number of items/equipment that could be installed.

## 8.6 GLOBAL ASSUMPTIONS:

Harbourfront’s approach uses global assumptions within the EE Model. There are two types of inputs, for example, one-time inputs, such as inflation and annual inputs such as the forecasted number of residential customers.

Some of the global assumptions were as follows:

1. Number of Residential Customers as forecasted by the Companies;
2. Number of Commercial and Industrial Customers as forecasted by the Companies;
3. Number of Motors is based on the large commercial customer survey’s inventory and data from existing programs in other states;
4. Free Riders and Spill Over percentages were set to cancel each other out;
5. Discount Rate = 8.48%;
6. Average Retail Rate: 10 cents (Supply and Distribution costs per kWh);<sup>17</sup>
7. The number of opt-out customers was set to zero; and
8. Current Efficiency standards were as deemed, with no adjustment for potential future changes.

## 8.7 SURVEY DATA

The survey results for the residential and commercial classes are presented in Section 6.0. There were specific questions asked in the surveys to identify customer participation in programs. The residential survey was conducted by mail and the small and mid-commercial survey was conducted by telephone. The two surveys were utilized in both of the achievable scenarios and applied to the appropriate customer groups. Some survey questions were more complex, such as: “how many CFL light bulbs do you have in service and how many hours are they on?” This information is used to identify how many CFL light bulbs exist in the service territory in order to exclude them from both the economically achievable and achievable scenarios as well as identify how many CFL lights will be beneficial to install.

## 8.8 MEASURE BUDGETS

Budgets were determined for each measure based on implementation, and administrative & general costs. The Implementation budgets are per unit cost. The measure per unit cost is based upon costs such as; utility personnel, supplies, vendor costs, and sales incentives paid to retailers. This number ranges from around \$1.11 per lamp to \$19,320 for the large Custom Building program.

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<sup>17</sup> Source: EIA Publication dated March 24, 2016, “State Electricity Profiles-2014-Ohio-Retail Electricity Price (cents/kWh)”; <http://www.eia.gov/electricity/state/>

## 8.9 AVOIDED COSTS

The avoided generation capacity and energy supply costs are based on the Companies' forecast of capacity and energy prices utilized in Stipulated ESP IV.

The avoided transmission and distribution capacity costs are based on the Avoided T & D Study performed by Harbourfront for the Companies.<sup>18</sup>

## 8.10 SAVINGS MANDATES

The Companies' plans are required to meet various incremental kWh and kW saving per year until 2027 and 2020, respectively. As an example, the kWh savings mandates are based on the three previous years' sales and continue to grow until they reach 2% of the average of the three previous years of sales. This target is incremental, meaning that another "X"<sup>19</sup> percent of sales will be needed each year. The source of the calculations for both the kWh (22% by 2027) and kW (7.5% by the 2020 system peak) savings was the forecasts provided by the Companies for each service territory. This was the basis for the EEPDR requirement calculations.

## 8.11 ECONOMICALLY ACHIEVABLE RESULTS

Economically achievable potential starts with the programs that have passed the TRC test and uses a one-year time horizon where all savings are assumed to be obtainable from all participating customers. The following tables provide the results of the EE Models by Company. For the three Companies, economic potential ranges between 20% and 23% of peak demand. The largest of the three Companies, OE, could reduce its peak demand by 23%, with the smallest Company, CEI, reaching 20% reduction of its peak load. The energy savings associated with the economic potential programs varied between 35.9% for OE to 30.1% for CEI. While these reductions reflect programs that passed the TRC test, it does not reflect customer choice budgetary considerations or plan timeframe. In other words, while the programs are cost-effective, not all eligible customers will likely elect to participate.

Table 8-7 kW and MWh Savings – OE

Economically Achievable Results		
Electric Impacts/Savings		
	Peak MW	Usage MWh
Forecast Sales & Peak 2031	5,725	25,561,947
Economically Achievable	1,312	9,178,975
% Economically Achievable	22.9%	35.9%

<sup>18</sup> April 2016 Avoided T & D Study performed by Harbourfront Group, Inc.

<sup>19</sup> "X" indicates the percentage changes by year.

Table 8-8 kW and MWh Savings – CEI

Economically Achievable Results		
Electric Impacts/Savings		
	Peak MW	Usage MWh
Forecast Sales & Peak 2031	4,368	19,571,138
Economically Achievable	889	5,896,105
% Economically Achievable	20.4%	30.1%

Table 8-9 kW and MWh Savings – TE

Economically Achievable Results		
Electric Impacts/Savings		
	Peak MW	Usage MWh
Forecast Sales & Peak 2031	2,464	11,477,218
Economically Achievable	512	3,556,632
% Economically Achievable	20.8%	31.0%

The following tables present the costs associated with the programs included in the economic potential estimates for each Company. The implementation costs will vary and are a function of the unique programs for each Company. Similarly, the incentives reflect the specific measures and the number of participants in the program. Savings costs (program costs divided by savings) range from \$0.018 for TE and \$0.026 for CEI. Cost of capacity savings vary between \$173/kW for CEI and \$122/kW for TE.

Table 8-10 Utility Program Costs – OE

Utility Program Costs Overall Costs	
Category	Total
Implementation	\$106,016,874
Incentives	\$107,011,708
Total	\$213,028,582
Total Costs per kW & kWh Saved	
	Total
\$/kW	\$162.40
\$/kWh	\$0.023

Table 8-11 Utility Program Costs – CEI

Utility Program Costs Overall Costs	
Category	Total
Implementation	\$79,603,308
Incentives	\$74,986,116
Total	\$154,589,424
Total Costs per kW & kWh Saved	
	Total
\$/kW	\$173.80
\$/kWh	\$0.026

Table 8-12 Utility Program Costs – TE

Utility Program Costs	
Overall Costs	
Category	Total
Implementation	\$31,584,111
Incentives	\$31,015,521
Total	\$62,599,632
Total Costs per kW & kWh Saved	
\$/kW	\$122.26
\$/kWh	\$0.018

The avoided energy costs are expected to yield more than \$802 million in benefits, accounting for nearly 73% of total avoided costs of \$1.103 billion across the three companies.

Table 8-13 Avoided Costs – OE

Avoided Costs (Cumulative Electric)			
	Energy	Capacity	Total Benefits
Cumulative Total	\$397,650,600	\$147,349,863	\$545,000,463

Table 8-14 Avoided Costs – CEI

Avoided Costs (Cumulative Electric)			
	Energy	Capacity	Total Benefits
Cumulative Total	\$289,093,378	\$110,781,234	\$399,874,612

Table 8-15 Avoided Costs – TE

Avoided Costs (Cumulative Electric)			
	Energy	Capacity	Total Benefits
Cumulative Total	\$115,270,972	\$43,241,172	\$158,512,145

On an aggregate basis, all programs pass the TRC requirements with ratios for Companies ranging between 1.53 for CEI and 1.69 for OE. The incentive costs and program cost levels make the programs cost-effective from both the participant and utility perspectives.

Table 8-16 Cost Test Results – OE

Cost Test Results	
Tests	Total (All Years)
Utility Test	2.29
TRC Test	1.69
Participant Test	5.93

Table 8-17 Cost Test Results – CEI

Cost Test Results	
Tests	Total (All Years)
Utility Test	2.15
TRC Test	1.53
Participant Test	5.28

Table 8-18 Cost Test Results – TE

Cost Test Results	
Tests	Total (All Years)
Utility Test	2.21
TRC Test	1.62
Participant Test	5.81

The following tables show the cost-effectiveness of the programs included in the economic potential analysis. The Appliance Turn-in Program has the highest TRC values of all of the residential programs and this result was consistent across the three Companies.



Table 8-19 Summary of Measure Tests by Program – OE

Summary of Measure Tests by Program				
Sub Program Name	Class	Today's Value Utility Test	Today's Value TRC Test	Today's Value Participant Test
Direct Load Control	Res	1.01	0.69	0.62
Behavioral	Res	1.00	1.00	0.00
Lighting	Res	4.26	3.31	14.35
Consumer Electronics	Res	1.43	1.43	5.55
Audits & Education	Res	0.89	0.89	0.00
EE Kits	Res	1.16	2.14	0.00
School Education	Res	0.61	0.93	0.00
Appliance Turn In	Res	2.34	2.89	0.00
HVAC	Res	1.60	0.37	0.85
Smart Thermostat	Res	1.17	0.55	1.57
Appliances	Res	2.05	1.94	5.60
New Homes	Res	1.55	1.13	3.82
LI - New Homes	LI RES	0.49	0.36	2.15
Community Connections	LI RES	0.48	0.86	NA
Audits & Education - SCI	COM	0.73	0.86	10.52
Audits & Education - LCI	IND	2.57	2.96	42.67
Custom Buildings - SCI	COM	1.06	0.87	4.89
Appliance Turn In - SCI	COM	2.33	2.88	0.00
Lighting - SCI	COM	2.10	1.26	3.61
Lighting - LCI	IND	2.15	1.46	4.43
Government Tariff Lighting	GOV	8.58	1.59	2.36
HVAC - SCI	COM	2.95	1.39	2.28
Appliances - SCI	COM	2.21	1.83	6.28
Food Service	COM	2.52	2.33	9.07
Agricultural	COM	0.69	0.38	1.55
Custom - SCI	COM	6.02	5.26	22.32
Custom - LCI	IND	2.71	2.65	14.12
HVAC - LCI	IND	3.13	2.50	6.52
Appliances - LCI	IND	3.63	4.14	20.00
Mercantile Self Directed Projects	IND	27.33	27.33	NA
T&D Projects	IND	0.00	0.00	NA

Table 8-20 Summary of Measure Tests by Program – CEI

Summary of Measure Tests by Program				
Sub Program Name	Class	Today's Value Utility Test	Today's Value TRC Test	Today's Value Participant Test
Direct Load Control	Res	1.01	0.69	0.61
Behavioral	Res	0.91	0.91	0.00
Lighting	Res	4.39	3.48	15.62
Consumer Electronics	Res	1.50	1.50	5.91
Audits & Education	Res	0.89	0.89	0.00
EE Kits	Res	1.16	2.14	0.00
School Education	Res	0.61	0.93	0.00
Appliance Turn In	Res	2.35	2.91	0.00
HVAC	Res	1.61	0.37	0.82
Smart Thermostat	Res	1.16	0.54	1.55
Appliances	Res	1.98	1.89	5.61
New Homes	Res	1.89	1.38	4.32
LI - New Homes	LI RES	0.48	0.36	2.09
Community Connections	LI RES	0.50	0.90	NA
Audits & Education - SCI	COM	0.71	0.84	10.22
Audits & Education - LCI	IND	2.28	2.63	37.83
Custom Buildings - SCI	COM	0.96	0.79	4.44
Appliance Turn In - SCI	COM	2.11	2.61	0.00
Lighting - SCI	COM	2.12	1.25	3.57
Lighting - LCI	IND	2.14	1.47	4.48
Government Tariff Lighting	GOV	9.66	1.38	2.12
HVAC - SCI	COM	2.92	1.42	2.39
Appliances - SCI	COM	2.18	1.89	6.68
Food Service	COM	2.25	2.17	8.89
Agricultural	COM	0.60	0.33	1.35
Custom - SCI	COM	5.90	5.06	21.10
Custom - LCI	IND	2.71	2.65	14.12
HVAC - LCI	IND	2.91	2.33	6.32
Appliances - LCI	IND	3.63	4.14	20.00
Mercantile Self Directed Projects	IND	0.00	0.00	NA
T&D Projects	IND	0.00	0.00	NA

Table 8-21 Summary of Measure Tests by Program – TE

Summary of Measure Tests by Program				
Sub Program Name	Class	Today's Value Utility Test	Today's Value TRC Test	Today's Value Participant Test
Direct Load Control	Res	0.99	0.69	0.62
Behavioral	Res	0.88	0.88	0.00
Lighting	Res	4.37	3.46	15.44
Consumer Electronics	Res	1.51	1.51	6.01
Audits & Education	Res	0.89	0.89	0.00
EE Kits	Res	1.16	2.14	0.00
School Education	Res	0.61	0.93	0.00
Appliance Turn In	Res	2.23	2.74	0.00
HVAC	Res	1.60	0.37	0.85
Smart Thermostat	Res	1.16	0.54	1.56
Appliances	Res	2.09	1.98	5.52
New Homes	Res	1.38	1.01	3.28
LI - New Homes	LI RES	0.48	0.36	2.10
Community Connections	LI RES	0.46	0.84	NA
Audits & Education - SCI	COM	0.45	0.53	6.51
Audits & Education - LCI	IND	2.25	2.60	37.43
Custom Buildings - SCI	COM	0.97	0.79	4.48
Appliance Turn In - SCI	COM	2.01	2.45	0.00
Lighting - SCI	COM	2.06	1.16	3.28
Lighting - LCI	IND	2.14	1.48	4.50
Government Tariff Lighting	GOV	17.06	0.96	1.59
HVAC - SCI	COM	2.97	1.40	2.31
Appliances - SCI	COM	2.18	1.88	6.65
Food Service	COM	2.52	2.25	8.52
Agricultural	COM	0.66	0.36	1.48
Custom - SCI	COM	5.83	4.96	20.47
Custom - LCI	IND	2.71	2.65	14.12
HVAC - LCI	IND	2.83	2.26	6.19
Appliances - LCI	IND	3.62	4.13	20.00
Mercantile Self Directed Projects	IND	0.00	0.00	NA
T&D Projects	IND	0.00	0.00	NA

Table 8-22 through Table 8-24 summarize the measure costs by program.

Table 8-22 Summary of Measure Costs by Program – OE

Summary of Measure Costs by Program							
Program Name	Class	Participant Costs	Program Benefits	Total Avoid Costs Energy Costs	Total Avoid Costs Capacity	Implementati on Costs	Incentive Costs
Direct Load Control	Res	\$19,896,650	\$37,019,944	\$4,810,897	\$32,209,047	\$30,139,567	\$3,316,108
Behavioral	Res	\$0	\$6,488,888	\$5,241,340	\$1,247,548	\$6,517,971	\$0
Lighting	Res	\$12,465,861	\$89,191,403	\$75,659,029	\$13,532,374	\$7,974,596	\$6,470,737
Consumer Electronics	Res	\$3,621,945	\$10,794,348	\$8,789,190	\$2,005,158	\$327,822	\$3,621,945
Audits & Education	Res	\$0	\$4,331,572	\$3,429,592	\$901,981	\$4,863,325	\$0
EE Kits	Res	\$0	\$85,978,810	\$70,545,525	\$15,433,285	\$6,282,193	\$33,914,378
School Education	Res	\$0	\$7,349,082	\$6,102,762	\$1,246,321	\$3,816,786	\$4,074,002
Appliance Turn In	Res	\$0	\$165,209,052	\$125,983,814	\$39,225,238	\$43,401,316	\$13,672,510
HVAC	Res	\$328,895,602	\$138,637,363	\$97,088,451	\$41,548,912	\$2,693,297	\$41,942,028
Smart Thermostat	Res	\$11,908,669	\$9,182,092	\$8,347,736	\$834,356	\$1,883,146	\$2,977,167
Appliances	Res	\$9,680,233	\$38,116,185	\$22,070,582	\$16,045,603	\$1,291,481	\$8,634,350
New Homes	Res	\$20,818,336	\$42,137,250	\$30,267,428	\$11,869,822	\$5,940,073	\$10,621,600
LI - New Homes	LI RES	\$176,266	\$259,170	\$144,076	\$115,093	\$534,278	\$0
Community Connections	LI RES	\$475	\$5,654,730	\$4,740,350	\$914,380	\$1,258,668	\$5,287,500
Audits & Education - SCI	COM	\$7,789,713	\$37,002,614	\$31,154,627	\$5,847,987	\$19,845,133	\$15,579,427
Audits & Education - LCI	IND	\$910,676	\$17,584,666	\$14,775,414	\$2,809,253	\$3,200,883	\$1,821,353
Custom Buildings - SCI	COM	\$42,469,049	\$93,914,242	\$78,910,895	\$15,003,348	\$43,553,601	\$22,542,880
Appliance Turn In - SCI	COM	\$0	\$3,413,157	\$2,635,287	\$777,871	\$907,765	\$277,699
Lighting - SCI	COM	\$152,755,217	\$270,472,036	\$211,076,977	\$59,395,059	-\$3,942,600	\$66,300,104
Lighting - LCI	IND	\$37,371,542	\$82,066,927	\$63,112,729	\$18,954,197	-\$796,638	\$19,503,840
Government Tariff Lighting	GOV	\$2,629,692	\$3,014,182	\$2,585,398	\$428,784	-\$1,821,174	\$1,086,284
HVAC - SCI	COM	\$17,949,394	\$32,972,205	\$14,931,927	\$18,040,277	\$491,756	\$5,350,823
Appliances - SCI	COM	\$1,612,092	\$5,144,133	\$4,196,704	\$947,429	\$70,056	\$1,130,946
Food Service	COM	\$3,023,900	\$13,514,189	\$11,540,528	\$1,973,661	\$203,510	\$2,580,514
Agricultural	COM	\$3,361,989	\$2,277,868	\$2,085,490	\$192,378	\$1,943,685	\$683,331
Custom - SCI	COM	\$33,292,340	\$343,325,067	\$265,762,814	\$77,562,253	\$6,966,666	\$25,022,597
Custom - LCI	IND	\$144,045,801	\$1,028,787,274	\$777,958,889	\$250,828,385	\$109,283,350	\$135,210,567
HVAC - LCI	IND	\$13,280,811	\$60,945,345	\$28,715,869	\$32,229,476	\$2,663,599	\$8,410,561
Appliances - LCI	IND	\$19,949	\$195,375	\$165,943	\$29,432	\$665	\$26,599
Mercantile Self Directed Projects	IND	\$0	\$67,120,389	\$67,107,612	\$12,777	\$2,455,866	\$0
T&D Projects	IND	\$0	\$12,654,103	\$12,651,785	\$2,318	\$0	\$0

Table 8-23 Summary of Measure Costs by Program – CEI

Summary of Measure Costs by Program							
Program Name	Class	Participant Costs	Program Benefits	Total Avoid Costs Energy Costs	Total Avoid Costs Capacity	Implementation Costs	Incentive Costs
Direct Load Control	Res	\$14,688,797	\$27,297,167	\$3,518,685	\$23,778,482	\$22,254,231	\$2,448,133
Behavioral	Res	\$0	\$4,463,107	\$3,605,034	\$858,073	\$4,882,086	\$0
Lighting	Res	\$9,431,480	\$73,442,359	\$62,298,146	\$11,144,213	\$6,579,437	\$5,082,371
Consumer Electronics	Res	\$1,953,653	\$6,127,942	\$5,017,030	\$1,110,912	\$177,709	\$1,953,653
Audits & Education	Res	\$0	\$3,217,533	\$2,547,533	\$670,000	\$3,612,524	\$0
EE Kits	Res	\$0	\$62,135,789	\$50,977,192	\$11,158,597	\$4,534,011	\$24,491,625
School Education	Res	\$0	\$5,356,394	\$4,448,011	\$908,383	\$2,781,872	\$2,969,345
Appliance Turn In	Res	\$0	\$126,041,033	\$95,371,274	\$30,669,759	\$32,883,521	\$10,428,453
HVAC	Res	\$216,817,679	\$91,793,289	\$61,310,474	\$30,482,815	\$1,897,917	\$27,612,536
Smart Thermostat	Res	\$8,105,012	\$6,160,971	\$5,586,575	\$574,396	\$1,281,665	\$2,026,253
Appliances	Res	\$4,873,020	\$19,022,123	\$11,128,766	\$7,893,357	\$801,192	\$4,409,853
New Homes	Res	\$15,066,254	\$37,222,965	\$24,726,272	\$12,496,693	\$4,298,838	\$7,686,864
LI - New Homes	LI RES	\$176,266	\$255,106	\$140,012	\$115,093	\$534,278	\$0
Community Connections	LI RES	\$475	\$5,865,282	\$4,916,856	\$948,427	\$1,258,668	\$5,287,500
Audits & Education - SCI	COM	\$5,330,934	\$24,713,799	\$20,709,797	\$4,004,002	\$13,581,129	\$10,661,868
Audits & Education - LCI	IND	\$423,947	\$7,258,183	\$6,098,646	\$1,159,537	\$1,490,106	\$847,894
Custom Buildings - SCI	COM	\$31,328,655	\$62,983,501	\$52,921,519	\$10,061,981	\$32,128,710	\$16,629,478
Appliance Turn In - SCI	COM	\$0	\$2,331,077	\$1,799,545	\$531,532	\$684,016	\$209,151
Lighting - SCI	COM	\$192,971,286	\$337,431,213	\$263,854,766	\$73,576,448	-\$6,880,307	\$82,967,407
Lighting - LCI	IND	\$35,923,500	\$79,868,763	\$61,351,746	\$18,517,017	-\$573,228	\$18,942,987
Government Tariff Lighting	GOV	\$2,290,487	\$2,328,114	\$2,021,074	\$307,041	-\$1,456,653	\$848,841
HVAC - SCI	COM	\$17,785,328	\$33,638,966	\$15,601,102	\$18,037,865	\$450,805	\$5,534,114
Appliances - SCI	COM	\$1,424,676	\$4,843,192	\$3,945,478	\$897,714	\$63,696	\$1,076,817
Food Service	COM	\$1,792,829	\$7,769,940	\$6,786,672	\$983,267	\$128,766	\$1,662,722
Agricultural	COM	\$2,991,809	\$1,737,131	\$1,637,224	\$99,907	\$1,716,630	\$577,874
Custom - SCI	COM	\$22,702,788	\$221,160,096	\$171,369,639	\$49,790,457	\$4,463,415	\$16,514,319
Custom - LCI	IND	\$72,282,845	\$516,250,179	\$390,383,344	\$125,866,836	\$54,838,887	\$67,849,283
HVAC - LCI	IND	\$7,822,312	\$32,977,336	\$16,663,189	\$16,314,147	\$1,352,209	\$4,992,418
Appliances - LCI	IND	\$10,011	\$98,040	\$83,271	\$14,769	\$341	\$13,347
Mercantile Self Directed Projects	IND	\$0	\$0	\$0	\$0	\$977,585	\$0
T&D Projects	IND	\$0	\$0	\$0	\$0	\$0	\$0

Table 8-24 Summary of Measure Costs by Program – TE

Summary of Measure Costs by Program							
Program Name	Class	Participant Costs	Program Benefits	Total Avoid Costs Energy Costs	Total Avoid Costs Capacity	Implementation Costs	Incentive Costs
Direct Load Control	Res	\$5,486,725	\$10,242,712	\$1,360,704	\$8,882,007	\$8,537,979	\$914,454
Behavioral	Res	\$0	\$1,652,863	\$1,335,085	\$317,778	\$1,881,521	\$0
Lighting	Res	\$3,314,941	\$25,515,668	\$21,643,957	\$3,871,711	\$2,285,262	\$1,777,013
Consumer Electronics	Res	\$742,839	\$2,359,669	\$1,934,420	\$425,249	\$78,924	\$742,839
Audits & Education	Res	\$0	\$1,231,002	\$974,666	\$256,337	\$1,382,122	\$0
EE Kits	Res	\$0	\$24,001,508	\$19,692,278	\$4,309,229	\$1,752,617	\$9,464,171
School Education	Res	\$0	\$2,059,744	\$1,710,435	\$349,309	\$1,069,739	\$1,141,830
Appliance Turn In	Res	\$0	\$48,754,368	\$36,890,876	\$11,863,492	\$13,746,451	\$4,033,866
HVAC	Res	\$101,070,876	\$42,694,611	\$29,728,551	\$12,966,060	\$849,495	\$12,941,349
Smart Thermostat	Res	\$3,572,453	\$2,734,701	\$2,482,939	\$251,762	\$564,920	\$893,113
Appliances	Res	\$2,651,237	\$10,654,455	\$5,947,953	\$4,706,501	\$357,451	\$2,364,151
New Homes	Res	\$6,478,822	\$11,692,244	\$8,072,863	\$3,619,382	\$1,848,595	\$3,305,521
LI - New Homes	LI RES	\$176,266	\$255,675	\$140,581	\$115,093	\$534,278	\$0
Community Connections	LI RES	\$475	\$5,476,828	\$4,591,215	\$885,613	\$1,258,668	\$5,287,500
Audits & Education - SCI	COM	\$3,077,938	\$9,057,700	\$7,614,304	\$1,443,396	\$7,841,379	\$6,155,876
Audits & Education - LCI	IND	\$443,773	\$7,516,687	\$6,315,853	\$1,200,835	\$1,559,793	\$887,547
Custom Buildings - SCI	COM	\$13,522,339	\$27,436,593	\$23,053,437	\$4,383,156	\$13,867,666	\$7,177,756
Appliance Turn In - SCI	COM	\$0	\$975,710	\$754,174	\$221,536	\$309,983	\$87,669
Lighting - SCI	COM	\$86,395,091	\$138,271,499	\$108,675,912	\$29,595,587	-\$1,864,627	\$34,430,207
Lighting - LCI	IND	\$35,021,646	\$78,266,568	\$60,100,044	\$18,166,524	-\$533,828	\$18,549,906
Government Tariff Lighting	GOV	\$1,784,821	\$1,305,369	\$1,179,815	\$125,554	-\$913,248	\$494,875
HVAC - SCI	COM	\$6,283,727	\$11,633,841	\$5,299,312	\$6,334,530	\$171,837	\$1,872,557
Appliances - SCI	COM	\$683,359	\$2,312,354	\$1,882,085	\$430,268	\$30,855	\$515,142
Food Service	COM	\$1,043,452	\$4,395,062	\$3,736,613	\$658,449	\$65,834	\$840,448
Agricultural	COM	\$1,146,277	\$737,650	\$681,646	\$56,004	\$660,950	\$228,919
Custom - SCI	COM	\$13,864,404	\$130,968,396	\$101,546,479	\$29,421,917	\$2,635,269	\$9,917,320
Custom - LCI	IND	\$56,563,814	\$403,983,538	\$305,488,406	\$98,495,132	\$42,913,317	\$53,094,400
HVAC - LCI	IND	\$6,441,754	\$26,305,758	\$13,500,278	\$12,805,480	\$1,062,469	\$4,120,423
Appliances - LCI	IND	\$7,834	\$76,720	\$65,163	\$11,557	\$312	\$10,445
Mercantile Self Directed Projects	IND	\$0	\$0	\$0	\$0	\$977,585	\$0
T&D Projects	IND	\$0	\$0	\$0	\$0	\$0	\$0

Table 8-25 Savings for Total Economically Achievable by Program – OE

Summary of Lifetime Measure Savings for Total Economically Achievable by Program			
Program	Class	kW	MWh
Direct Load Control	Res	45,290	122,592
Behavioral	Res	13,869	113,863
Lighting	Res	22,182	1,789,431
Consumer Electronics	Res	4,324	200,999
Audits & Education	Res	4,394	75,437
EE Kits	Res	44,126	1,546,168
School Education	Res	3,563	133,756
Appliance Turn In	Res	87,800	2,918,795
HVAC	Res	43,795	2,793,994
Smart Thermostat	Res	1,173	186,895
Appliances	Res	24,199	542,473
New Homes	Res	13,331	795,948
LI - New Homes	LI RES	129	3,789
Community Connections	LI RES	1,672	109,817
Audits & Education - SCI	COM	6,568	819,279
Audits & Education - LCI	IND	3,155	388,552
Custom Buildings - SCI	COM	16,851	2,075,133
Appliance Turn In - SCI	COM	1,422	61,050
Lighting - SCI	COM	66,629	5,511,521
Lighting - LCI	IND	21,273	1,655,336
Government Tariff Lighting	GOV	650	62,161
HVAC - SCI	COM	22,240	408,476
Appliances - SCI	COM	1,403	101,202
Food Service	COM	2,650	274,392
Agricultural	COM	216	52,002
Custom - SCI	COM	87,179	7,430,358
Custom - LCI	IND	286,829	20,343,941
HVAC - LCI	IND	30,473	866,263
Appliances - LCI	IND	45	3,990
Mercantile Self Directed Projects	IND	41,111	3,176,907
T&D Projects	IND	5,708	450,000

Table 8-26 Savings for Total Economically Achievable by Program – CEI

Summary of Lifetime Measure Savings for Total Economically Achievable by Program			
Program	Class	kW	MWh
Direct Load Control	Res	33,436	90,173
Behavioral	Res	9,539	78,316
Lighting	Res	18,290	1,473,019
Consumer Electronics	Res	2,320	115,513
Audits & Education	Res	3,264	56,035
EE Kits	Res	31,904	1,117,283
School Education	Res	2,597	97,488
Appliance Turn In	Res	71,273	2,209,603
HVAC	Res	32,154	1,769,352
Smart Thermostat	Res	808	125,674
Appliances	Res	11,960	273,441
New Homes	Res	14,035	650,231
LI - New Homes	LI RES	129	3,682
Community Connections	LI RES	1,734	113,906
Audits & Education - SCI	COM	4,497	544,609
Audits & Education - LCI	IND	1,302	160,377
Custom Buildings - SCI	COM	11,301	1,391,686
Appliance Turn In - SCI	COM	972	41,689
Lighting - SCI	COM	82,510	6,888,555
Lighting - LCI	IND	20,785	1,609,445
Government Tariff Lighting	GOV	466	48,593
HVAC - SCI	COM	22,415	425,420
Appliances - SCI	COM	1,328	95,190
Food Service	COM	1,328	159,421
Agricultural	COM	112	40,330
Custom - SCI	COM	55,933	4,790,266
Custom - LCI	IND	143,932	10,208,683
HVAC - LCI	IND	15,506	494,610
Appliances - LCI	IND	22	2,002
Mercantile Self Directed Projects	IND	36,945	2,825,553
T&D Projects	IND	0	0



Table 8-27 Savings for Total Economically Achievable by Program – TE

Summary of Lifetime Measure Savings for Total Economically Achievable by Program			
Program	Class	kW	MWh
Direct Load Control	Res	12,489	34,148
Behavioral	Res	3,533	29,003
Lighting	Res	6,353	511,783
Consumer Electronics	Res	881	44,610
Audits & Education	Res	1,249	21,439
EE Kits	Res	12,321	431,602
School Education	Res	999	37,488
Appliance Turn In	Res	27,569	854,704
HVAC	Res	13,731	854,597
Smart Thermostat	Res	354	55,724
Appliances	Res	7,116	146,282
New Homes	Res	4,065	212,293
LI - New Homes	LI RES	129	3,697
Community Connections	LI RES	1,619	106,362
Audits & Education - SCI	COM	1,621	200,235
Audits & Education - LCI	IND	1,349	166,089
Custom Buildings - SCI	COM	4,923	606,240
Appliance Turn In - SCI	COM	405	17,471
Lighting - SCI	COM	33,200	2,830,555
Lighting - LCI	IND	20,392	1,576,753
Government Tariff Lighting	GOV	190	28,367
HVAC - SCI	COM	7,803	145,065
Appliances - SCI	COM	636	45,428
Food Service	COM	884	88,898
Agricultural	COM	63	16,930
Custom - SCI	COM	33,046	2,837,947
Custom - LCI	IND	112,632	7,988,646
HVAC - LCI	IND	12,193	398,589
Appliances - LCI	IND	18	1,567
Mercantile Self Directed Projects	IND	20,357	1,544,560
T&D Projects	IND	0	0

### 8.13 EEPDR ACHIEVABLE RESULTS

Achievable potential has been estimated by including measures that either passed the TRC or are important based on their potential impacts. The following tables present the Base and High Case results of this analysis by Company. The results are calculated on a year-by-year basis. However, the tables below only display the years 2017, 2021, 2026 and 2031.

#### The Base Case Tables:

For the Base Case, the Appliance Turn in Program accounts for the largest share of residential energy savings in both the achievable and economic market potential estimates. Among the commercial and industrial programs, the Custom Program is expected to have the largest savings impact.

Table 8-28 Base Case Summary of Measure Energy Savings by Program – OE

Base Case Summary of Measure Energy Lifetime Savings by Program					
Program Name	Class	2017 MWh	2021 MWh	2026 MWh	2031 MWh
Direct Load Control	Res	584	2,920	4,611	6,303
Behavioral	Res	37,454	187,123	187,123	187,123
Lighting	Res	29,844	149,103	153,294	157,486
Consumer Electronics	Res	4,754	23,752	23,752	23,752
Audits & Education	Res	3,669	18,332	18,332	18,332
EE Kits	Res	32,290	161,321	203,871	246,421
School Education	Res	4,272	21,341	21,341	21,341
Appliance Turn In	Res	25,365	126,725	190,054	253,383
HVAC	Res	6,411	32,028	67,034	102,040
Smart Thermostat	Res	1,125	5,620	9,044	12,468
Appliances	Res	4,894	24,448	35,350	46,251
New Homes	Res	2,831	14,144	21,193	28,242
LI - New Homes	LI RES	27	188	188	188
Community Connections	LI RES	2,929	14,635	14,635	14,635
Audits & Education - SCI	COM	8,285	41,394	41,394	41,394
Audits & Education - LCI	IND	3,929	19,632	19,632	19,632
Custom Buildings - SCI	COM	11,809	58,998	88,404	117,810
Appliance Turn In - SCI	COM	529	2,642	3,958	5,275
Lighting - SCI	COM	41,580	207,738	242,252	276,766
Lighting - LCI	IND	11,442	57,164	66,662	76,159
Government Tariff Lighting	GOV	657	3,281	4,949	6,617
HVAC - SCI	COM	2,390	11,942	19,874	27,805
Appliances - SCI	COM	1,034	5,168	7,524	9,879
Food Service	COM	3,352	16,745	21,477	26,208
Agricultural	COM	368	1,837	3,301	4,764
Custom - SCI	COM	24,929	124,544	243,019	361,494
Custom - LCI	IND	44,159	220,622	419,808	618,994
HVAC - LCI	IND	3,838	19,177	28,778	38,378
Appliances - LCI	IND	11	53	79	106

Table 8-29 Base Case Summary of Measure Energy Savings by Program – CEI

<b>Base Case</b> <b>Summary of Measure Energy Lifetime Savings by Program</b>					
<b>Program Name</b>	<b>Class</b>	<b>2017 MWh</b>	<b>2021 MWh</b>	<b>2026 MWh</b>	<b>2031 MWh</b>
Direct Load Control	Res	432	2,160	3,422	4,683
Behavioral	Res	25,266	126,231	126,231	126,231
Lighting	Res	26,060	130,200	133,152	136,105
Consumer Electronics	Res	3,381	16,892	16,892	16,892
Audits & Education	Res	2,677	13,375	13,375	13,375
EE Kits	Res	22,451	112,168	142,146	172,123
School Education	Res	3,009	15,035	15,035	15,035
Appliance Turn In	Res	20,479	102,314	153,478	204,641
HVAC	Res	3,883	19,398	40,429	61,460
Smart Thermostat	Res	722	3,606	5,804	8,001
Appliances	Res	2,703	13,502	19,039	24,576
New Homes	Res	2,313	11,554	17,313	23,072
LI - New Homes	LI RES	26	183	183	183
Community Connections	LI RES	3,038	15,180	15,180	15,180
Audits & Education - SCI	COM	5,836	29,158	29,158	29,158
Audits & Education - LCI	IND	1,719	8,586	8,586	8,586
Custom Buildings - SCI	COM	7,920	39,567	59,288	79,009
Appliance Turn In - SCI	COM	385	1,922	2,880	3,838
Lighting - SCI	COM	58,255	291,045	339,399	387,753
Lighting - LCI	IND	12,581	62,856	73,299	83,742
Government Tariff Lighting	GOV	513	2,565	3,869	5,173
HVAC - SCI	COM	2,631	13,146	21,907	30,668
Appliances - SCI	COM	911	4,551	6,663	8,776
Food Service	COM	1,895	9,466	10,973	12,480
Agricultural	COM	256	1,277	2,439	3,601
Custom - SCI	COM	16,064	80,259	156,310	232,361
Custom - LCI	IND	22,159	110,709	210,662	310,614
HVAC - LCI	IND	2,408	12,030	18,069	24,109
Appliances - LCI	IND	5	27	41	54

Table 8-30 Base Case Summary of Measure Energy Savings by Program – TE

Base Case Summary of Measure Energy Lifetime Savings by Program					
Program Name	Class	2017 MWh	2021 MWh	2026 MWh	2031 MWh
Direct Load Control	Res	159	793	1,243	1,693
Behavioral	Res	9,338	46,651	46,651	46,651
Lighting	Res	8,790	43,914	44,962	46,011
Consumer Electronics	Res	1,292	6,457	6,457	6,457
Audits & Education	Res	991	4,952	4,952	4,952
EE Kits	Res	8,674	43,334	54,835	66,336
School Education	Res	1,155	5,768	5,768	5,768
Appliance Turn In	Res	7,561	37,773	56,662	75,551
HVAC	Res	1,888	9,433	19,632	29,831
Smart Thermostat	Res	335	1,675	2,695	3,715
Appliances	Res	1,374	6,866	9,862	12,859
New Homes	Res	755	3,772	5,653	7,533
LI - New Homes	LI RES	26	184	184	184
Community Connections	LI RES	2,837	14,175	14,175	14,175
Audits & Education - SCI	COM	2,130	10,640	10,640	10,640
Audits & Education - LCI	IND	1,766	8,825	8,825	8,825
Custom Buildings - SCI	COM	3,450	17,236	25,827	34,418
Appliance Turn In - SCI	COM	154	769	1,152	1,535
Lighting - SCI	COM	22,341	111,615	130,159	148,702
Lighting - LCI	IND	11,363	56,770	66,202	75,633
Government Tariff Lighting	GOV	300	1,497	2,258	3,020
HVAC - SCI	COM	832	4,157	6,944	9,731
Appliances - SCI	COM	434	2,171	3,196	4,221
Food Service	COM	990	4,948	6,192	7,437
Agricultural	COM	112	561	1,032	1,503
Custom - SCI	COM	9,601	47,965	93,118	138,271
Custom - LCI	IND	17,340	86,634	164,850	243,066
HVAC - LCI	IND	1,891	9,447	14,191	18,935
Appliances - LCI	IND	4	21	31	42

When the market potential for demand savings are analyzed for the residential programs, the Appliance Turn in Program is expected to produce the greatest level of savings. Again, for the commercial and industrial programs, the Custom Program will generate the largest demand savings of the programs in that sector.

Table 8-31 Base Case Summary of Demand Savings by Program – OE

<b>Base Case</b> <b>Summary of Measure Demand Lifetime Savings by Program</b>					
<b>Program Name</b>	<b>Class</b>	<b>2017 kW</b>	<b>2021 kW</b>	<b>2026 kW</b>	<b>2031 kW</b>
Direct Load Control	Res	4,813	24,046	24,046	24,046
Behavioral	Res	4,276	21,361	21,361	21,361
Lighting	Res	3,155	15,763	16,202	16,641
Consumer Electronics	Res	653	3,264	3,264	3,264
Audits & Education	Res	601	3,002	3,002	3,002
EE Kits	Res	4,314	21,554	27,254	32,955
School Education	Res	533	2,664	2,664	2,664
Appliance Turn In	Res	5,409	27,023	41,948	56,874
HVAC	Res	1,750	8,741	17,263	25,785
Smart Thermostat	Res	73	364	585	807
Appliances	Res	2,266	11,319	16,987	22,654
New Homes	Res	667	3,330	4,990	6,650
LI - New Homes	LI RES	13	90	90	90
Community Connections	LI RES	334	1,671	1,671	1,671
Audits & Education - SCI	COM	934	4,665	4,665	4,665
Audits & Education - LCI	IND	449	2,241	2,241	2,241
Custom Buildings - SCI	COM	1,348	6,735	10,092	13,449
Appliance Turn In - SCI	COM	92	461	691	921
Lighting - SCI	COM	6,802	33,985	39,631	45,277
Lighting - LCI	IND	2,142	10,700	12,478	14,256
Government Tariff Lighting	GOV	64	322	485	649
HVAC - SCI	COM	1,476	7,375	13,179	18,983
Appliances - SCI	COM	126	628	956	1,283
Food Service	COM	223	1,113	1,862	2,611
Agricultural	COM	22	108	162	216
Custom - SCI	COM	3,984	19,903	39,368	58,833
Custom - LCI	IND	7,791	38,926	76,664	114,402
HVAC - LCI	IND	2,282	11,400	17,084	22,767
Appliances - LCI	IND	1	6	8	11

Table 8-32 Base Case Summary of Demand Savings by Program – CEI

<b>Base Case</b> <b>Summary of Measure Demand Lifetime Savings by Program</b>					
<b>Program Name</b>	<b>Class</b>	<b>2017 kW</b>	<b>2021 kW</b>	<b>2026 kW</b>	<b>2031 kW</b>
Direct Load Control	Res	3,589	17,932	17,932	17,932
Behavioral	Res	2,884	14,410	14,410	14,410
Lighting	Res	2,755	13,765	14,075	14,384
Consumer Electronics	Res	464	2,318	2,318	2,318
Audits & Education	Res	438	2,190	2,190	2,190
EE Kits	Res	3,002	14,999	19,015	23,032
School Education	Res	376	1,877	1,877	1,877
Appliance Turn In	Res	4,637	23,168	36,182	49,196
HVAC	Res	1,208	6,037	11,885	17,732
Smart Thermostat	Res	48	239	385	530
Appliances	Res	1,140	5,693	8,486	11,278
New Homes	Res	702	3,506	5,254	7,001
LI - New Homes	LI RES	13	90	90	90
Community Connections	LI RES	347	1,733	1,733	1,733
Audits & Education - SCI	COM	677	3,385	3,385	3,385
Audits & Education - LCI	IND	196	980	980	980
Custom Buildings - SCI	COM	904	4,517	6,768	9,019
Appliance Turn In - SCI	COM	67	336	503	671
Lighting - SCI	COM	9,438	47,154	54,988	62,822
Lighting - LCI	IND	2,357	11,774	13,730	15,686
Government Tariff Lighting	GOV	46	230	347	464
HVAC - SCI	COM	1,537	7,680	13,655	19,631
Appliances - SCI	COM	113	563	856	1,148
Food Service	COM	72	359	590	822
Agricultural	COM	7	36	53	71
Custom - SCI	COM	2,555	12,767	25,232	37,697
Custom - LCI	IND	3,910	19,533	38,470	57,407
HVAC - LCI	IND	1,163	5,808	8,705	11,602
Appliances - LCI	IND	1	3	4	6

Table 8-33 Base Case Summary of Demand Savings by Program – TE

<b>Base Case</b> <b>Summary of Measure Demand Lifetime Savings by Program</b>					
<b>Program Name</b>	<b>Class</b>	<b>2017 kW</b>	<b>2021 kW</b>	<b>2026 kW</b>	<b>2031 kW</b>
Direct Load Control	Res	1,280	6,393	6,393	6,393
Behavioral	Res	1,066	5,326	5,326	5,326
Lighting	Res	929	4,643	4,753	4,863
Consumer Electronics	Res	176	880	880	880
Audits & Education	Res	162	811	811	811
EE Kits	Res	1,159	5,792	7,333	8,874
School Education	Res	144	720	720	720
Appliance Turn In	Res	1,712	8,553	13,358	18,163
HVAC	Res	535	2,674	5,196	7,718
Smart Thermostat	Res	22	110	176	243
Appliances	Res	675	3,372	5,053	6,733
New Homes	Res	203	1,015	1,522	2,028
LI - New Homes	LI RES	13	90	90	90
Community Connections	LI RES	324	1,618	1,618	1,618
Audits & Education - SCI	COM	242	1,211	1,211	1,211
Audits & Education - LCI	IND	202	1,007	1,007	1,007
Custom Buildings - SCI	COM	394	1,968	2,948	3,929
Appliance Turn In - SCI	COM	27	134	200	267
Lighting - SCI	COM	3,502	17,494	20,400	23,307
Lighting - LCI	IND	2,130	10,640	12,408	14,176
Government Tariff Lighting	GOV	19	94	142	190
HVAC - SCI	COM	513	2,564	4,594	6,625
Appliances - SCI	COM	55	272	415	558
Food Service	COM	60	298	497	696
Agricultural	COM	5	26	39	52
Custom - SCI	COM	1,518	7,584	14,960	22,336
Custom - LCI	IND	3,059	15,285	30,104	44,923
HVAC - LCI	IND	910	4,549	6,817	9,085
Appliances - LCI	IND	0	2	3	4

The program and participant costs are shown for each Company in the tables below. The number of participants represents the total number of customers or the total number of items (i.e. CFL kits, Commercial Lighting Fixtures) in each program. Also, customers may participate in multiple programs in the year and will be counted in each program. Participant costs are derived based upon the expected mix of measures installed under the programs. Utility costs are higher in the first five years due to the initial use of direct load control programs to meet peak reduction goals.

Table 8-34 through Table 8-36 show the total costs by Company.

Table 8-37 through Table 8-39 show the breakdown of the utility costs by incentive and program costs.

Table 8-34 Base Case Achievable Results and Costs – OE

Base Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$11,472,472	\$11,472,497	\$1,784,788	\$1,784,788	NA
Participant Costs	\$49,248,030	\$49,265,657	\$26,695,219	\$26,695,219	\$513,227,596
Utility Costs	\$61,977,030	\$59,574,591	\$22,424,891	\$22,424,891	\$534,240,911
<b>Total Costs (\$)</b>	<b>\$111,225,060</b>	<b>\$108,840,248</b>	<b>\$49,120,110</b>	<b>\$49,120,110</b>	<b>\$1,047,468,507</b>

Table 8-35 Base Case Achievable Results and Costs – CEI

Base Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$14,391,177	\$14,391,202	\$2,282,693	\$2,282,693	NA
Participant Costs	\$45,832,840	\$45,850,466	\$19,294,684	\$19,294,684	\$422,146,291
Utility Costs	\$46,982,109	\$46,057,952	\$14,792,286	\$14,792,286	\$382,940,257
<b>Total Costs (\$)</b>	<b>\$92,814,949</b>	<b>\$91,908,419</b>	<b>\$34,086,969</b>	<b>\$34,086,969</b>	<b>\$805,086,548</b>

Table 8-36 Base Case Achievable Results and Costs – TE

Base Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$6,802,770	\$6,802,795	\$1,097,080	\$1,097,080	NA
Participant Costs	\$22,483,169	\$22,500,796	\$9,694,568	\$9,694,568	\$209,396,780
Utility Costs	\$24,646,684	\$23,722,527	\$8,348,080	\$8,348,080	\$206,821,077
<b>Total Costs (\$)</b>	<b>\$47,129,853</b>	<b>\$46,223,322</b>	<b>\$18,042,648</b>	<b>\$18,042,648</b>	<b>\$416,217,858</b>



Table 8-37 Base Case Utility Program Costs – OE

Base Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$31,711,377	\$29,308,938	\$10,942,886	\$10,942,886
Incentives	\$30,265,653	\$30,265,653	\$11,482,004	\$11,482,004
<b>Total Costs \$</b>	<b>\$61,977,030</b>	<b>\$59,574,591</b>	<b>\$22,424,891</b>	<b>\$22,424,891</b>

Table 8-38 Base Case Utility Program Costs – CEI

Base Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$20,644,691	\$19,720,534	\$6,610,325	\$6,610,325
Incentives	\$26,337,418	\$26,337,418	\$8,181,960	\$8,181,960
<b>Total Costs \$</b>	<b>\$46,982,109</b>	<b>\$46,057,952</b>	<b>\$14,792,286</b>	<b>\$14,792,286</b>

Table 8-39 Base Case Utility Program Costs – TE

Base Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$11,085,942	\$10,161,785	\$3,940,682	\$3,940,682
Incentives	\$13,560,742	\$13,560,742	\$4,407,398	\$4,407,398
<b>Total Costs \$</b>	<b>\$24,646,684</b>	<b>\$23,722,527</b>	<b>\$8,348,080</b>	<b>\$8,348,080</b>

The tables below show the results for the cost-benefit analysis for the individual program

Table 8-40 Base Case Summary of Measure Tests by Program – OE

Summary of Measure Tests by Program for Base Case Year 2026				
Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.81	1.20
Behavioral	Res	0.00	1.13	0.00
Lighting	Res	2.75	4.35	2.50
Consumer Electronics	Res	0.00	1.78	0.00
Audits & Education	Res	0.00	0.96	0.00
EE Kits	Res	2.04	2.53	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	3.60	2.98	0.00
HVAC	Res	3.02	0.46	0.87
Smart Thermostat	Res	1.95	0.64	1.57
Appliances	Res	4.26	2.20	6.91
New Homes	Res	2.41	1.27	3.82
LI - New Homes	LI RES	0.00	0.43	0.00
Community Connections	LI RES	0.00	1.03	0.00
Audits & Education - SCI	COM	0.00	0.94	0.00
Audits & Education - LCI	IND	0.00	3.21	0.00
Custom Buildings - SCI	COM	1.70	0.98	4.89
Appliance Turn In - SCI	COM	3.57	2.96	0.00
Lighting - SCI	COM	3.52	1.48	3.61
Lighting - LCI	IND	3.56	1.86	5.03
Government Tariff Lighting	GOV	14.89	1.89	2.36
HVAC - SCI	COM	5.64	2.10	3.44
Appliances - SCI	COM	3.67	2.14	6.17
Food Service	COM	6.66	2.70	7.94
Agricultural	COM	1.12	0.51	1.44
Custom - SCI	COM	9.74	4.96	21.59
Custom - LCI	IND	3.45	2.22	14.39
HVAC - LCI	IND	5.49	2.91	6.56
Appliances - LCI	IND	6.20	4.83	20.00

Table 8-41 Base Case Summary of Measure Tests by Program – CEI

Summary of Measure Tests by Program for Base Case Year 2026				
Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.80	1.20
Behavioral	Res	0.00	1.04	0.00
Lighting	Res	2.75	4.54	2.50
Consumer Electronics	Res	0.00	1.78	0.00
Audits & Education	Res	0.00	0.96	0.00
EE Kits	Res	2.04	2.53	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	3.62	2.99	0.00
HVAC	Res	3.01	0.46	0.84
Smart Thermostat	Res	1.92	0.63	1.55
Appliances	Res	4.27	2.01	7.14
New Homes	Res	2.92	1.54	4.32
LI - New Homes	LI RES	0.00	0.42	0.00
Community Connections	LI RES	0.00	1.07	0.00
Audits & Education - SCI	COM	0.00	0.92	0.00
Audits & Education - LCI	IND	0.00	2.85	0.00
Custom Buildings - SCI	COM	1.55	0.89	4.44
Appliance Turn In - SCI	COM	3.24	2.68	0.00
Lighting - SCI	COM	3.54	1.47	3.56
Lighting - LCI	IND	3.56	1.86	5.04
Government Tariff Lighting	GOV	16.79	1.64	2.12
HVAC - SCI	COM	5.39	2.00	3.08
Appliances - SCI	COM	3.57	2.22	6.75
Food Service	COM	6.12	2.41	7.10
Agricultural	COM	0.95	0.39	1.21
Custom - SCI	COM	9.55	4.67	20.33
Custom - LCI	IND	3.45	2.22	14.39
HVAC - LCI	IND	5.07	2.69	6.32
Appliances - LCI	IND	6.19	4.83	20.00

Table 8-42 Base Case Summary of Measure Tests by Program – TE

Summary of Measure Tests by Program for Base Case Year 2026				
Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.79	1.20
Behavioral	Res	0.00	1.00	0.00
Lighting	Res	2.75	4.50	2.50
Consumer Electronics	Res	0.00	1.79	0.00
Audits & Education	Res	0.00	0.96	0.00
EE Kits	Res	2.04	2.53	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	3.44	2.81	0.00
HVAC	Res	3.02	0.47	0.87
Smart Thermostat	Res	1.94	0.63	1.56
Appliances	Res	4.34	2.22	6.72
New Homes	Res	2.14	1.13	3.28
LI - New Homes	LI RES	0.00	0.42	0.00
Community Connections	LI RES	0.00	1.00	0.00
Audits & Education - SCI	COM	0.00	0.58	0.00
Audits & Education - LCI	IND	0.00	2.82	0.00
Custom Buildings - SCI	COM	1.56	0.90	4.48
Appliance Turn In - SCI	COM	3.07	2.51	0.00
Lighting - SCI	COM	3.45	1.37	3.27
Lighting - LCI	IND	3.56	1.86	5.04
Government Tariff Lighting	GOV	29.81	1.13	1.59
HVAC - SCI	COM	5.70	2.11	3.45
Appliances - SCI	COM	3.58	2.19	6.66
Food Service	COM	6.54	2.59	7.51
Agricultural	COM	1.05	0.46	1.34
Custom - SCI	COM	9.42	4.52	19.69
Custom - LCI	IND	3.45	2.22	14.39
HVAC - LCI	IND	5.03	2.67	6.26
Appliances - LCI	IND	6.16	4.80	20.00

The costs and benefits for the programs are shown below. These were the components used in the cost-effectiveness analysis to calculate the cost-benefit ratios described above.

Table 8-43 Base Case Summary of Measure Costs &amp; Benefits – OE

Base Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	1,532,933	3,669,045	246,233	3,422,812	3,882,612	352,398
	2021		4,362,381	292,147	4,070,234	3,882,612	352,398
	2026		193,366	193,366	0	0	0
	2031	290,729	233,547	233,547	0	0	0
Behavioral	2017	0	2,000,416	1,615,818	384,598	2,269,580	0
	2021		2,565,198	2,137,754	427,443	2,269,580	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	1,357,480	12,636,476	10,718,582	1,917,894	2,097,024	796,211
	2021		15,038,207	12,727,101	2,311,107	2,097,024	796,211
	2026		557,408	479,123	78,286	138,399	105,164
	2031	315,493	669,693	580,769	88,924	138,399	105,164
Consumer Electronics	2017	549,999	1,720,662	1,408,346	312,316	605,871	549,999
	2021		2,058,223	1,672,120	386,103	605,871	549,999
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	592,386	469,031	123,355	790,009	0
	2021		761,067	588,656	172,411	790,009	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	8,412,547	6,903,662	1,508,885	4,027,176	3,322,403
	2021		10,184,377	8,235,167	1,949,211	4,027,176	3,322,403
	2026		3,243,684	2,663,723	579,962	1,061,770	876,406
	2031	0	3,960,090	3,305,393	654,697	1,061,770	876,406
School Education	2017	0	1,099,775	913,265	186,509	1,263,093	609,666
	2021		1,330,343	1,089,406	240,937	1,263,093	609,666
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	0	10,663,868	8,176,811	2,487,057	4,297,539	882,683
	2021		12,790,223	9,711,722	3,078,501	4,297,539	882,683
	2026		7,796,946	5,974,524	1,822,422	2,156,482	446,484
	2031	0	9,377,102	7,314,062	2,063,040	2,156,482	446,484
HVAC	2017	10,782,198	4,919,069	3,447,279	1,471,790	1,715,477	1,528,398
	2021		5,804,625	4,072,743	1,731,883	1,715,477	1,528,398
	2026		7,998,153	5,802,758	2,195,395	1,792,290	1,671,933
	2031	13,131,630	10,461,042	7,955,277	2,505,765	1,792,290	1,671,933
Smart Thermostat	2017	738,978	569,784	518,009	51,775	323,078	184,745
	2021		676,100	614,532	61,568	323,078	184,745
	2026		503,998	461,654	42,345	197,437	112,899
	2031	451,598	605,823	557,674	48,150	197,437	112,899
Appliances	2017	812,468	3,194,896	1,725,548	1,469,348	924,285	746,472
	2021		3,812,844	2,052,122	1,760,722	924,285	746,472
	2026		2,374,042	1,337,854	1,036,188	346,631	308,404
	2031	331,516	2,792,860	1,615,394	1,177,466	346,631	308,404
New Homes	2017	1,040,917	2,106,862	1,513,371	593,491	927,085	531,080
	2021		2,489,759	1,794,834	694,925	927,085	531,080
	2026		1,484,032	1,091,529	392,502	463,542	265,540
	2031	520,458	1,753,947	1,306,387	447,559	463,542	265,540

Base Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	1,107,453	5,260,613	4,429,212	831,401	5,513,112	2,214,906
	2021		6,226,470	5,252,975	973,496	5,513,112	2,214,906
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	3,397,524	7,513,139	6,312,872	1,200,268	5,674,862	1,803,430
	2021		8,892,371	7,486,965	1,405,406	5,674,862	1,803,430
	2026		5,346,993	4,553,202	793,791	2,837,431	901,715
	2031	1,698,762	6,354,597	5,449,459	905,138	2,837,431	901,715
Appliance Turn In - SCI	2017	0	221,634	171,123	50,511	89,510	18,032
	2021		264,704	203,218	61,486	89,510	18,032
	2026		159,431	124,895	34,537	44,755	9,016
	2031	0	192,019	152,890	39,129	44,755	9,016
Lighting - SCI	2017	15,599,893	27,604,602	21,541,068	6,063,533	6,431,471	6,766,436
	2021		32,646,934	25,547,535	7,099,399	6,431,471	6,766,436
	2026		6,520,669	5,184,028	1,336,641	1,071,912	1,127,739
	2031	2,599,982	7,735,524	6,211,370	1,524,154	1,071,912	1,127,739
HVAC - SCI	2017	784,895	2,107,547	954,574	1,152,973	402,802	355,776
	2021		2,494,614	1,132,476	1,362,138	402,802	355,776
	2026		2,346,354	1,036,373	1,309,982	253,563	231,487
	2031	575,787	2,737,607	1,244,706	1,492,901	253,563	231,487
Appliances - SCI	2017	146,757	466,323	382,987	83,336	112,200	105,377
	2021		554,372	454,691	99,681	112,200	105,377
	2026		337,693	277,137	60,557	56,794	53,499
	2031	74,561	404,294	335,469	68,825	56,794	53,499
Food Service	2017	264,635	1,195,388	1,030,543	164,846	261,217	239,176
	2021		1,420,854	1,225,403	195,452	261,217	239,176
	2026		765,617	614,568	151,049	71,559	65,381
	2031	132,348	912,443	740,554	171,890	71,559	65,381
Agricultural	2017	239,855	184,931	165,694	19,238	190,765	51,088
	2021		219,096	196,571	22,526	190,765	51,088
	2026		195,571	182,849	12,723	167,319	42,789
	2031	216,271	235,236	220,729	14,507	167,319	42,789
Custom - SCI	2017	2,098,111	16,104,892	12,563,720	3,541,172	1,742,586	1,365,676
	2021		19,044,586	14,897,708	4,146,878	1,742,586	1,365,676
	2026		21,849,072	17,249,923	4,599,149	1,515,884	1,143,135
	2031	1,547,535	25,889,611	20,645,380	5,244,231	1,515,884	1,143,135
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	129,470	2,499,989	2,100,601	399,388	790,917	258,939
	2021		2,958,926	2,491,279	467,647	790,917	258,939
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	3,192,851	8,011,512	6,104,466	1,907,046	1,898,397	1,869,809
	2021		9,472,775	7,239,803	2,232,972	1,898,397	1,869,809
	2026		1,888,125	1,467,720	420,404	316,400	311,635
	2031	532,142	2,236,126	1,756,751	479,375	316,400	311,635
Custom - LCI	2017	4,216,806	28,867,746	22,069,372	6,798,374	11,154,194	3,929,666
	2021		34,148,881	26,178,760	7,970,121	11,154,194	3,929,666
	2026		37,837,447	29,056,481	8,780,966	9,545,401	3,443,590
	2031	3,653,429	44,848,981	34,838,204	10,010,777	9,545,401	3,443,590

Table 8-44 Base Case Summary of Measure Costs &amp; Benefits – CEI

Base Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	1,143,154	2,732,575	180,083	2,552,492	2,895,877	262,794
	2021		3,248,956	213,662	3,035,294	2,895,877	262,794
	2026		144,199	144,199	0	0	0
	2031	216,805	174,163	174,163	0	0	0
Behavioral	2017	0	1,349,460	1,090,014	259,446	1,667,290	0
	2021		1,730,456	1,442,108	288,349	1,667,290	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	1,086,224	11,023,714	9,350,439	1,673,274	1,802,809	665,682
	2021		13,119,179	11,102,666	2,016,513	1,802,809	665,682
	2026		392,675	337,526	55,149	97,497	74,085
	2031	222,254	471,776	409,132	62,644	97,497	74,085
Consumer Electronics	2017	390,731	1,225,588	1,003,406	222,182	431,170	390,731
	2021		1,465,955	1,191,333	274,622	431,170	390,731
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	432,206	342,206	90,000	576,392	0
	2021		555,276	429,484	125,792	576,392	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	5,850,219	4,800,180	1,050,038	2,797,029	2,307,905
	2021		7,082,451	5,725,988	1,356,462	2,797,029	2,307,905
	2026		2,285,273	1,876,673	408,601	748,049	617,454
	2031	0	2,790,003	2,328,748	461,254	748,049	617,454
School Education	2017	0	774,824	643,423	131,401	889,887	429,528
	2021		937,267	767,519	169,747	889,887	429,528
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	0	8,657,016	6,595,270	2,061,746	3,472,966	716,423
	2021		10,394,698	7,833,558	2,561,140	3,472,966	716,423
	2026		6,352,752	4,820,273	1,532,479	1,744,250	363,390
	2031	0	7,635,624	5,901,092	1,734,532	1,744,250	363,390
HVAC	2017	6,793,064	3,083,107	2,071,423	1,011,683	1,097,565	969,468
	2021		3,638,155	2,447,255	1,190,899	1,097,565	969,468
	2026		4,990,328	3,480,637	1,509,691	1,117,551	1,038,821
	2031	8,206,769	6,498,932	4,775,770	1,723,162	1,117,551	1,038,821
Smart Thermostat	2017	479,944	364,826	330,813	34,013	209,829	119,986
	2021		432,903	392,456	40,447	209,829	119,986
	2026		322,646	294,828	27,818	128,229	73,325
	2031	293,299	387,780	356,148	31,632	128,229	73,325
Appliances	2017	443,365	1,641,742	912,126	729,616	530,817	412,927
	2021		1,960,939	1,085,622	875,318	530,817	412,927
	2026		1,196,025	684,016	512,009	175,004	154,645
	2031	164,442	1,407,525	825,681	581,844	175,004	154,645
New Homes	2017	753,313	1,861,148	1,236,314	624,835	670,932	384,343
	2021		2,197,874	1,466,248	731,625	670,932	384,343
	2026		1,304,931	891,700	413,231	335,466	192,172
	2031	376,656	1,538,419	1,067,223	471,196	335,466	192,172

Base Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	803,102	3,723,118	3,119,917	603,200	3,997,993	1,606,204
	2021		4,406,466	3,700,172	706,294	3,997,993	1,606,204
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	2,506,292	5,038,680	4,233,722	804,959	4,186,244	1,330,358
	2021		5,963,661	5,021,126	942,534	4,186,244	1,330,358
	2026		3,585,956	3,053,601	532,355	2,093,122	665,179
	2031	1,253,146	4,261,705	3,654,675	607,030	2,093,122	665,179
Appliance Turn In - SCI	2017	0	161,300	124,520	36,780	71,865	14,472
	2021		192,646	147,875	44,771	71,865	14,472
	2026		116,030	90,882	25,148	35,933	7,236
	2031	0	139,744	111,253	28,492	35,933	7,236
Lighting - SCI	2017	22,098,049	38,558,896	30,143,627	8,415,268	8,849,974	9,479,957
	2021		45,602,573	35,749,821	9,852,752	8,849,974	9,479,957
	2026		9,109,517	7,254,479	1,855,038	1,474,996	1,579,993
	2031	3,683,008	10,807,788	8,692,506	2,115,282	1,474,996	1,579,993
HVAC - SCI	2017	906,178	2,252,665	1,055,340	1,197,325	427,311	385,631
	2021		2,666,624	1,251,932	1,414,693	427,311	385,631
	2026		2,458,279	1,125,784	1,332,495	277,682	254,680
	2031	695,823	2,871,320	1,352,991	1,518,329	277,682	254,680
Appliances - SCI	2017	119,493	414,747	340,094	74,653	102,434	96,670
	2021		493,039	403,738	89,301	102,434	96,670
	2026		300,842	247,172	53,670	51,920	49,117
	2031	60,726	360,265	299,273	60,992	51,920	49,117
Food Service	2017	123,143	556,038	503,962	52,077	151,476	138,698
	2021		661,759	599,921	61,838	151,476	138,698
	2026		238,781	192,560	46,221	24,340	22,188
	2031	46,235	284,765	232,174	52,591	24,340	22,188
Agricultural	2017	196,811	113,402	107,044	6,358	150,810	37,924
	2021		134,455	127,011	7,444	150,810	37,924
	2026		142,154	137,949	4,205	144,391	35,500
	2031	190,798	171,709	166,914	4,794	144,391	35,500
Custom - SCI	2017	1,477,957	10,411,741	8,134,849	2,276,892	1,157,666	916,934
	2021		12,311,753	9,645,786	2,665,967	1,157,666	916,934
	2026		14,048,690	11,100,115	2,948,574	990,785	752,616
	2031	1,057,582	16,646,193	13,284,003	3,362,190	990,785	752,616
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	63,867	1,093,441	918,757	174,683	390,159	127,735
	2021		1,294,170	1,089,631	204,539	390,159	127,735
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	3,502,599	8,812,003	6,713,633	2,098,370	2,086,780	2,056,064
	2021		10,419,255	7,962,261	2,456,994	2,086,780	2,056,064
	2026		2,076,754	1,614,173	462,581	347,797	342,677
	2031	583,766	2,459,499	1,932,030	527,469	347,797	342,677
Custom - LCI	2017	2,116,013	14,485,967	11,074,512	3,411,455	5,597,226	1,971,924
	2021		17,136,065	13,136,622	3,999,443	5,597,226	1,971,924
	2026		18,987,005	14,580,675	4,406,329	4,789,926	1,728,009
	2031	1,833,307	22,505,425	17,481,971	5,023,454	4,789,926	1,728,009



Table 8-45 Base Case Summary of Measure Costs &amp; Benefits – TE

Base Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	407,549	978,949	68,952	909,997	1,062,569	93,689
	2021		1,163,932	81,810	1,082,122	1,062,569	93,689
	2026		51,409	51,409	0	0	0
	2031	77,294	62,091	62,091	0	0	0
Behavioral	2017	0	498,721	402,837	95,884	641,229	0
	2021		639,526	532,961	106,565	641,229	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	373,766	3,718,872	3,154,401	564,471	610,168	226,730
	2021		4,425,762	3,745,515	680,247	610,168	226,730
	2026		139,466	119,879	19,587	34,628	26,313
	2031	78,938	167,560	145,311	22,249	34,628	26,313
Consumer Electronics	2017	148,568	471,934	386,884	85,050	166,487	148,568
	2021		564,360	459,335	105,025	166,487	148,568
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	160,013	126,693	33,320	213,394	0
	2021		205,576	159,005	46,571	213,394	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	2,259,951	1,854,471	405,481	1,081,225	892,072
	2021		2,735,950	2,212,141	523,809	1,081,225	892,072
	2026		876,725	719,969	156,756	286,982	236,881
	2031	0	1,070,360	893,404	176,956	286,982	236,881
School Education	2017	0	297,255	246,844	50,411	341,398	164,785
	2021		359,574	294,452	65,122	341,398	164,785
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	0	3,196,051	2,434,882	761,169	1,364,389	264,493
	2021		3,837,580	2,892,041	945,539	1,364,389	264,493
	2026		2,345,349	1,779,578	565,771	685,062	134,158
	2031	0	2,818,968	2,178,601	640,367	685,062	134,158
HVAC	2017	3,164,517	1,455,583	1,013,484	442,099	516,105	456,738
	2021		1,718,360	1,197,481	520,879	516,105	456,738
	2026		2,341,450	1,693,547	647,903	523,566	487,797
	2031	3,811,987	3,056,783	2,317,306	739,477	523,566	487,797
Smart Thermostat	2017	221,523	169,575	153,964	15,611	96,849	55,381
	2021		201,217	182,653	18,564	96,849	55,381
	2026		149,983	137,215	12,768	59,185	33,844
	2031	135,375	180,272	165,754	14,518	59,185	33,844
Appliances	2017	230,808	916,141	479,047	437,094	261,986	211,500
	2021		1,093,604	569,767	523,837	261,986	211,500
	2026		671,116	364,957	306,159	95,988	85,936
	2031	93,063	788,657	440,774	347,883	95,988	85,936
New Homes	2017	323,941	584,612	403,643	180,969	288,516	165,276
	2021		690,613	478,714	211,899	288,516	165,276
	2026		410,813	291,130	119,683	144,258	82,638
	2031	161,971	484,908	348,437	136,471	144,258	82,638

Base Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	460,197	1,354,258	1,138,449	215,809	2,290,946	920,393
	2021		1,602,875	1,350,183	252,693	2,290,946	920,393
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	1,081,787	2,194,927	1,844,275	350,652	1,806,902	574,220
	2021		2,597,863	2,187,281	410,583	1,806,902	574,220
	2026		1,562,098	1,330,196	231,902	903,451	287,110
	2031	540,894	1,856,465	1,592,033	264,432	903,451	287,110
Appliance Turn In - SCI	2017	0	64,438	49,807	14,631	30,614	5,790
	2021		76,959	59,149	17,810	30,614	5,790
	2026		46,356	36,352	10,004	15,307	2,895
	2031	0	55,834	44,500	11,334	15,307	2,895
Lighting - SCI	2017	9,120,431	14,573,248	11,452,115	3,121,133	3,483,071	3,628,687
	2021		17,236,736	13,582,398	3,654,339	3,483,071	3,628,687
	2026		3,445,089	2,757,068	688,021	580,512	604,781
	2031	1,520,072	4,089,246	3,304,706	784,541	580,512	604,781
HVAC - SCI	2017	274,334	735,670	333,658	402,013	139,182	122,824
	2021		870,684	395,839	474,845	139,182	122,824
	2026		824,653	365,609	459,044	88,288	80,530
	2031	203,115	962,189	439,036	523,153	88,288	80,530
Appliances - SCI	2017	58,819	199,658	163,418	36,240	49,501	46,670
	2021		237,327	193,992	43,336	49,501	46,670
	2026		146,427	120,180	26,246	25,159	23,772
	2031	29,952	175,328	145,501	29,828	25,159	23,772
Food Service	2017	77,320	338,148	294,192	43,957	78,046	71,490
	2021		402,037	349,908	52,129	78,046	71,490
	2026		201,153	161,108	40,045	19,159	17,520
	2031	36,623	239,729	194,161	45,568	19,159	17,520
Agricultural	2017	78,320	53,819	49,152	4,667	61,311	15,997
	2021		63,779	58,314	5,465	61,311	15,997
	2026		60,722	57,636	3,086	55,851	14,039
	2031	72,904	73,162	69,642	3,519	55,851	14,039
Custom - SCI	2017	921,250	6,216,133	4,863,954	1,352,178	704,247	561,497
	2021		7,350,568	5,767,305	1,583,264	704,247	561,497
	2026		8,336,737	6,592,165	1,744,571	594,926	454,122
	2031	648,404	9,878,483	7,889,192	1,989,291	594,926	454,122
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	66,351	1,123,854	944,312	179,542	405,329	132,701
	2021		1,330,167	1,119,939	210,228	405,329	132,701
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	3,161,962	7,960,032	6,063,710	1,896,322	1,888,821	1,856,937
	2021		9,411,889	7,191,471	2,220,418	1,888,821	1,856,937
	2026		1,875,953	1,457,913	418,040	314,803	309,489
	2031	526,994	2,221,678	1,744,998	476,680	314,803	309,489
Custom - LCI	2017	1,655,853	11,335,768	8,666,187	2,669,581	4,380,022	1,543,099
	2021		13,409,561	10,279,859	3,129,702	4,380,022	1,543,099
	2026		14,857,985	11,409,880	3,448,104	3,748,282	1,352,227
	2031	1,434,626	17,611,270	13,680,244	3,931,026	3,748,282	1,352,227

**The High Case Tables:**

The Base Case market potential analysis is repeated for the High Case Scenario. For the High Case Scenario, the assumption of participation levels is broadened to also include customers who indicated that they were likely to participate in the program or install the equipment. In addition, the program budgets are increased to reflect greater marketing requirements and higher incentive rates (in order to lure the “likely to participate” to actually participate in programs).

Not surprisingly, the higher participation assumptions lead to greater savings than the Base Case and an increase of roughly 24% to 27%. However, the relative magnitude of the program energy savings across programs does not change the Appliance Turn in and the Custom Program produce the largest savings. The tables below show the energy savings by Company.

Table 8-46 High Case Summary of Energy Lifetime Savings by Program – OE

High Case Summary of Measure Energy Lifetime Savings by Program					
Program Name	Class	2017 MWh	2021 MWh	2026 MWh	2031 MWh
Direct Load Control	Res	1,100	5,495	8,678	11,862
Behavioral	Res	48,597	242,794	242,794	242,794
Lighting	Res	39,961	199,648	204,677	209,707
Consumer Electronics	Res	6,139	30,669	30,669	30,669
Audits & Education	Res	5,366	26,810	26,810	26,810
EE Kits	Res	43,154	215,601	272,468	329,334
School Education	Res	5,709	28,521	28,521	28,521
Appliance Turn In	Res	39,062	195,157	292,683	390,210
HVAC	Res	6,516	32,553	67,931	103,309
Smart Thermostat	Res	1,632	8,152	13,117	18,083
Appliances	Res	5,985	29,903	43,523	57,142
New Homes	Res	5,662	28,287	42,386	56,485
LI - New Homes	LI RES	54	269	269	269
Community Connections	LI RES	2,929	14,635	14,635	14,635
Audits & Education - SCI	COM	11,656	58,232	58,232	58,232
Audits & Education - LCI	IND	5,528	27,617	27,617	27,617
Custom Buildings - SCI	COM	14,761	73,748	110,505	147,263
Appliance Turn In - SCI	COM	814	4,068	6,096	8,123
Lighting - SCI	COM	43,926	219,459	255,920	292,381
Lighting - LCI	IND	11,682	58,364	68,060	77,757
Government Tariff Lighting	GOV	657	3,281	4,949	6,617
HVAC - SCI	COM	3,047	15,224	25,219	35,215
Appliances - SCI	COM	1,141	5,699	8,287	10,876
Food Service	COM	5,326	26,607	31,421	36,235
Agricultural	COM	368	1,837	3,301	4,764
Custom - SCI	COM	30,421	151,987	298,232	444,477
Custom - LCI	IND	55,199	275,777	524,760	773,743
HVAC - LCI	IND	3,929	19,631	29,477	39,324
Appliances - LCI	IND	11	53	79	106

Table 8-47 High Case Summary of Energy Lifetime Savings by Program – CEI

High Case Summary of Measure Energy Lifetime Savings by Program					
Program Name	Class	2017 MWh	2021 MWh	2026 MWh	2031 MWh
Direct Load Control	Res	806	4,025	6,375	8,725
Behavioral	Res	33,425	166,995	166,995	166,995
Lighting	Res	33,188	165,810	169,353	172,896
Consumer Electronics	Res	3,381	16,892	16,892	16,892
Audits & Education	Res	3,986	19,914	19,914	19,914
EE Kits	Res	31,041	155,085	196,532	237,979
School Education	Res	4,161	20,788	20,788	20,788
Appliance Turn In	Res	29,596	147,863	221,803	295,744
HVAC	Res	3,988	19,926	41,332	62,738
Smart Thermostat	Res	1,097	5,481	8,821	12,160
Appliances	Res	3,182	15,899	22,630	29,362
New Homes	Res	4,625	23,108	34,626	46,144
LI - New Homes	LI RES	52	262	262	262
Community Connections	LI RES	3,038	15,180	15,180	15,180
Audits & Education - SCI	COM	7,748	38,710	38,710	38,710
Audits & Education - LCI	IND	2,282	11,399	11,399	11,399
Custom Buildings - SCI	COM	9,900	49,459	74,110	98,762
Appliance Turn In - SCI	COM	556	2,778	4,163	5,547
Lighting - SCI	COM	60,516	302,340	352,571	402,802
Lighting - LCI	IND	12,840	64,148	74,805	85,463
Government Tariff Lighting	GOV	513	2,565	3,869	5,173
HVAC - SCI	COM	3,208	16,030	26,551	37,072
Appliances - SCI	COM	1,049	5,239	7,697	10,155
Food Service	COM	3,598	17,974	20,418	22,862
Agricultural	COM	285	1,423	2,657	3,892
Custom - SCI	COM	19,689	98,365	192,456	286,547
Custom - LCI	IND	27,699	138,386	263,327	388,268
HVAC - LCI	IND	2,542	12,702	19,092	25,481
Appliances - LCI	IND	5	27	41	54

Table 8-48 High Case Summary of Energy Lifetime Savings by Program – TE

High Case Summary of Measure Energy Lifetime Savings by Program					
Program Name	Class	2017 MWh	2021 MWh	2026 MWh	2031 MWh
Direct Load Control	Res	310	1,548	2,426	3,304
Behavioral	Res	12,379	61,845	61,845	61,845
Lighting	Res	11,517	57,541	58,800	60,058
Consumer Electronics	Res	1,292	6,457	6,457	6,457
Audits & Education	Res	1,525	7,619	7,619	7,619
EE Kits	Res	12,020	60,055	75,993	91,931
School Education	Res	1,600	7,994	7,994	7,994
Appliance Turn In	Res	11,448	57,195	85,797	114,398
HVAC	Res	1,928	9,630	19,969	30,309
Smart Thermostat	Res	486	2,430	3,911	5,392
Appliances	Res	1,643	8,208	11,873	15,538
New Homes	Res	1,510	7,545	11,305	15,066
LI - New Homes	LI RES	53	263	263	263
Community Connections	LI RES	2,837	14,175	14,175	14,175
Audits & Education - SCI	COM	2,849	14,232	14,232	14,232
Audits & Education - LCI	IND	2,363	11,805	11,805	11,805
Custom Buildings - SCI	COM	4,312	21,545	32,284	43,022
Appliance Turn In - SCI	COM	233	1,164	1,744	2,325
Lighting - SCI	COM	23,818	118,997	138,767	158,537
Lighting - LCI	IND	11,514	57,523	67,080	76,637
Government Tariff Lighting	GOV	300	1,497	2,258	3,020
HVAC - SCI	COM	1,075	5,371	8,918	12,466
Appliances - SCI	COM	495	2,475	3,651	4,828
Food Service	COM	1,706	8,525	10,101	11,676
Agricultural	COM	120	598	1,088	1,577
Custom - SCI	COM	11,699	58,449	114,139	169,828
Custom - LCI	IND	21,676	108,292	206,062	303,833
HVAC - LCI	IND	2,129	10,639	15,994	21,350
Appliances - LCI	IND	4	21	31	42

As with energy savings, the High Case Scenario yields significantly higher demand savings while the relative rank among programs with respect to demand savings levels does not change from the Base Case.

Table 8-49 High Case Summary of Demand Lifetime Savings by Program – OE

High Case Summary of Measure Demand Lifetime Savings by Program					
Program Name	Class	2017 kW	2021 kW	2026 kW	2031 kW
Direct Load Control	Res	9,058	45,255	45,255	45,255
Behavioral	Res	5,548	27,716	27,716	27,716
Lighting	Res	4,225	21,107	21,634	22,161
Consumer Electronics	Res	865	4,320	4,320	4,320
Audits & Education	Res	879	4,390	4,390	4,390
EE Kits	Res	5,766	28,806	36,424	44,043
School Education	Res	713	3,561	3,561	3,561
Appliance Turn In	Res	8,330	41,616	64,600	87,585
HVAC	Res	1,885	9,416	18,418	27,420
Smart Thermostat	Res	106	528	849	1,170
Appliances	Res	2,415	12,064	18,103	24,142
New Homes	Res	1,333	6,660	9,980	13,300
LI - New Homes	LI RES	26	129	129	129
Community Connections	LI RES	334	1,671	1,671	1,671
Audits & Education - SCI	COM	1,314	6,563	6,563	6,563
Audits & Education - LCI	IND	631	3,153	3,153	3,153
Custom Buildings - SCI	COM	1,685	8,419	12,615	16,811
Appliance Turn In - SCI	COM	142	711	1,065	1,419
Lighting - SCI	COM	6,802	33,985	39,631	45,277
Lighting - LCI	IND	2,171	10,845	12,646	14,448
Government Tariff Lighting	GOV	64	322	485	649
HVAC - SCI	COM	1,753	8,760	15,470	22,180
Appliances - SCI	COM	137	685	1,042	1,399
Food Service	COM	227	1,134	1,888	2,643
Agricultural	COM	22	108	162	216
Custom - SCI	COM	4,914	24,548	48,714	72,880
Custom - LCI	IND	9,739	48,657	95,830	143,002
HVAC - LCI	IND	2,072	10,353	15,516	20,679
Appliances - LCI	IND	1	6	8	11

Table 8-50 High Case Summary of Demand Lifetime Savings by Program – CEI

High Case Summary of Measure Demand Lifetime Savings by Program					
Program Name	Class	2017 kW	2021 kW	2026 kW	2031 kW
Direct Load Control	Res	6,687	33,409	33,409	33,409
Behavioral	Res	3,816	19,063	19,063	19,063
Lighting	Res	3,509	17,531	17,902	18,274
Consumer Electronics	Res	464	2,318	2,318	2,318
Audits & Education	Res	653	3,261	3,261	3,261
EE Kits	Res	4,151	20,738	26,291	31,844
School Education	Res	519	2,595	2,595	2,595
Appliance Turn In	Res	6,702	33,482	52,290	71,097
HVAC	Res	1,344	6,717	13,047	19,377
Smart Thermostat	Res	73	363	584	806
Appliances	Res	1,205	6,021	8,976	11,932
New Homes	Res	1,404	7,012	10,507	14,002
LI - New Homes	LI RES	26	129	129	129
Community Connections	LI RES	347	1,733	1,733	1,733
Audits & Education - SCI	COM	899	4,493	4,493	4,493
Audits & Education - LCI	IND	260	1,301	1,301	1,301
Custom Buildings - SCI	COM	1,130	5,646	8,460	11,274
Appliance Turn In - SCI	COM	97	486	728	970
Lighting - SCI	COM	9,438	47,154	54,988	62,822
Lighting - LCI	IND	2,388	11,929	13,911	15,893
Government Tariff Lighting	GOV	46	230	347	464
HVAC - SCI	COM	1,778	8,882	15,618	22,354
Appliances - SCI	COM	129	646	986	1,325
Food Service	COM	115	573	949	1,325
Agricultural	COM	11	56	84	112
Custom - SCI	COM	3,161	15,793	31,292	46,791
Custom - LCI	IND	4,887	24,416	48,088	71,759
HVAC - LCI	IND	1,061	5,301	7,946	10,590
Appliances - LCI	IND	1	3	4	6



Table 8-51 High Case Summary of Demand Lifetime Savings by Program – TE

High Case Summary of Measure Demand Lifetime Savings by Program					
Program Name	Class	2017 kW	2021 kW	2026 kW	2031 kW
Direct Load Control	Res	2,498	12,479	12,479	12,479
Behavioral	Res	1,413	7,060	7,060	7,060
Lighting	Res	1,218	6,084	6,216	6,348
Consumer Electronics	Res	176	880	880	880
Audits & Education	Res	250	1,248	1,248	1,248
EE Kits	Res	1,607	8,027	10,162	12,297
School Education	Res	200	998	998	998
Appliance Turn In	Res	2,592	12,951	20,226	27,501
HVAC	Res	586	2,928	5,631	8,333
Smart Thermostat	Res	32	159	256	353
Appliances	Res	712	3,556	5,328	7,099
New Homes	Res	407	2,031	3,043	4,055
LI - New Homes	LI RES	26	129	129	129
Community Connections	LI RES	324	1,618	1,618	1,618
Audits & Education - SCI	COM	324	1,620	1,620	1,620
Audits & Education - LCI	IND	270	1,348	1,348	1,348
Custom Buildings - SCI	COM	492	2,459	3,685	4,911
Appliance Turn In - SCI	COM	41	202	303	404
Lighting - SCI	COM	3,502	17,494	20,400	23,307
Lighting - LCI	IND	2,148	10,731	12,514	14,297
Government Tariff Lighting	GOV	19	94	142	190
HVAC - SCI	COM	614	3,068	5,425	7,782
Appliances - SCI	COM	62	308	471	634
Food Service	COM	76	378	630	882
Agricultural	COM	6	31	47	63
Custom - SCI	COM	1,871	9,349	18,503	27,658
Custom - LCI	IND	3,824	19,107	37,630	56,154
HVAC - LCI	IND	836	4,178	6,262	8,346
Appliances - LCI	IND	0	2	3	4

For both CEI and TE, participant and utility costs increased between 30% and 31% over the Base Case, while for OE the same costs increased by 34%. This finding indicates that more customers in the CEI and TE service territories fall into the “likely to participate” category than OE customers.

Table 8-52 High Case Achievable Results and Costs – OE

High Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$11,925,055	\$11,925,055	\$1,813,958	\$1,813,958	NA
Participant Costs	\$45,244,447	\$45,244,447	\$25,321,102	\$25,321,102	\$479,433,256
Utility Costs	\$107,247,859	\$104,791,992	\$38,941,834	\$38,941,834	\$925,657,631
<b>Total Costs (\$)</b>	<b>\$152,492,306</b>	<b>\$150,036,440</b>	<b>\$64,262,936</b>	<b>\$64,262,936</b>	<b>\$1,405,090,887</b>

Table 8-53 High Case Achievable Results and Costs – CEI

High Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$14,710,128	\$14,710,128	\$2,304,712	\$2,304,712	NA
Participant Costs	\$41,134,110	\$41,134,110	\$18,258,477	\$18,258,477	\$388,255,314
Utility Costs	\$80,372,279	\$79,394,694	\$25,659,693	\$25,659,693	\$658,458,330
<b>Total Costs (\$)</b>	<b>\$121,506,389</b>	<b>\$120,528,804</b>	<b>\$43,918,170</b>	<b>\$43,918,170</b>	<b>\$1,046,713,644</b>

Table 8-54 High Case Achievable Results and Costs – TE

High Case Achievable Results and Costs					
YEAR	2017	2021	2026	2031	Total of All Years
New Participants	\$6,930,251	\$6,930,251	\$1,106,856	\$1,106,856	NA
Participant Costs	\$20,430,085	\$20,430,085	\$9,106,827	\$9,106,827	\$193,218,697
Utility Costs	\$41,523,509	\$40,545,925	\$14,442,888	\$14,442,888	\$352,046,428
<b>Total Costs (\$)</b>	<b>\$61,953,594</b>	<b>\$60,976,009</b>	<b>\$23,549,715</b>	<b>\$23,549,715</b>	<b>\$545,265,125</b>

The breakout of the utility costs for the High Case Scenario is shown in the tables below. The increase in program costs reflects the need for higher spending in order to capture the likely participants. The extended marketing campaigns and collateral necessary to reach this customer segment increases program costs.

Table 8-55 High Case Utility Program Costs – OE

High Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$56,572,033	\$54,116,166	\$19,801,270	\$19,801,270
Incentives	\$50,675,826	\$50,675,826	\$19,140,564	\$19,140,564
<b>Total</b>	<b>\$107,247,859</b>	<b>\$104,791,992</b>	<b>\$38,941,834</b>	<b>\$38,941,834</b>

Table 8-56 High Case Utility Program Costs – CEI

High Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$37,485,018	\$36,507,433	\$12,102,699	\$12,102,699
Incentives	\$42,887,262	\$42,887,262	\$13,556,994	\$13,556,994
<b>Total</b>	<b>\$80,372,279</b>	<b>\$79,394,694</b>	<b>\$25,659,693</b>	<b>\$25,659,693</b>

Table 8-57 High Case Utility Program Costs – TE

Higher program costs serve to reduce the cost-effectiveness of all programs across the Companies. This is a consistent finding for each of the three Companies. The Commercial Lighting Program, which also produces significant energy and demand savings, however, remains cost-effective based on the TRC.

High Case Utility Program Costs (\$)				
Utility Program Costs (\$)	2017	2021	2026	2031
Implementation	\$19,594,399	\$18,616,814	\$7,089,869	\$7,089,869
Incentives	\$21,929,111	\$21,929,111	\$7,353,020	\$7,353,020
<b>Total</b>	<b>\$41,523,509</b>	<b>\$40,545,925</b>	<b>\$14,442,888</b>	<b>\$14,442,888</b>

Table 8-58 High Case Summary of Measure Test by Program – OE

Summary of Measure Tests by Program for High Case Year 2026				
Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.80	1.20
Behavioral	Res	0.00	0.86	0.00
Lighting	Res	1.83	1.42	3.00
Consumer Electronics	Res	0.00	1.66	0.00
Audits & Education	Res	0.00	0.64	0.00
EE Kits	Res	2.04	3.73	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	2.40	3.11	42.47
HVAC	Res	2.18	0.70	0.92
Smart Thermostat	Res	1.30	0.88	1.79
Appliances	Res	2.80	3.59	9.45
New Homes	Res	1.82	1.67	4.57
LI - New Homes	LI RES	0.00	0.31	0.00
Community Connections	LI RES	0.00	1.03	0.00
Audits & Education - SCI	COM	0.00	0.75	0.00
Audits & Education - LCI	IND	0.00	2.71	0.00
Custom Buildings - SCI	COM	1.29	1.23	5.89
Appliance Turn In - SCI	COM	2.38	3.07	43.97
Lighting - SCI	COM	2.26	1.90	3.96
Lighting - LCI	IND	2.40	2.68	7.20
Government Tariff Lighting	GOV	3.53	2.70	2.98
HVAC - SCI	COM	3.61	2.23	2.48
Appliances - SCI	COM	2.52	3.09	9.60
Food Service	COM	4.39	4.34	10.34
Agricultural	COM	0.75	0.53	1.60
Custom - SCI	COM	6.77	8.29	35.97
Custom - LCI	IND	2.52	2.92	22.60
HVAC - LCI	IND	3.93	4.02	7.95
Appliances - LCI	IND	4.13	6.95	60.00

Table 8-59 High Case Summary of Measure Test by Program – CEI

Summary of Measure Tests by Program for High Case Year 2026				
Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.80	1.20
Behavioral	Res	0.00	0.79	0.00
Lighting	Res	1.83	1.42	3.00
Consumer Electronics	Res	0.00	1.74	0.00
Audits & Education	Res	0.00	0.64	0.00
EE Kits	Res	2.04	3.73	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	2.42	3.14	42.10
HVAC	Res	2.16	0.70	0.89
Smart Thermostat	Res	1.28	0.86	1.77
Appliances	Res	2.83	3.65	9.92
New Homes	Res	2.21	2.03	5.16
LI - New Homes	LI RES	0.00	0.31	0.00
Community Connections	LI RES	0.00	1.07	0.00
Audits & Education - SCI	COM	0.00	0.73	0.00
Audits & Education - LCI	IND	0.00	2.41	0.00
Custom Buildings - SCI	COM	1.17	1.12	5.35
Appliance Turn In - SCI	COM	2.16	2.78	39.86
Lighting - SCI	COM	2.28	1.94	4.08
Lighting - LCI	IND	2.40	2.68	7.22
Government Tariff Lighting	GOV	3.59	2.35	2.60
HVAC - SCI	COM	3.53	2.27	2.61
Appliances - SCI	COM	2.51	3.21	10.73
Food Service	COM	4.16	4.05	9.50
Agricultural	COM	0.67	0.47	1.42
Custom - SCI	COM	6.66	8.03	33.37
Custom - LCI	IND	2.52	2.92	22.60
HVAC - LCI	IND	3.59	3.69	7.63
Appliances - LCI	IND	4.13	6.94	60.00

Table 8-60 High Case Summary of Measure Test by Program – TE  
**Summary of Measure Tests by Program for High Case  
 Year 2026**

Sub Program Name	Class	Utility Test	TRC Test	Participant Test
Direct Load Control	Res	0.00	0.80	1.20
Behavioral	Res	0.00	0.76	0.00
Lighting	Res	1.83	1.42	3.00
Consumer Electronics	Res	0.00	1.74	0.00
Audits & Education	Res	0.00	0.64	0.00
EE Kits	Res	2.04	3.73	0.00
School Education	Res	0.00	1.05	0.00
Appliance Turn In	Res	2.29	2.93	42.10
HVAC	Res	2.17	0.71	0.92
Smart Thermostat	Res	1.29	0.87	1.78
Appliances	Res	2.86	3.67	9.37
New Homes	Res	1.62	1.49	3.92
LI - New Homes	LI RES	0.00	0.31	0.00
Community Connections	LI RES	0.00	1.00	0.00
Audits & Education - SCI	COM	0.00	0.47	0.00
Audits & Education - LCI	IND	0.00	2.38	0.00
Custom Buildings - SCI	COM	1.18	1.13	5.40
Appliance Turn In - SCI	COM	2.04	2.60	39.86
Lighting - SCI	COM	2.21	1.74	3.51
Lighting - LCI	IND	2.39	2.66	7.20
Government Tariff Lighting	GOV	3.84	1.64	1.85
HVAC - SCI	COM	3.64	2.25	2.52
Appliances - SCI	COM	2.51	3.21	10.69
Food Service	COM	4.33	4.16	9.57
Agricultural	COM	0.72	0.51	1.53
Custom - SCI	COM	6.60	7.89	32.07
Custom - LCI	IND	2.52	2.92	22.60
HVAC - LCI	IND	3.47	3.57	7.46
Appliances - LCI	IND	4.11	6.89	60.00

The cost-effectiveness analysis was based upon program level costs and benefits. The data used for the analysis are shown by program in the following tables.

Table 8-61 High Case Summary of Measure Costs & Benefits – OE

High Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	2,354,437	6,905,225	463,416	6,441,809	7,221,712	1,193,799
	2021		8,210,099	549,828	7,660,271	7,221,712	1,193,799
	2026		363,919	363,919	0	0	0
	2031	547,158	439,541	439,541	0	0	0
Behavioral	2017	0	2,595,555	2,096,536	499,019	3,887,132	0
	2021		3,328,364	2,773,753	554,611	3,887,132	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	1,215,112	16,911,328	14,344,492	2,566,836	4,176,820	1,562,629
	2021		20,125,767	17,032,523	3,093,244	4,176,820	1,562,629
	2026		668,890	574,947	93,943	249,118	189,296
	2031	315,493	803,632	696,923	106,709	249,118	189,296
Consumer Electronics	2017	362,194	2,158,870	1,757,838	401,032	1,199,468	1,086,583
	2021		2,584,779	2,087,216	497,563	1,199,468	1,086,583
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	866,314	685,918	180,396	1,732,981	0
	2021		1,112,996	860,859	252,137	1,732,981	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	11,243,122	9,226,541	2,016,581	5,382,202	4,440,294
	2021		13,611,121	11,006,058	2,605,063	5,382,202	4,440,294
	2026		4,335,089	3,559,987	775,102	1,419,025	1,171,291
	2031	0	5,292,544	4,417,560	874,984	1,419,025	1,171,291
School Education	2017	0	1,469,816	1,220,552	249,264	1,688,087	814,800
	2021		1,777,964	1,455,960	322,005	1,688,087	814,800
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	-679,666	16,422,357	12,592,290	3,830,067	9,927,315	2,038,999
	2021		19,696,944	14,956,052	4,740,892	9,927,315	2,038,999
	2026		12,007,296	9,200,767	2,806,530	4,981,474	1,031,377
	2031	-343,792	14,440,738	11,263,655	3,177,082	4,981,474	1,031,377
HVAC	2017	10,275,170	5,065,719	3,491,173	1,574,546	2,516,273	2,182,406
	2021		5,978,292	4,124,825	1,853,467	2,516,273	2,182,406
	2026		8,141,203	5,848,278	2,292,924	2,546,701	2,329,244
	2031	12,578,986	10,626,860	8,010,097	2,616,762	2,546,701	2,329,244
Smart Thermostat	2017	937,808	826,388	751,296	75,092	702,867	401,918
	2021		980,585	891,290	89,296	702,867	401,918
	2026		730,976	669,562	61,415	429,530	245,616
	2031	573,105	878,659	808,824	69,834	429,530	245,616
Appliances	2017	676,672	3,718,805	2,151,101	1,567,704	1,563,739	1,294,337
	2021		4,435,529	2,557,131	1,878,398	1,563,739	1,294,337
	2026		2,750,977	1,648,620	1,102,357	607,739	549,322
	2031	296,632	3,244,717	1,992,089	1,252,628	607,739	549,322
New Homes	2017	1,741,942	4,213,725	3,026,743	1,186,982	2,447,504	1,402,051
	2021		4,979,519	3,589,669	1,389,850	2,447,504	1,402,051
	2026		2,968,063	2,183,059	785,005	1,223,752	701,026
	2031	870,971	3,507,893	2,612,775	895,119	1,223,752	701,026

High Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	0	7,400,523	6,230,925	1,169,597	11,633,600	4,673,828
	2021		8,759,272	7,389,778	1,369,494	11,633,600	4,673,828
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	3,525,533	9,391,424	7,891,089	1,500,335	9,363,522	2,975,660
	2021		11,115,464	9,358,706	1,756,758	9,363,522	2,975,660
	2026		6,683,741	5,691,502	992,239	4,681,761	1,487,830
	2031	1,762,766	7,943,246	6,811,824	1,131,422	4,681,761	1,487,830
Appliance Turn In - SCI	2017	-13,885	341,316	263,529	77,787	206,768	41,655
	2021		407,644	312,956	94,689	206,768	41,655
	2026		245,524	192,338	53,186	103,384	20,827
	2031	-6,942	295,709	235,450	60,259	103,384	20,827
Lighting - SCI	2017	14,744,792	28,519,053	22,455,520	6,063,533	10,592,324	10,697,261
	2021		33,732,126	26,632,726	7,099,399	10,592,324	10,697,261
	2026		6,743,266	5,406,625	1,336,641	1,765,387	1,782,877
	2031	2,457,465	8,005,345	6,481,191	1,524,154	1,765,387	1,782,877
HVAC - SCI	2017	1,160,478	2,567,244	1,212,903	1,354,341	746,262	667,859
	2021		3,040,124	1,438,893	1,601,231	746,262	667,859
	2026		2,780,225	1,284,997	1,495,228	469,639	429,755
	2031	986,098	3,248,050	1,544,308	1,703,741	469,639	429,755
Appliances - SCI	2017	103,810	512,475	421,636	90,839	179,538	168,374
	2021		609,238	500,584	108,654	179,538	168,374
	2026		370,965	304,793	66,173	90,831	85,455
	2031	52,757	444,138	368,928	75,210	90,831	85,455
Food Service	2017	213,868	1,621,972	1,454,996	166,977	547,697	501,690
	2021		1,929,737	1,731,673	198,064	547,697	501,690
	2026		772,783	620,895	151,888	109,555	100,092
	2031	102,571	921,182	748,341	172,841	109,555	100,092
Agricultural	2017	214,311	184,931	165,694	19,238	286,148	76,632
	2021		219,096	196,571	22,526	286,148	76,632
	2026		195,571	182,849	12,723	250,979	64,184
	2031	194,877	235,236	220,729	14,507	250,979	64,184
Custom - SCI	2017	1,623,062	19,684,778	15,315,727	4,369,051	3,002,808	2,305,672
	2021		23,277,581	18,161,331	5,116,250	3,002,808	2,305,672
	2026		26,992,131	21,281,364	5,710,768	2,709,829	2,015,735
	2031	1,146,927	31,981,919	25,470,141	6,511,778	2,709,829	2,015,735
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	65,569	3,516,933	2,955,083	561,851	1,468,693	480,837
	2021		4,162,558	3,504,681	657,877	1,468,693	480,837
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	2,278,276	8,172,909	6,238,991	1,933,918	2,832,561	2,865,701
	2021		9,663,509	7,399,145	2,264,363	2,832,561	2,865,701
	2026		1,926,266	1,499,947	426,319	472,094	477,617
	2031	379,713	2,281,385	1,795,262	486,123	472,094	477,617
Custom - LCI	2017	3,422,647	36,084,682	27,586,715	8,497,967	18,934,094	6,760,443
	2021		42,686,101	32,723,450	9,962,651	18,934,094	6,760,443
	2026		47,296,808	36,320,601	10,976,208	16,287,611	5,962,607
	2031	2,908,667	56,061,227	43,547,756	12,513,471	16,287,611	5,962,607



Table 8-62 High Case Summary of Measure Costs &amp; Benefits – CEI

High Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	1,738,174	5,091,219	335,523	4,755,696	5,332,174	881,328
	2021		6,053,318	398,086	5,655,232	5,332,174	881,328
	2026		268,665	268,665	0	0	0
	2031	403,942	324,493	324,493	0	0	0
Behavioral	2017	0	1,785,243	1,442,014	343,229	2,911,537	0
	2021		2,289,274	1,907,809	381,466	2,911,537	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	933,550	14,035,465	11,904,993	2,130,472	3,430,779	1,258,006
	2021		16,703,506	14,135,955	2,567,551	3,430,779	1,258,006
	2026		471,210	405,031	66,179	175,495	133,353
	2031	222,254	566,131	490,958	75,173	175,495	133,353
Consumer Electronics	2017	195,365	1,225,588	1,003,406	222,182	646,755	586,096
	2021		1,465,955	1,191,333	274,622	646,755	586,096
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	643,507	509,507	134,000	1,287,275	0
	2021		826,744	639,454	187,290	1,287,275	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	8,088,564	6,636,771	1,451,792	3,867,196	3,190,929
	2021		9,792,258	7,916,801	1,875,456	3,867,196	3,190,929
	2026		3,159,638	2,594,704	564,935	1,034,259	853,698
	2031	0	3,857,482	3,219,748	637,734	1,034,259	853,698
School Education	2017	0	1,071,279	889,602	181,677	1,230,366	593,869
	2021		1,295,873	1,061,179	234,694	1,230,366	593,869
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	-517,681	12,510,970	9,531,370	2,979,600	7,528,606	1,553,043
	2021		15,022,238	11,320,923	3,701,315	7,528,606	1,553,043
	2026		9,180,887	6,966,175	2,214,713	3,781,141	787,746
	2031	-262,582	11,034,872	8,528,156	2,506,715	3,781,141	787,746
HVAC	2017	6,499,579	3,230,694	2,115,598	1,115,096	1,653,225	1,410,872
	2021		3,812,931	2,499,670	1,313,261	1,653,225	1,410,872
	2026		5,134,292	3,526,448	1,607,844	1,620,793	1,467,496
	2031	7,883,431	6,665,810	4,830,941	1,834,869	1,620,793	1,467,496
Smart Thermostat	2017	638,270	554,487	502,792	51,696	478,369	273,544
	2021		657,955	596,481	61,474	478,369	273,544
	2026		490,380	448,100	42,280	292,337	167,166
	2031	390,054	589,374	541,298	48,076	292,337	167,166
Appliances	2017	344,010	1,871,937	1,099,106	772,832	871,123	693,336
	2021		2,234,535	1,307,513	927,022	871,123	693,336
	2026		1,361,643	820,561	541,082	299,480	268,611
	2031	141,003	1,606,062	991,194	614,868	299,480	268,611
New Homes	2017	1,260,646	3,722,297	2,472,627	1,249,669	1,771,262	1,014,666
	2021		4,395,747	2,932,496	1,463,251	1,771,262	1,014,666
	2026		2,609,862	1,783,399	826,462	885,631	507,333
	2031	630,323	3,076,838	2,134,446	942,392	885,631	507,333

High Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	0	4,942,760	4,141,959	800,800	7,961,520	3,198,561
	2021		5,849,963	4,912,298	937,666	7,961,520	3,198,561
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	2,600,722	6,298,350	5,292,152	1,006,198	6,907,302	2,195,091
	2021		7,454,576	6,276,408	1,178,168	6,907,302	2,195,091
	2026		4,482,445	3,817,001	665,444	3,453,651	1,097,546
	2031	1,300,361	5,327,131	4,568,344	758,787	3,453,651	1,097,546
Appliance Turn In - SCI	2017	-10,458	233,108	179,955	53,153	155,788	31,373
	2021		278,409	213,707	64,702	155,788	31,373
	2026		167,684	131,341	36,343	77,894	15,686
	2031	-5,229	201,956	160,781	41,176	77,894	15,686
Lighting - SCI	2017	19,794,550	39,440,201	31,024,932	8,415,268	14,423,277	14,747,692
	2021		46,648,430	36,795,678	9,852,752	14,423,277	14,747,692
	2026		9,324,045	7,469,007	1,855,038	2,403,880	2,457,949
	2031	3,299,092	11,067,828	8,952,547	2,115,282	2,403,880	2,457,949
HVAC - SCI	2017	1,140,205	2,649,220	1,279,468	1,369,752	759,548	691,512
	2021		3,137,424	1,517,784	1,619,640	759,548	691,512
	2026		2,819,995	1,334,456	1,485,539	486,279	447,295
	2031	968,791	3,297,099	1,604,618	1,692,481	486,279	447,295
Appliances - SCI	2017	87,828	479,213	393,162	86,051	170,086	160,031
	2021		569,623	466,732	102,891	170,086	160,031
	2026		351,647	288,921	62,726	86,412	81,507
	2031	44,713	421,037	349,748	71,290	86,412	81,507
Food Service	2017	132,952	1,012,348	928,484	83,864	371,483	340,225
	2021		1,205,099	1,105,574	99,525	371,483	340,225
	2026		387,396	312,149	75,247	58,037	52,944
	2031	56,022	461,975	376,355	85,621	58,037	52,944
Agricultural	2017	186,164	132,615	122,625	9,991	240,696	61,874
	2021		157,187	145,489	11,698	240,696	61,874
	2026		155,794	149,187	6,607	223,828	55,744
	2031	177,205	187,898	180,364	7,534	223,828	55,744
Custom - SCI	2017	1,163,866	12,751,687	9,938,098	2,813,590	1,988,266	1,541,448
	2021		15,078,887	11,784,305	3,294,582	1,988,266	1,541,448
	2026		17,374,511	13,710,163	3,664,348	1,766,621	1,322,320
	2031	796,351	20,586,510	16,408,166	4,178,345	1,766,621	1,322,320
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	30,524	1,451,637	1,219,729	231,907	683,720	223,844
	2021		1,718,122	1,446,579	271,543	683,720	223,844
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	2,496,461	8,985,825	6,858,515	2,127,310	3,114,428	3,149,778
	2021		10,624,673	8,133,872	2,490,802	3,114,428	3,149,778
	2026		2,117,833	1,648,881	468,951	519,071	524,963
	2031	416,077	2,508,242	1,973,506	534,736	519,071	524,963
Custom - LCI	2017	1,717,500	18,107,459	13,843,140	4,264,319	9,501,215	3,392,421
	2021		21,420,081	16,420,778	4,999,304	9,501,215	3,392,421
	2026		23,733,756	18,225,844	5,507,911	8,173,198	2,992,064
	2031	1,459,582	28,131,781	21,852,464	6,279,317	8,173,198	2,992,064

Table 8-63 High Case Summary of Measure Costs &amp; Benefits – TE

High Case Summary of Measure Costs and Benefits by Class and Program							
RESIDENTIAL PROGRAMS	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
Direct Load Control	2017	649,262	1,911,003	134,601	1,776,401	2,036,799	329,204
	2021		2,272,106	159,700	2,112,406	2,036,799	329,204
	2026		100,355	100,355	0	0	0
	2031	150,885	121,208	121,208	0	0	0
Behavioral	2017	0	661,145	534,034	127,111	1,122,086	0
	2021		847,808	706,536	141,272	1,122,086	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting	2017	327,411	4,871,206	4,131,802	739,404	1,192,327	438,378
	2021		5,797,176	4,906,086	891,090	1,192,327	438,378
	2026		167,359	143,854	23,505	62,330	47,363
	2031	78,938	201,072	174,373	26,699	62,330	47,363
Consumer Electronics	2017	74,284	471,934	386,884	85,050	249,730	222,852
	2021		564,360	459,335	105,025	249,730	222,852
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Audits & Education	2017	0	246,200	194,933	51,267	492,501	0
	2021		316,305	244,650	71,656	492,501	0
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
EE Kits	2017	0	3,131,942	2,570,009	561,933	1,498,409	1,236,274
	2021		3,791,602	3,065,684	725,917	1,498,409	1,236,274
	2026		1,215,005	997,765	217,240	397,713	328,280
	2031	0	1,483,353	1,238,119	245,234	397,713	328,280
School Education	2017	0	411,949	342,087	69,862	473,124	228,366
	2021		498,314	408,065	90,249	473,124	228,366
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Appliance Turn In	2017	-200,246	4,839,411	3,686,861	1,152,551	3,098,906	600,738
	2021		5,810,804	4,379,083	1,431,720	3,098,906	600,738
	2026		3,551,291	2,694,609	856,682	1,555,966	304,711
	2031	-101,570	4,268,437	3,298,804	969,633	1,555,966	304,711
HVAC	2017	3,018,359	1,510,764	1,030,001	480,764	766,988	658,200
	2021		1,783,706	1,217,078	566,629	766,988	658,200
	2026		2,395,276	1,710,675	684,601	751,085	683,659
	2031	3,655,509	3,119,177	2,337,934	781,243	751,085	683,659
Smart Thermostat	2017	281,331	246,123	223,464	22,659	210,851	120,570
	2021		292,049	265,104	26,944	210,851	120,570
	2026		217,687	199,155	18,532	128,854	73,682
	2031	171,924	261,649	240,577	21,072	128,854	73,682
Appliances	2017	184,984	1,045,043	583,750	461,293	435,029	358,709
	2021		1,246,809	694,019	552,790	435,029	358,709
	2026		763,856	441,418	322,439	164,790	149,483
	2031	80,209	899,831	533,456	366,375	164,790	149,483
New Homes	2017	542,105	1,169,224	807,286	361,938	761,682	436,329
	2021		1,381,226	957,429	423,797	761,682	436,329
	2026		821,627	582,261	239,366	380,841	218,164
	2031	271,053	969,816	696,874	272,942	380,841	218,164

High Case Summary of Measure Costs and Benefits by Class and Program							
	Year	Participant Costs	Program Benefits	Avoided Energy Costs	Avoided Capacity Costs	Total Utility Budget Costs	Incentive Costs
<b>COMMERCIAL PROGRAMS</b>							
Audits & Education - SCI	2017	0	1,811,540	1,522,861	288,679	4,596,768	1,846,763
	2021		2,144,106	1,806,089	338,018	4,596,768	1,846,763
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Custom Buildings - SCI	2017	1,122,546	2,743,659	2,305,344	438,316	2,981,388	947,464
	2021		3,247,329	2,734,101	513,228	2,981,388	947,464
	2026		1,952,623	1,662,745	289,878	1,490,694	473,732
	2031	561,273	2,320,581	1,990,042	330,539	1,490,694	473,732
Appliance Turn In - SCI	2017	-4,383	97,571	75,417	22,154	69,533	13,150
	2021		116,530	89,563	26,967	69,533	13,150
	2026		70,191	55,044	15,147	34,767	6,575
	2031	-2,192	84,543	67,382	17,162	34,767	6,575
Lighting - SCI	2017	8,898,383	15,149,202	12,028,069	3,121,133	5,778,750	5,787,933
	2021		17,920,228	14,265,889	3,654,339	5,778,750	5,787,933
	2026		3,585,288	2,897,268	688,021	963,125	964,655
	2031	1,483,064	4,259,189	3,474,648	784,541	963,125	964,655
HVAC - SCI	2017	405,953	904,053	429,044	475,009	260,533	233,239
	2021		1,070,531	508,982	561,549	260,533	233,239
	2026		982,397	457,028	525,370	164,538	150,552
	2031	345,480	1,147,846	549,208	598,638	164,538	150,552
Appliances - SCI	2017	42,172	227,939	186,774	41,166	81,350	76,488
	2021		270,926	221,716	49,211	81,350	76,488
	2026		168,500	138,385	30,115	41,414	39,027
	2031	21,493	201,742	167,515	34,227	41,414	39,027
Food Service	2017	75,136	524,213	468,460	55,753	177,340	162,500
	2021		623,649	557,523	66,126	177,340	162,500
	2026		253,612	202,965	50,647	36,481	33,381
	2031	36,191	302,274	244,642	57,632	36,481	33,381
Agricultural	2017	72,458	58,755	53,155	5,600	95,687	25,278
	2021		69,619	63,062	6,558	95,687	25,278
	2026		64,227	60,523	3,704	85,637	21,699
	2031	66,953	77,321	73,098	4,223	85,637	21,699
Custom - SCI	2017	728,590	7,578,122	5,912,111	1,666,010	1,196,669	932,723
	2021		8,961,111	7,010,330	1,950,782	1,196,669	932,723
	2026		10,284,228	8,119,514	2,164,713	1,053,581	791,429
	2031	490,659	12,185,588	9,717,227	2,468,361	1,053,581	791,429
<b>INDUSTRIAL PROGRAMS</b>							
Audits & Education - LCI	2017	31,952	1,503,337	1,263,171	240,167	715,695	234,312
	2021		1,779,314	1,498,100	281,214	715,695	234,312
	2026		0	0	0	0	0
	2031	0	0	0	0	0	0
Lighting - LCI	2017	2,246,256	8,061,360	6,148,167	1,913,192	2,823,746	2,823,694
	2021		9,531,636	7,291,510	2,240,126	2,823,746	2,823,694
	2026		1,899,899	1,478,146	421,754	470,624	470,616
	2031	374,376	2,250,092	1,769,176	480,916	470,624	470,616
Custom - LCI	2017	1,344,003	14,169,710	10,832,734	3,336,976	7,435,028	2,654,687
	2021		16,761,951	12,849,824	3,912,127	7,435,028	2,654,687
	2026		18,572,481	14,262,351	4,310,130	6,395,809	2,341,393
	2031	1,142,173	22,014,087	17,100,305	4,913,782	6,395,809	2,341,393

## 9.0 CONCLUSIONS

Based on the analyses as set forth in this Market Study, and assuming there are no significant changes to the facts underlying the assumptions and parameters as described herein, Harbourfront concludes:

1. The *Base Case Energy Efficiency* estimate of achievable potential for energy efficiency-related reductions are 26.4% for Ohio Edison; 23.7% for CEI; and 21.9% for Toledo Edison by 2031.
2. The *Base Case Peak Demand Reduction* estimate of achievable potential peak related reductions are 14.4% for Ohio Edison; 13.7% for CEI; and 13.1% for Toledo Edison by 2031.
3. The *High Case Energy Efficiency* estimate of achievable potential for energy efficiency-related reductions are 33.0% for Ohio Edison; 28.8% for CEI; and 26.6% for Toledo Edison by 2031.
4. The *High Case Peak Demand Reduction* estimate of achievable potential peak related reductions are 17.2% for Ohio Edison; 16.2% for CEI; and 15.3% for Toledo Edison by 2031.
5. There is sufficient achievable and economic energy efficiency and peak demand reduction market potential to provide the Companies with the opportunity to achieve their energy efficiency and peak demand reduction goals during the period the Proposed Plans are in effect.

## 10.0 APPENDICES

## APPENDIX A: COMMERCIAL ENERGY USE DATA TABLES

### 2015 Estimates of Commercial Sales (MWh)

Commercial Building Types (CBECS):	FirstEnergy Ohio 2015 Estimated Energy Consumption (MWh)										
	Space Heating	Cooling	Ventilation	Water Heat	Lighting	Cooking	Refrigeration	Other Office Equipment	Computers	Misc / Other	Total
Education	49,970	249,850	279,520	37,478	381,022	6,246	54,655	14,054	107,748	70,270	1,250,813
Food Sales	18,693	37,545	21,888	6,231	143,791	6,231	371,939	6,231	6,231	31,314	650,095
Food Service	32,729	91,688	78,457	32,729	140,666	42,478	229,105	6,499	6,499	49,210	710,063
Health Care	29,692	169,140	209,437	10,074	522,797	4,772	39,766	20,148	49,841	179,214	1,234,882
Inpatient	14,238	117,846	179,041	9,391	358,386	4,847	18,783	9,391	33,021	94,216	839,161
Outpatient	17,273	51,591	22,955	3,864	160,455	2,045	22,955	11,364	17,273	85,909	395,683
Lodging	70,628	120,440	70,628	60,220	623,760	10,408	60,220	14,869	30,482	120,440	1,182,096
Mercantile	196,632	370,130	231,332	128,678	1,045,329	7,229	166,270	27,471	37,591	277,598	2,488,260
Retail (Other Than Mall)	21,516	90,229	57,608	6,941	401,867	-	79,818	11,105	14,575	79,818	763,478
Enclosed and Strip Malls	155,586	251,042	152,580	107,482	588,521	6,013	80,424	15,032	24,052	182,644	1,563,377
Office	170,993	521,123	323,666	36,641	1,453,444	6,107	181,172	164,887	380,664	468,196	3,706,893
Public Assembly	20,177	141,240	254,231	6,470	108,956	-	36,319	1,617	12,106	92,815	673,931
Public order and safety	15,436	47,042	29,218	3,308	131,204	551	16,355	14,884	34,363	42,264	334,624
Religious Worship	9,886	36,054	16,283	2,326	55,826	-	19,772	1,163	3,489	59,315	204,113
Service	22,440	55,813	89,186	-	233,610	-	33,373	3,452	10,932	103,571	552,378
Warehouse and Storage	32,000	81,599	126,398	11,200	830,387	-	227,196	12,800	32,000	183,997	1,537,576
Other	9,311	74,488	51,084	-	305,500	-	46,555	6,291	23,152	102,420	618,800
Vacant	4,336	11,057	17,128	1,518	112,524	-	30,787	1,734	4,336	24,933	208,354
Total	665,213	1,978,649	1,769,872	325,798	6,029,919	84,928	1,509,426	295,375	740,923	1,791,335	15,191,438

### EIA Estimates of Energy Use Intensities (EUIs)

Commercial Building Types (CBECS):	EUIs (kWh/FT2)										Avg Bldg EUI (kWh/FT2) Across all End Uses:
	Space Heating	Cooling	Ventilation	Water Heat	Lighting	Cooking	Refrigeration	Other Office Equipment	Computers	Misc / Other	
Education	0.32	1.60	1.79	0.24	2.44	0.04	0.35	0.09	0.69	0.45	8.00
Food Sales	1.17	2.35	1.37	0.39	9.00	0.39	23.28	0.39	0.39	1.96	40.68
Food Service	1.41	3.95	3.38	1.41	6.06	1.83	9.87	0.28	0.28	2.12	30.60
Health Care	0.56	3.19	3.95	0.19	9.86	0.09	0.75	0.38	0.94	3.38	23.30
Inpatient	0.47	3.89	5.91	0.31	11.83	0.16	0.62	0.31	1.09	3.11	27.70
Outpatient	0.76	2.27	1.01	0.17	7.06	0.09	1.01	0.50	0.76	3.78	17.40
Lodging	0.95	1.62	0.95	0.81	8.39	0.14	0.81	0.20	0.41	1.62	15.90
Mercantile	1.36	2.56	1.60	0.89	7.23	0.05	1.15	0.19	0.26	1.92	17.20
Retail (Other Than Mall)	0.31	1.30	0.83	0.10	5.79	-	1.15	0.16	0.21	1.15	11.00
Enclosed and Strip Malls	2.07	3.34	2.03	1.43	7.83	0.08	1.07	0.20	0.32	2.43	20.80
Office	0.84	2.56	1.59	0.18	7.14	0.03	0.89	0.81	1.87	2.30	18.20
Public Assembly	0.28	1.99	3.58	0.09	1.54	-	0.51	0.02	0.17	1.31	9.50
Public order and safety	0.84	2.56	1.59	0.18	7.14	0.03	0.89	0.81	1.87	2.30	18.20
Religious Worship	0.17	0.62	0.28	0.04	0.96	-	0.34	0.02	0.06	1.02	3.50
Service	0.39	0.97	1.55	-	4.06	-	0.58	0.06	0.19	1.80	9.60
Warehouse and Storage	0.20	0.51	0.79	0.07	5.19	-	1.42	0.08	0.20	1.15	9.60
Other	0.37	2.96	2.03	-	12.14	-	1.85	0.25	0.92	4.07	24.60
Vacant	0.20	0.51	0.79	0.07	5.19	-	1.42	0.08	0.20	1.15	9.60

## **APPENDIX B: LARGE MANAGED ACCOUNTS CUSTOMERS**

Large Managed Accounts Customer Characteristics



	Large Commercial & Industrial Customer Characteristics (>700kW)	Chemical & Allied Prod	Education	Electronic Mfg.	Entertainment	Food and Kindred Products	Health	Mining & Oil Gas Extract	Paper Mills & Products	Primary Metals & Hvy Mfg.	Professional	Refining & Plastics	Retail - Large	Transport Mfg.
1	These customers may have a dedicated energy manager.	√	√			√	√			√		√	√	√
2	These customers may not have the luxury of having a dedicated energy manager and such duties are the responsibility of the facilities or plant manager. In these cases opportunities for energy efficiency improvements are not the primary focus of these individuals.	√	√	√	√	√		√	√	√	√	√	√	
3	The customers need to have easy and timely access to their energy demand and consumption data in order to better understand the costs associated with various production runs and the timing and use of electrical equipment.	√	√	√	√	√	√	√	√	√	√	√	√	√
4	Large C&I account representatives have frequent contact with all managed accounts and some customers have sought out and implemented some energy efficiency measures in the past.	√	√	√	√	√	√	√	√	√	√	√	√	√
5	These customers may be in operation 24 hours per day, 5 to 7 days a week.	√		√	√	√	√	√	√	√		√		√
6	These customers are in operation more than 10 hours per day, 5 - 6 days a week.		√		√						√		√	
7	While these customers have implemented some energy efficiency measures in the past, they would benefit from having an energy audit or survey of their facilities.	√	√	√	√	√	√	√	√	√	√	√	√	√
8	Typically a financial payback of ~ 1 year is necessary in order to get the interest of the customer.	√		√	√		√	√	√	√	√	√	√	√
9	Typically a financial payback of 2 to 4 years is necessary in order to get the interest of the customer.		√				√							

	Large Commercial & Industrial Customer Characteristics (>700kW)	Chemical & Allied Prod	Education	Electronic Mfg.	Entertainment	Food and Kindred Products	Health	Mining & Oil Gas Extract	Paper Mills & Products	Primary Metals & Hvy Mfg.	Professional	Refining & Plastics	Retail - Large	Transport Mfg.
10	Typically customers need to be further educated in potential energy saving opportunities and measures	√	√	√	√	√	√	√	√	√	√	√	√	√
11	Typical barriers to investing in energy efficiency improvements are first costs, adequate payback, lack of capital and today's uncertainty regarding general economic conditions.	√	√	√	√	√	√	√	√	√	√	√	√	√
12	Potential leverage points to help encourage the customer's decision to investigate and implement energy efficiency measures include education, energy audits, cost savings (payback), cash incentives, low interest loans, and environmental benefits.	√	√	√	√	√	√	√	√	√	√	√	√	√
13	Major energy efficiency improvement opportunities include interior and exterior lighting improvements.	√	√	√	√	√	√	√	√	√	√	√	√	√
14	Major energy efficiency improvement opportunities include motor improvements.	√	√	√	√	√	√	√	√	√	√	√	√	√
15	Major energy efficiency improvement opportunities include HVAC improvements.		√	√	√	√	√			√		√		
16	Major energy efficiency improvement opportunities include a demand / energy management system.	√	√	√	√	√	√	√	√	√	√	√	√	√

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Summary: Application electronically filed by Ms. Carrie M Dunn on behalf of The Toledo Edison Company and The Cleveland Electric Illuminating Company and Ohio Edison Company